Pak-Austria Fachhochschule: Institute of Applied Sciences & Technology, Haripur

KHYBER PAKHTUNKHWA

Tender Document

"Supply, Installation & Commissioning of Labs Equipment for Sino-Pak Center for Artificial Intelligence (SPCAI)"

Submission of Bids: Monday, April 25, 2022 @ 12:00 noon

Bid Opening: Monday, April 25, 2022 @ 12:30 PM

Contents

Section 1. Letter of Invitation

The Pak-Austria Fachhochschule: Institute of Applied Sciences & Technology (PAF- IAST), Haripur invites sealed bids from interested firms for the "**Supply, Installation & Commissioning of Labs Equipment for Sino-Pak Center for Artificial Intelligence (SPCAI)"** under the following Lots.

Lot. 1: Customized Multicopters for Field Robotics Lab
Lot. 2: Field Robotics Lab and Support Equipment
Lot. 3: Embedded Systems and IoT Lab
Lot. 4: Computers for AI Computer Lab
Lot. 5: Furniture for AI Computer Lab

The bidder must be registered and duly recognized in Pakistan and be registered with FBR; possess Manufacturer's status or Distributor/ Dealer status with authorization from Manufacturer/ Principal specific for this tender, with sufficient financial, technical and human resources to take up the task assigned and complete the same within prescribed time limit on the finalization of contract with PAF- IAST.

Tender document containing instructions to bidders covering definitions, introduction/ background of the Project, scope of work, general terms and conditions, and special terms, procedure for submission of bids, opening of bid, evaluation criteria, and other related information, can be obtained against a written request on company's letterhead, from Pak-Austria Fachhochschule: Institute of Applied Sciences & Technology, Haripur – Pakistan. Cost of the document is Rs. 500/- Non-refundable (Stationery charges) for each LOT separately. Tender document can also be downloaded from http://www.paf-iast.edu.pk/ free of cost, however, the Bid should also be submitted along with Pay Order/ Demand Draft of Rs. 500/- (Stationery Charges). No bid will be accepted without Tender Document fee.

Bidder(s) interested in participating in the tender process are advised to submit their Bid Proposal(s), along with the Earnest Money amounting 2% of their Bid Value in the shape of CDR, in accordance with the instructions in this tender document. Bid Proposal(s) must reach PAF-IAST, Haripur on Monday the April 25, 2022 by 1200 hrs. Any late Bid(s) shall not be accepted and returned unopened. Accepted Bids will be opened on the same day at 1230 hrs, in presence of bidders who chose to attend. In case of sudden holiday on bid opening day, bids will be opened on next working day. The Tender shall be executed in accordance with PPRA Rule 36(b) "Single Stage, Two Envelope Procedure".

This advertisement is also available on PAF: IAST and PPRA websites http://www.paf-iast.edu.pk/ & http://www.ppra.gov.pk .

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Section 2. Instruction to Bidders (ITB)

A. GENERAL TERMS	
1. Introduction	1.1 Bidders shall adhere to all the requirements of this ITB, including any amendments made in writing by PAF-IAST. This ITB will be governed under Clause 36(b) "Single Stage, Two Envelope Procedure" of Public Procurement Regulatory Authority. 1.2 Any Bid submitted will be regarded as an offer by the Bidder and does not constitute or imply the acceptance of the Bid by PAF-IAST. The Institute is under no obligation to award a contract to any Bidder as a result of this ITB. 1.3 PAF-IAST reserves the right to cancel the procurement process at any stage without any liability of any kind for PAF-IAST, upon notice to the bidders or publication of cancellation notice on PAF- IAST website.
2. Fraud & Corruption, Gifts and Hospitality	2.1 PAF-IAST strictly enforces a policy of zero tolerance on proscribed practices, including fraud, corruption, collusion, unethical or unprofessional practices, and obstruction of PAF-IAST vendors and requires all bidders/ vendors observe the highest standard of ethics during the procurement process and contract implementation. 2.2 Bidders/ vendors shall not offer gifts or hospitality of any kind to PAF-IAST staff members including recreational trips to sporting or cultural events, theme parks or offers of holidays, transportation, or invitations to extravagant lunches or dinners. 2.3 In pursuance of this policy, PAF-IAST: (a) Shall reject a bid if it determines that the selected bidder has engaged in any corrupt or fraudulent practices in competing for the contract in question; (b) Shall declare a vendor ineligible, either indefinitely or for a stated period, to be awarded a contract if at any time it determines that the vendor has engaged in any corrupt or fraudulent practices in competing for, or in executing a PAF- IAST contract; or counseling or canvassing staff or elected representatives; or engaging in collusion with other bidders.
3. Eligibility	3.1 A Bidder should not be suspended, debarred, or otherwise identified as ineligible by any Government/ Semi-government/ or any other international Organization. Bidders are therefore required to disclose to PAF-IAST whether they are subject to any sanction or temporary suspension imposed by these organizations. 3.2 It is the Bidder's responsibility to ensure that its employees, sub-contractors, service providers, suppliers and/ or their employees meet the eligibility requirements as established by PAF-IAST.
4. General Terms	4.1 The Bidder should be registered with Sales Tax and Income Tax Department. 4.2 The Bidder should have not been blacklisted by any Government/ semi Government organization. 4.3 There should be no litigation against the bidder/ firm.
B. PREPARATION OF BIDS	

5. General Considerations	5.1 In preparing the Bid, the Bidder is expected to examine the ITB in detail. Material deficiencies in providing the information requested in the ITB may result in rejection of the Bid. 5.2 The Bidder will not be permitted to take advantage of any errors or omissions in the ITB. Should such errors or omissions be discovered, the Bidder must notify the Project Director, SPCAI accordingly.
6. Cost of Preparation of Bid	6.1 The Bidder shall bear all costs related to the preparation and/ or submission of the Bid, regardless of whether its Bid is selected or not. PAF-IAST shall not be responsible or liable for those costs, regardless of the conduct or outcome of the procurement process.
7. Language	7.1 The Bid, as well as any, and all related correspondence exchanged by the Bidder and PAF- IAST, shall be written in the language(s) specified in the BDS.
8. Documents Comprising the Bid	8.1 The Bid shall comprise of the following documents and related forms of which details are provided in the BDS. All pages of the Bid shall be signed, stamped and properly paginated. a) Returnable Forms as referred in Section 6 shall be properly filled in Ink or Typed. Forms filled in using a pencil shall not be considered and substantiate the annulment of the Bid Proposal. b) Documents Establishing the Eligibility and Qualifications of the Bidder; c) Bid covering Technical Specifications in detail, and covering Price Schedule; d) Bid Security, if required by BDS; e) Any attachments and/ or appendices to the Bid.
9.Documents Establishing the Eligibility and Qualifications	9.1 The Bidder shall furnish documentary evidence of its status as an eligible and qualified supplier, using the Forms provided under Section 6 and providing documents required in those forms. In order to award a contract to a Bidder, its qualifications must be documented to PAF-IAST's satisfaction.
10. Technical Bid Format and Content	10.1 The Bidder is required to submit a Bid using the Standard Forms and templates provided in Section 6 of the ITB. 10.2 Samples of items, when required as per Section 5, shall be provided within the time specified and unless otherwise specified by the Purchaser, at no expense to the Institute. If not destroyed by testing, samples will be returned at Bidder's request and expense, unless otherwise specified. 10.3 When applicable and required in Section 5, the Bidder shall describe the necessary training program available for the maintenance and operation of the equipment offered as well as the cost to the Institute. Unless otherwise specified, such training as well as training materials shall be provided in the language of the Bid as specified in the BDS. 10.4 When applicable and required in Section 5, the Bidder shall certify the availability of spare parts for a period of at least five (5) years from date of delivery, or as otherwise specified in this ITB.
11. Price Schedule	11.1 The Price Schedule shall be prepared using the Forms provided in Section 6 of the ITB and taking into consideration the requirements in the ITB. 11.2 Any requirement described in this ITB but not priced in the Price Schedule, shall be assumed to have been included in the prices of other activities or items, as well as in the final total price.
12. Bid Security	12.1 A Bid Security shall be provided in the amount and form indicated in the BDS. The Bid Security shall be valid for the duration as referred in BDS.

	12.2	The Bid Security shall be included along with the Bid. If Bid Security not found in the Bid, the Bid shall be rejected.
	12.3	If the Bid Security amount or its validity period is found to be less than what is required, PAF-IAST shall reject the Bid.
	12.4	In the event an electronic submission is allowed in the BDS, Bidders shall include a copy of the Bid Security in their bid and the original of the Bid Security must be sent via courier or hand delivery as per the instructions in BDS.
	12.5	The Bid Security will be forfeited by PAF-IAST, and the Bid rejected, in the event of any, or combination, of the following conditions: a) If the Bidder withdraws its offer during the period of the Bid Validity specified in the BDS, or; b) In the event the successful Bidder fails: i. to sign the Contract after PAF-IAST has issued an award; or ii. to furnish the Performance Security, insurances, or other documents that PAF-IAST may require as a condition precedent to the effectivity of the contract that may be awarded to the Bidder.
13. Currencies	13.1	All prices shall be quoted in the currency indicated in the BDS. Where prices are quoted in different currencies, for the purposes of comparison: a) PAF-IAST will convert the currency quoted into the currency indicated in BDS, in accordance with the prevailing Inter Bank rate of exchange on the last day of submission of Bids; and b) In the event that PAF-IAST selects a Bid for award that is quoted in a currency different from the preferred currency in the BDS, PAF-IAST shall reserve the right to award the contract in the currency of PAF-IAST's preference, using the conversion method specified above.
14. Joint Venture, Consortium or Association	14.1	If the Bidder is a group of legal entities that will form or have formed a Joint Venture (JV), Consortium or Association for the Bid, they shall confirm in their Bid that : (i) they have designated one party to act as a lead entity, duly vested with authority to legally bind the members of the JV, Consortium or Association jointly and severally, which shall be evidenced by an intent letter or an Agreement among the legal entities duly notarized, and submitted with the Bid; and (ii) if they are awarded the contract, the contract shall be entered into, by and between PAF-IAST and the designated lead entity, who shall be acting for and on behalf of all the member entities comprising the joint venture.
	14.2	After the Deadline for Submission of Bid, the lead entity identified to represent the JV, Consortium or Association or any change in the constitution of the JV, Consortium or Association shall not be altered without the prior written consent of PAF-IAST/ Procurement Committee.
	14.3	The lead entity and the member entities of the JV, Consortium or Association shall abide by the provisions of Clause 15 herein in respect of submitting only one Bid.
	14.4	The description of the organization of the JV, Consortium or Association must clearly define the expected role of each of the entities in the joint venture in delivering the requirements of the ITB, both in the Bid and the JV, Consortium or Association Agreement or Intent Letter. All entities that comprise the JV, Consortium or Association shall be cumulatively subject to the eligibility and

	technical qualification assessment by PAF-IAST as defined in Section 4: Evaluation Criteria. 14.5 A JV, Consortium or Association in presenting its track record and experience should clearly differentiate between: a) Those that were undertaken together by the JV, Consortium or Association; and b) Those that were undertaken by the individual entities of the JV, Consortium or Association. 14.6 Previous contracts completed by individual experts working privately but who are permanently or were temporarily associated with any of the member firms cannot be claimed as the experience of the JV, Consortium or Association or those of its members, but should only be claimed by the individual experts themselves in their presentation of their individual credentials.
15. Only One Bid	15.1 The Bidder (including the individual members of any Joint Venture) shall submit only one Bid, either in its own name or as part of a Joint Venture. 15.2 Bids submitted by two (2) or more Bidders shall all be rejected if they are found to have any of the following: a) they have at least one controlling partner, director or shareholder in common; or b) any one of them receive or have received any direct or indirect subsidy from the other/s; or c) they have the same legal representative for purposes of this ITB; or d) they are subcontractors to each other's Bid, or a subcontractor to one Bid also submits another Bid under its name as lead Bidder; or some key personnel proposed to be in the team of one Bidder participates in more than one Bid received for this ITB process. This condition relating to the personnel, does not apply to subcontractors being included in more than one Bid.
16. Bid Validity Period	16.1 Bids shall remain valid for the period specified in the BDS, commencing on the Deadline for Submission of Bids. A Bid valid for a shorter period may be rejected by PAF-IAST and rendered non-responsive. 16.2 During the Bid validity period, the Bidder shall maintain its original Bid without any change, including the availability of the Key Personnel.
17. Extension of Bid Validity Period	17.1 In exceptional circumstances, prior to the expiration of the Bid validity period, PAF-IAST may request Bidders to extend the period of validity of their Bids. The request and the responses shall be made in writing and shall be considered integral to the Bid. 17.2 If the Bidder agrees to extend the validity of its Bid, it shall be done without any change to the original Bid. 17.3 The Bidder has the right to refuse to extend the validity of its Bid, in which case, the Bid shall not be further evaluated.

18. Clarification on ITB (from the Bidders)	18.1	Bidders may request clarifications on any of the ITB documents no later than the date indicated in the BDS. Any request for clarification must be sent in writing in the manner indicated in the BDS. If inquiries are sent other than specified channel, even if they are sent to a PAF-IAST staff member, PAF-IAST shall have no obligation to respond or confirm that the query was officially received.
	18.2	PAF-IAST will provide the responses to clarifications through the method specified in the BDS.
	18.3	PAF-IAST shall endeavor to provide responses to clarifications in an expeditious manner, but any delay in such response shall not cause an obligation on the part of PAF-IAST to extend the submission date of the Bids, unless PAF-IAST deems that such an extension is justified and necessary.
19. Amendment in ITB	19.1	At any time prior to the deadline of Bid submission, PAF-IAST may for any reason, such as in response to a clarification requested by a Bidder, modify the ITB in the form of an amendment to the ITB. Amendments will be made available to all prospective bidders.
	19.2	If the amendment is substantial, PAF-IAST may extend the Deadline for submission of Bid to give the Bidders reasonable time to incorporate the amendment into their Bids.
20. Alternative Bids	20.1	Unless otherwise specified in the BDS, alternative Bids shall not be considered. If submission of alternative Bid is allowed by BDS, a Bidder may submit an alternative Bid, but only if it also submits a Bid conforming to the ITB requirements. Where the conditions for its acceptance are met, or justifications are clearly established, PAF-IAST reserves the right to award a contract based on an alternative Bid.
	20.2	If multiple/ alternative bids are being submitted, they must be clearly marked as "Main Bid" and "Alternative Bid"
21. Pre-Bid Conference	21.1	When appropriate, a pre-bid conference may be conducted at the date, time and location specified in the BDS. All Bidders are encouraged to attend. Nonattendance, however, shall not result in disqualification of an interested Bidder. Minutes of the Bidder's conference will be disseminated on the procurement website and/ or shared by email as specified in the BDS. No verbal statement made during the conference shall modify the terms and conditions of the ITB, unless specifically incorporated in the Minutes of the Bidder's Conference or issued/ posted as an amendment to ITB.
C. SUBMISSION AND OPENING OF BIDS		
22. Bid Proposal Submission	22.1	The Bidder shall submit a duly signed and numbered all pages of the complete Bid in an Envelope sealed and marked as per ITB 22.6, and in accordance with **PPRA Rule 36(b)**.
	22.2	The Outer Envelope should contain Two (02) separate sealed envelopes, one of which comprising the **Forms (A – F) and supporting documents** in accordance with requirements in the BDS, shall be marked as **"Technical Proposal"**. Whereas, the other envelope containing the **Form G: Price Schedule Form** shall be marked as **"Financial Proposal"**.
	22.3	The Bid Security as referred in BDS must be placed in the **"Financial Proposal"** but in duly sealed envelope and marked as "Bid Security". However, an Affidavit

	stating that the Bid Security (without indicating the amount) has been placed in the Financial Proposal, should be enclosed in "Technical Proposal". Bid Security envelope will be opened with financial proposal of Technically qualified bidders. 22.4 Bid can be delivered either personally, or by courier as specified in the BDS. 22.5 The Bid shall be signed by the Bidder or person(s) duly authorized to commit the Bidder. The authorization shall be communicated through a document evidencing such authorization issued by the legal representative of the bidding entity, or a Power of Attorney, accompanying the Bid. There should not be errors and/ or over-writings. Corrections (if any) should be made clearly and initialed with dates.
	22.6 Bidders must be aware that the mere act of submission of a Bid, in and of itself, implies that the Bidder fully accepts the General Contract Terms and Conditions. 22.7 Hard copy submission by courier or hand delivery allowed or specified in the BDS shall be governed as follows: a) The signed Bid shall be marked "Original", and its copies marked "Copy" as appropriate. The number of copies is indicated in the BDS. All copies shall be made from the signed original only. If there are discrepancies between the original and the copies, the original shall prevail. (b) The Bid Proposals must be sealed and submitted in an envelope, which shall: i. Bear the name of the Bidder; ii. Be addressed to PAF - IAST as specified in the BDS; and iii. Bear a warning not to open before the time and date for Bid opening as specified in the BDS. If the envelope with the Bid is not sealed and marked as required, PAF-IAST shall assume no responsibility for the misplacement, loss, or premature opening of the Bid.
23. Deadline for Submission of Bids and Late Bids	23.1 Complete Bids must be received by PAF-IAST in the manner, and no later than the date and time, specified in the BDS. PAF-IAST shall only recognize the actual date and time that the bid was received by PAF-IAST. 23.2 PAF-IAST shall not consider any Bid that is received after the deadline for the submission of Bids.
24. Withdrawal, Substitution, and Modification of Bids	24.1 A Bidder may withdraw, substitute or modify its Bid after it has been submitted at any time prior to the deadline for submission. 24.2 A bidder may withdraw, substitute or modify its Bid by sending a written notice to PAF- IAST, duly signed by an authorized representative, including a Power of Attorney. The corresponding substitution or modification of the Bid, must accompany the respective written notice. All notices must be submitted in the same manner as specified for submission of Bids, by clearly marking them as "WITHDRAWAL" "SUBSTITUTION," or "MODIFICATION" 24.3 Bids requested to be withdrawn shall be returned unopened to the Bidders, except if the bid is withdrawn after the bid has been opened.
25. Bid Opening	25.1 The Procurement Committee of PAF- IAST will open the Bid in the presence of Bidders' representative(s) who choose to attend. 25.2 The Bidders' names, modifications, withdrawals, the condition of the envelope labels/ seals, the number of folders/ files and all other such other details as PAFIAST may consider appropriate, will be announced at the opening. No Bid

	shall be rejected at the opening stage, except for late submissions, in which case, the Bid shall be returned unopened to the Bidders. 25.3 In case of public holiday on bid opening day, bids will be opened on next working day.
D. EVALUATION OF BIDS	
26. Confidentiality	26.1 Information relating to the examination, evaluation, and comparison of Bids, and the recommendation of contract award, shall not be disclosed to Bidders, even after publication of the contract award. 26.2 Any effort by a Bidder to influence PAF-IAST in the examination, evaluation and comparison of the Bids or contract award decisions may, at PAF-IAST's decision, result in the rejection of its Bid and may subsequently be subject to consequences.
27. Preliminary Examination	27.1 PAF-IAST shall examine the Bids to determine whether they are complete with respect to minimum documentary requirements, whether the documents have been properly signed, and whether the Bids are generally in order, among other indicators that may be used at this stage. PAF-IAST reserves the right to reject any Bid at this stage.
28. Evaluation of Eligibility and Technical Qualification	28.1 Eligibility and Technical Qualification of the Bidder will be evaluated against the Minimum Eligibility/ Qualification requirements specified in the Section 4: Evaluation Criteria. 28.2 In general terms, Bidders that meet the following criteria may be considered qualified: a) They are not included in the list of blacklisted or barred companies published on PPRA website, any federal or provincial government department; b) They have a good financial standing and have access to adequate financial resources to perform the contract and all existing commercial commitments, c) They have the necessary experience, technical expertise, production capacity, quality certifications, quality assurance procedures and other resources applicable to the supply of goods and/ or services required; d) They are able to comply fully with the General Terms and Conditions of Contract; e) They do not have a consistent history of court/ arbitral award decisions against the Bidder; and f) They have a record of timely and satisfactory performance with their clients.
29. Evaluation of Bid Proposals	29.1 The evaluation team shall review and evaluate the Bids on the basis of their responsiveness to the Schedule of Requirements and Technical Specifications and other documentation provided, applying the procedure indicated in the BDS and other ITB documents. When necessary, and if stated in the BDS, PAF- IAST may invite technically responsive bidders for a presentation related to their Bids. The conditions for the presentation shall be provided in the bid document where required.
30. Due diligence	30.1 PAF- IAST reserves the right to undertake a due diligence exercise, aimed at determining to its satisfaction, the validity of the information provided by the Bidder. Such exercise shall be fully documented and may include, but need not be limited to, all or any combination of the following: a) Verification of accuracy, correctness and authenticity of information provided by the Bidder;

	b) Validation of extent of compliance to the ITB requirements and evaluation criteria based on what has so far been found by the evaluation team; c) Inquiry and reference checking with Government entities with jurisdiction on the Bidder, or with previous clients, or any other entity that may have done business with the Bidder; d) Inquiry and reference checking with previous clients on the performance on on-going or completed contracts, including physical inspections of previous works, as deemed necessary; e) Physical inspection of the Bidder's offices, branches or other places where business transpires, with or without notice to the Bidder; f) Other means that PAF-IAST may deem appropriate, at any stage within the selection process, prior to declaring the Bidder as Qualified.
31. Clarification of Bids	31.1 To assist in the examination, evaluation and comparison of Bids, PAF- IAST may, at its discretion, request any Bidder for a clarification of its Bid. 31.2 PAF- IAST's request for clarification and the response shall be in writing and no change in the prices or substance of the Bid shall be sought, offered, or permitted, except to provide clarification, and confirm the correction of any arithmetic errors discovered by PAF-IAST in the evaluation of the Bids in accordance with the ITB. 31.3 Any unsolicited clarification submitted by a Bidder in respect to its Bid, which is not a response to a request by PAF-IAST, may not be considered during the review and evaluation of the Bids.
32. Responsiveness of Bid	32.1 PAF-IAST's determination of a Bid's responsiveness will be based on the contents of the bid itself. A substantially responsive Bid is one that conforms to all the terms, conditions, specifications and other requirements of the ITB without material deviation, reservation, or omission. 32.2 If a bid is not substantially responsive, it may be rejected by PAF-IAST and may not subsequently be made responsive by the Bidder by correction of the material deviation, reservation, or omission.
33. Right to Accept, Reject, Any or All Bids	33.1 PAF-IAST reserves the right to accept or reject any proposal in response to the ITB, to render any or all of the proposals as non-responsive, and to reject all Proposals in response to the ITB at any time prior to award of contract, while assigning the reason(s) thereof. 33.2 PAF- IAST shall not be obliged to award the contract to the lowest priced offer.
34. Nonconformities, Reparable Errors and Omissions	34.1 Provided that a Bid is substantially responsive, PAF-IAST may waive any nonconformities or omissions in the Bid that, in the opinion of PAF-IAST, do not constitute a material deviation. 34.2 PAF-IAST may request the Bidder to submit the necessary information or documentation, within a reasonable period, to rectify nonmaterial nonconformities or omissions in the Bid related to documentation requirements. Such omission shall not be related to any aspect of the price. Failure of the Bidder to comply with the request may result in the rejection of its Bid.

	34.3 For the Price Schedule that are submitted, PAF-IAST shall check and correct arithmetical errors as follows: a) if there is a discrepancy between the unit price and the line item total that is obtained by multiplying the unit price by the quantity, the unit price shall prevail and the line item total shall be corrected, unless in the opinion of PAF-IAST there is an obvious misplacement of the decimal point in the unit price; in which case, the line item total as quoted shall govern and the unit price shall be corrected; b) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail. 34.4 If the Bidder does not accept the correction of errors made by PAF- IAST, its Bid shall be rejected.
35. Bidder Grievance	35.1 PAF- IAST's grievance readdress procedure provides an opportunity for appeal to those persons or firms not awarded a contract through a competitive procurement process. In the event that a Bidder believes that it was not treated fairly, the Bidder may lodge a complaint to the PAF-IAST's Grievance Readdress Committee.
E. AWARD OF CONTRACT	
36. Evaluation	36.1 PAF-IAST will conduct the evaluation solely on the basis of response to this tender received from the firms. 36.2 Evaluation shall be undertaken in the following steps: a) Preliminary Examination including Technical Specifications and other compliances b) Arithmetical check and ranking of bidders who passed preliminary examination by price. c) Evaluation of prices 36.3 Price comparison shall be based on the landed price, including transportation, insurance and the total cost of ownership (including spare parts, consumption, installation, commissioning, training, special packaging, etc., where applicable)
37. Integrity Pact	37.1 Bidders will also be required to submit a signed Integrity Pact on a stamp paper of appropriate value as part of their response. The text of Integrity Pact is available at Annex – I.
38. Award Criteria	38.1 Prior to expiration of the period of Proposal validity, PAF-IAST shall award the contract to the Bidder that is found to be responsive to the requirements of the Technical Specifications and has offered the lowest price. 38.2 PAF-IAST shall not be obliged to award the contract to the lowest priced offer, if the response is found deficient to the Technical Specifications and other compliances. 38.3 In case of tie in Financial Bid Value, the Contract will be awarded to the bidder having more closest match to the Technical Specifications.

39. Contract Signing	39.1 After the approval of any Work Award, a Contract Agreement on the stamp paper of appropriate value, shall be executed by PAF-IAST with Selected Bidder (i.e. Contractor) within 15 days from the date of issuance of LoI (Letter of Intent)/ Work Order.
	39.2 Failure to signing of Contract Agreement by the selected Bidder Firm with PAFIAST within the stipulated time may constitute sufficient grounds for the annulment of the award, and forfeiture of the Bid Security, if any, and on which event, PAF-IAST may award the Contract to the Second highest rated or call for new Proposals.
40. Right to Vary quantity at the Time of Award	40.1 At the time of award of Contract, PAF-IAST reserves the right to vary the quantity of goods and/ or services, without any change in the unit price or other terms and conditions.
41. Sample draft Contract	41.1 A sample draft Contract to be signed, containing applicable General Terms and Conditions can be found at Annex – II.
42. Performance Security	42.1 A performance security, if required in the BDS, shall be provided in the amount specified in BDS, well prior to the Contract signing by both parties. Where a performance security is required, the receipt of the performance security by PAFIAST shall be a condition for rendering the contract effective.
43. Bank Guarantee for Advanced Payment	43.1 No Payment will be released in advance.
44. Liquidated Damages	44.1 PAF-IAST shall apply Liquidated Damages for the damages and/ or risks caused to PAF-IAST resulting from the Contractor's delays or breach of its obligations as per Contract. a) In case of delay, the Procurement Committee, PAF-IAST reserves the right to impose a penalty not exceeding 10% of the total amount of the Contract Value at the rate as referred in the Sample Contract at Annexure – II. b) If the Contractor fails to complete work as per PAF-IAST requirement, the Rector, PAF-IAST reserves the right to reject it altogether or impose a penalty not exceeding 50% of the total amount of the Contract. c) If the Contractor fails to provide supplies/ services as per PAF-IAST requirements, PAF-IAST may forfeit his earnest money as well as Performance Security, and the work will be done at the risk and cost of Contractor. d) In case of any dispute, matter will be referred to Rector, PAF-IAST whose decision will be binding on both the parties.
45. Force Majeure	45.1 "Force Majeure" means an event which is beyond the reasonable control of a party and which makes a party's performance of its obligations under the Purchase Order/ Work Order/ Contract impossible or so impractical as to be considered impossible under the circumstances, and includes, but is not limited to, War, Riots, Storm, Flood or other industrial actions (except where such strikes, lockouts or other industrial issues are within the power of the party invoking Force Majeure), confiscation or any other action by Government agencies. In all disputes between the parties as to matters arising pursuant to this Purchase Order/ Work Order/ Contract, the dispute will be referred to Project Director, SPCAI whose decision will be final.
46. Delivery of Goods	46.1 Contractor will be required to deliver the goods as per the Delivery Schedule referred in BDS without claiming any additional cost to the PAF-IAST at the designated site(s) and in quantities as referred in the Contract.

47. Payment Provisions	47.1	Payment may be made through LC (Letter of Credit) which will be Open by PAF-IAST within 30 days after signing the Contract. However, Payment will be made only upon PAF-IAST's acceptance of the goods and/ or services performed. The terms of payment shall be within thirty (30) days, after receipt of invoice, and certification of acceptance of goods and/ or services issued by the proper authority in PAF: IAST. Payment will be affected by bank transfer in the currency of the contract.
	47.2	The Contractor shall provide all necessary supporting documents along with GST invoice, delivery challan and any other relevant documents as required by the PAF- IAST.

Section 3. Bid Data Sheet

The following data for the goods and/ or services to be procured shall complement, supplement, or amend the provisions in the Invitation to Bid. In the case of a conflict between the Instructions to Bidders, the Bid Data Sheet, and other annexes or references attached to the Bid Data Sheet, the provisions in the Bid Data Sheet shall prevail**.**

BDS No.	Ref. to Section.2	Data	Specific Instructions / Requirements
1.		Background of the Project	Pak-Austria Fachhochschule: Institute of Applied Sciences and Technology (PAF: IAST) is novel in its content and holistic in approach. The project concept is based on the slogan of "Skilling Pakistan" to create a high-quality technical education infrastructure. This unique educational institution in Pakistan will closely collaborate with several institutions in Austria and China and award multiple foreign degrees. This is a historic and visionary initiative as it is probably the first time that an institution will be established in Pakistan with many foreign universities giving degrees to students who study in it.
2.		Objective	The main objective of this Tender is to equip the PAF-IAST with necessary and advanced level of laboratory facilities, providing enabling environment to the students and faculty to perform their academic and research work in a conducive and productive environment and deliver beyond the expectations.
3.		Scope of Work	**Supply of Laboratory Equipment** The required items in various Lots as referred in Section – 5 have been sought by Sino-Pak Center for Artificial Intelligence (SPCAI) from a reputed Firms/ Companies. The supplier is expected to supply high quality products meeting the specification as stipulated in this ITB, which conforms to the international quality standards. The time specified for delivery, Installation and Commissioning in the tender form shall be deemed to be the essence of the contract and the Successful Bidder shall arrange within the specified period. **Post-Delivery Warranty and Support Services** It is required that Manufacturer's Warranty and Post-delivery Bidder's Support Services for at least One (01) year from the date of commissioning at PAF-IAST be provided by the Supplier within the quoted cost of items. Moreover, additional Warranty and Support Services for next two (02) years should be quoted separately by the Bidder on annual payment basis. However, it will be at sole discretion of PAF-IAST to avail additional Warranty and Support Services in subsequent year(s) or otherwise.
4.	7	Language of the Bid	English
5.	22, 23, 27	Submitting Bids for Parts or subparts of the Schedule of Requirements (partial bids)	The Purchase Committee shall consider the Bids Lot-wise (i.e. package against each of the Lots) as referred in Section – 5. Any item not quoted in the respective Lot shall have reasonable grounds to reject the Bid for that Lot.

6.	20	Alternative Bids	**Not Allowed.**
7.	21	Pre-Bid conference	Thursday the 7th April, 2022 at 10 am at Conference Room, PAF-IAST and Online as well. Please email to info@spcai.paf-iast.edu.pk to receive link to join the session Online.
8.	16	Bid Validity Period	**90 days**
9.	13	Bid Security/ Earnest Money (Refundable)	Required in the amount of: **2% of the Bid Value amount (including Extended Warranty) quoted in DDP (in PKR) for each Lot (separately) against which the Bidder is participating.** In case of options, earnest money shall be based on the maximum quoted price of the same items in the Lot. Acceptable Forms of Bid Security: Denominated in Pak Rupees duly issued by a Pakistani Bank or branch of a Foreign Bank, in the form of **CDR** in favor of the **Project Director SPCAI, PAF-IAST**
10.	42	Liquidated Damages	Will be imposed as follows: **Percentage of contract price per day of delay: as referred in Draft Contract Sample in Annexure – II.**
11.	40	Performance Security	Within one week of issuance of LoI/ Purchase Order and well prior to the signing of Contract, as **10% of the Contract value** for the duration of Warranty period referred in Tender Document.
12.	12	Currency of Bid	Both Pakistani Rupees (PKR) for DDP, and US Dollars (USD) for CPT
13.	31	Deadline for submitting requests for clarifications/ questions	**5 days** before the submission deadline
14.	31	Contact Details for submitting clarifications/ questions	Focal Person in SPCAI : **Dr. Sohail Khan** sohail.khan@spcai.paf-iast.edu.pk **Mr. Maaz Jamil Khan** maaz.khan@paf-iast.edu.pk
15.	18, 19, and 21	Manner of Disseminating Supplemental Information to the ITB and responses/ clarifications to queries	Direct communication to prospective Bidders by email and/ or Posting on the PAF: IAST website: maaz.khan@paf-iast.edu.pk (General Queries) ali.bukhari@paf-iast.edu.pk (Lot 1, 2, 3) ahsan.ali@paf-iast.edu.pk (Lot 4, 5) muhammad.sohail@paf-iast.edu.pk (Lot 1, 2)

<table>
<tr><td>16.</td><td>23</td><td>Deadline for Submission</td><td>Monday the April 25, 2022 on or before 12:00 noon (PST)</td></tr>
<tr><td>17.</td><td>22</td><td>Number of Set(s) of Bid</td><td>Technical Proposal(s)
- One (01) Original
- One (01) Copy
- Soft copy of Technical Proposal in a USB Flash Drive
Financial Proposal(s)
- One (01) Original

<u>Note:</u> Bidders are required to prepare and submit the Proposal(s) against the Lot(s) separately in separate envelopes, in which they intend to participate.</td></tr>
<tr><td>18.</td><td>22</td><td>Allowable Manner of Submitting Bids</td><td>☒ Courier/ Hand Delivery</td></tr>
<tr><td>19.</td><td>22</td><td>Bid Submission Address</td><td>☒ <u>By Courier / Hand Delivery:</u>
Convener Procurement Committee SPCAI,
PAF- IAST, Mang, Haripur</td></tr>
<tr><td>20.</td><td>22</td><td>Electronic submission (email) requirements</td><td>Not Allowed</td></tr>
<tr><td>21.</td><td>25</td><td>Date, time and venue for the opening of bid</td><td>Date and Time: Monday the April 25, 2022 at 12:30 PM
Venue: Conference Room, PAF-IAST, Mang, Haripur</td></tr>
<tr><td>22.</td><td>27, 36</td><td>Evaluation Method</td><td>Eligible and qualified bids meeting the PAF- IAST requirements and technically responsive as stipulated in this ITB</td></tr>
<tr><td>23.</td><td></td><td>Evaluation Method for the Award of Contract</td><td>Most advantageous bid by Lowest priced technically responsive</td></tr>
<tr><td>24.</td><td></td><td>Expected date for commencement of Contract</td><td>June 2022</td></tr>
<tr><td>25.</td><td></td><td>Maximum expected duration of Contract</td><td>36 months</td></tr>
<tr><td>26.</td><td>35</td><td>PAF: IAST will award the contract to:</td><td>One Bidder Only against each Lot</td></tr>
<tr><td>27.</td><td>39</td><td>Type and Contract Terms and Conditions that will apply</td><td>PAF-IAST General Terms and Conditions for Contracts for Goods and/ or Services as per Sample at Annex – II.</td></tr>
<tr><td>28.</td><td>46</td><td>Delivery, Installation and Testing/ Training</td><td><table><tr><td></td><td>Delivery</td><td>Installation</td><td>Testing/ Training</td></tr><tr><td>LOT # 1-5</td><td>14-16 weeks</td><td>2 weeks</td><td>2 week</td></tr></table></td></tr>
</table>

Section 4. Evaluation Criteria

Preliminary Examination Criteria

Bids will be examined to determine whether they are complete and submitted in accordance with ITB requirements as per below criteria on a Yes/ No basis:

- Appropriate signatures
- Power of Attorney
- Minimum Bid documents provided
- Bid Validity
- Bid Security submitted as per ITB requirements with compliant validity period

Minimum Eligibility Criteria

Eligibility will be evaluated on a Pass/ Fail basis. If the Bid is submitted as a Joint Venture, there should be no more than two (02) companies in the Joint Venture and each company should meet the minimum criteria, unless otherwise specified.

	ELIGIBILITY		
S. #	**Subject**	**Criteria**	**Reference Returnable Form(s)**
1.	**Bidder's Status**	Participating as ☐ Individual Company ☐ JV/ Consortium	Form B: Joint Venture/ Consortium/ Association Information Form
2.	**Legal Status**	Bidder is a legally registered entity in Pakistan. Bidder is/ are also registered with FBR for Income Tax and Sales Tax	Form C: Bidder Information Form
3.	**Location of Offices**	Bidder (Lead Bidder) has either declared office(s) in Islamabad/ Rawalpindi/ Peshawar or in Haripur. Alternately, if the Contract is awarded, the Bidder may be asked to establish office in either of these cities.	Form C: Bidder Information Form
4.	**Principal's Authorization**	Bidder or at least one member of JV/ Consortium/ Association must be Authorized Partner/ Reseller/ Dealer for the supply and services of quoted goods/ services.	Form C: Bidder Information Form
5.	**Company in Operation**	Bidder (Lead Bidder) is in operation for at least Five (05) years.	Form C: Bidder Information Form
6.	**Financial Strength**	Average annual turnover over last 3 years no less than Rs. 10 million *(For JV/ Consortium/ Association, all Parties cumulatively should meet requirement).*	Form C: Bidder Information Form

7.	**Relevant Experience**	Minimum No. of Projects of similar nature, value, and complexity in last 3 years Two (02) projects *(For JV/Consortium/Association, all Parties cumulatively should meet requirement).*	Form C: Bidder Information Form
8.	**Eligibility**	Bidder(s) is not suspended, nor debarred, nor otherwise identified as ineligible by any Government/ Semi-government/ Autonomous organization in Pakistan, in accordance with ITB clause 3.	Form A: Bid Submission Form
9.	**Bankruptcy**	Bidder(s) has not declared bankruptcy, is not involved in bankruptcy or receivership proceedings, and there is no judgment or pending legal action against the vendor that could impair its operations in the foreseeable future.	Form A: Bid Submission Form

	QUALIFICATION				
S. #	**Attribute**	**Description**	**Max. Score**	**Criteria**	**Returnable Form(s)**
	Section – I: General Corporate Profile		**25**		
1.	**Bidder's Footprints**	Number of offices/ services centers across the country	5	4+ offices fully operational for last five (05) year	Form C: Bidder Information Form
			3	3 – 4 offices fully operational for last five (05) year	
			1	< 3 offices fully operational for last five (05) year	
2.	**Bidder's Human Resource Strength**	Number of full-time employees (documentary proof required)	8	40+ employees with at least 20% Technical staff with at least 10% having technical certification	Form C: Bidder Information Form
			6	25 – 39 employees with at least 20% Technical staff at least 10% having technical certification	
			4	9 – 24 employees with at least 20% Technical staff at least 10% having technical certification	
			2	<8 employees with at least 20% Technical staff at least 10% having technical certification	
3.	**Financial Standing**	Annual Turnover averaged over last 3 years	7	2+ x Financial Strength	Form D: Qualification Form
			4	2 x Financial Strength	
			2	1.5 x Financial Strength	
4.	**Annual Tax Paid**		5	Rs. 2+ million or more	
			3	Rs. 1.0 – 2.0 million	

		Annual Tax Paid averaged over last 3 years	2	Rs. 0.5 – 1.0 million	Form D: Qualification Form
	Section – II: Business Profile		**30**		
5.	**Relevant Experience**	Project(s) of similar nature, value and complexity completed.	7	Min. No. of Projects + 5	Form D: Qualification Form
			5	Min. No. of Projects + 3	
			3	Min. No. of Projects + 2	
6.	**Public Sector Experience**	Project(s) delivered to government organizations	9	5 Projects worth $0.5 million or more each	Form D: Qualification Form
			7	3 Projects worth $0.25-0.49 million each	
			5	2 Projects worth $0.05-0.24 million each	
7.	**Education Sector Experience**	Project(s) completed at education institutions.	9	2+ Projects	Form D: Qualification Form
			7	2 Projects	
			5	1 Project	
8.	**Experience in KP**	Project(s) completed in KP	5	Project worth Rs 5 million in KP	Form D: Qualification Form
			3	Project worth Rs 2.5 million in KP	
	Section – III: Manufacturer's/ Product's Strengths		**10**		
9.	**Manufacturer's Global Presence**	Countries having supplied the same Quoted items	5	No. of countries identified by Bid in consideration/ Max. No. of countries identified in all Bids * 5	Form E: Project Proposal Form
10.	**Manufacturer's Products Portfolio**	Various Products produced by the manufacturer beyond quoted items	5	No. of relevant Products mentioned by Bid in consideration/ Max. No. of Products referred in all Bids * 5	Form E: Project Proposal Form
	Section – IV: Registration & Certifications		**10**		
11.	**ISO 9001 Certified or equal if apply**	Bidder or the Lead Bidder in case of JV should be Certified	5	Copy of Valid Certificate	Form E: Project Proposal Form
12.	**Certification specific to quoted Products/ Solution**	Bidder or any of the JV Partners or Principal should possess them	5	Copy of Valid Certificate(s) of the quoted Product(s)	Form E: Project Proposal Form
	Section – V: Presentation on Project Proposal		**25**		
13.	**Project Management Approach**	Overall approach towards planning and implementing the project.	8	To be assigned by the Technical Committee	Form E: Project Proposal Form

14.	**Post-Commissioning Services**	Overall approach towards after-sale support and services.	7	To be assigned by the Technical Committee	Form E: Project Proposal Form
15.	**Distinguishing Features**	Distinguishing features of the quoted Product and/ or overall project proposed.	10	To be assigned by the Technical Committee	Form E: Project Proposal Form
Grand Total			**100**		
	Technical Evaluation	Bids shall be evaluated on both Eligibility and Technical Qualification Criteria. Bidders meeting the Eligibility Criteria and able to secure **60 percent** in Technical qualification shall be declared as Technically Qualified Bidders for the next step, i.e. Opening of Financial Bid.			
	Financial Evaluation	Detailed analysis of the price schedule based on requirements listed in Section 5 and quoted for by the bidders in Form F. Price comparison shall be based on the landed price, including transportation, insurance, duties, taxes and the total cost of ownership (including spare parts, consumption, installation, commissioning, training, special packaging, etc., where applicable) Comparison with budget/ internal estimates. Tender will be awarded on **least-cost basis**.			

Section 5a: Technical Specifications of the Required Goods

S. No.	Lot 1: Customized Multi-copters and support equipment	
1	**Custom-Build Agile Multi-copter** **Quantity: 4**	
	Base	Carbon fiber multi-copter frame
	Autopilot system	Pixhawk Autopilot
	GPS	GPS CAN Module GPS / Module with CAN Bus
	Camera	4K Camera with gimbal
	Propellers	Carbon fiber propellers with appropriate dimensions
	Speed Controller	Electronic Speed Controller
	Propeller motor	Brushless DC motors for propellers
	Stand	Tripod Stand for Ground unit
	RF Transceiver	RF Transmitter with Receiver
	Cables	Servo Cable RF cables 12awg 14awg 16awg 20awg 26awg Silicon wires As per the mentioned technical specifications of multi-copter
	Connectors	RF Connectors
	Charger	Charger to meet the mentioned technical specifications of multi-copter
	Telemetry	Telemetry Module with Telemetry Cables required for ensuring communication with the Multicopter during flight radius
	Battery 1	Battery to meet the operational requirements for aerial unit
	Battery 2	Battery for ground unit.
	Maximum Service Ceiling Above Sea Level:	1000 m or better
	Maximum Speed:	50 Km/h or better
	Maximum Flight Time:	30 minutes or better
	Maximum Flight radius:	5 KM or better
	Absolute accuracy	Vertical: ± 0.5m or better (with ground control points) Horizontal: ± 0.5m or better (with ground control points)
	Software	Remote controller software that can be installed on the tablet for navigation control and monitoring
	On Multi-copter Video Recording:	4K UHD or better
	Video Live Stream	HD Video or better
	Video Interface	TCP/IP Ethernet

	Addon 1	Provision of on-board computer Jetson AGX Xavier Developer Kit in terms of dimensions and compatibility with Jetson AGX Xavier Developer Kit and JETSON AGX ORIN developer kit
	Addon 2	Depth Camera
	Addon 3	Camera Interface dev kit compatible with Jetson AGX Xavier and JETSON AGX ORIN developer kit
	Addon 4	Raspberry Pi 4 Model B board (8GB RAM, 64GB Card)
	Addon 5	MB1220 XL-MaxSonar-EZ2 Rangefinders on each wing or equivalent or better
2	**Custom-Built Carrier Multi-copter Quantity: 2**	
	Base	Carbon fiber multi-copter frame
	Autopilot system	Pixhawk Autopilot
	GPS	GPS CAN Module GPS / Module with CAN Bus
	Camera	4K Camera with gimbal or better
	Propellers	Carbon fiber propellers with appropriate dimensions
	Speed Controller	Electronic Speed Controller
	Propeller motor	Brushless DC motors for propellers
	Stand	Tripod Stand for Ground unit
	RF Transceiver	RF Transmitter with Receiver compatible with multi-copter
	Cables	Servo Cable RF cables 12awg 14awg 16awg 20awg 26awg Silicon wires As per the mentioned technical specifications of multi-copter
	Connectors	RF Connectors
	Charger	Charger to meet the mentioned technical specifications of multi-copter
	Telemetry	Telemetry Module with Telemetry Cables required for ensuring communication with the Multicopter during flight radius
	Battery 1	Battery to meet the operational requirements for aerial unit
	Battery 2	Battery for ground unit.
	Maximum Service Ceiling Above Sea Level:	1000 m or better
	Maximum Speed:	30 Km/h or better
	Maximum Flight Time:	30 minutes or better
	Maximum Flight radius:	3 KM or better
	Absolute accuracy	Vertical: ± 0.5m or better (with ground control points) Horizontal: ± 0.5m or better (with ground control points)
	Software	Remote controller software that can be installed on the tablet for navigation control and monitoring

	On Multi-copter Video Recording:	4K UHD or better
	Video Live Stream	HD Video or better
	Video Interface	TCP/IP Ethernet
	Load-carrying capability	5 KG including payload attachment and bay or better. The bay is preferred to have a provision for connecting the ground robot or related equipment.
	Addon 1	Provision of on-board computer in terms of dimensions and compatibility with Jetson AGX Xavier Developer Kit and JETSON AGX ORIN developer kit
	Addon 2	Depth Camera
	Addon 3	Camera Interface dev kit compatible with Jetson AGX Xavier and JETSON AGX ORIN developer kit
	Addon 4	Raspberry Pi 4 Model B board (8GB RAM, 64GB Card)
	Addon 5	MB1220 XL-MaxSonar-EZ2 Rangefinders on each wing or equivalent or better
3	**RTK-GNSS Base station (Here+V2 or Equivalent) Quantity: 1**	
	GNSS module	u-blox NEO-M8P-2 or better
	Ceramic antenna	CGGBP.25.4.A.02 or better
	Connectors	At least the following connectors: USB, UART, SMA
	GNSS Signals Support	At least the following: GPS L1 C/A, GLONASS L10F, BeiDou B11
	Working Voltage:	5V or better
	Working Temperature:	-40℃ to +85℃ or better
	Time-To-First-Fix:	GPS & GLONASS: <=26s (cold start) or better <=1s (hot start) or better <=2s (aided start) or better
4	**Extra Aerial & Ground batteries Quantity: 2 each**	
	Aerial Battery for Agile multi-copter	As per the technical specification of Agile multi-copter
	Ground Battery for Agile multi-copter	As per the technical specification of Agile multi-copter
	Aerial Battery for Carrier multi-copter	As per the technical specification of Carrier multi-copter
	Ground Battery for Carrier multi-copter	As per the technical specification of Carrier multi-copter
5	**Safety net for Multi-copters (M500BK FR or better) Dimensions: 30 x 40 Feet Quantity: 1**	
	Material	high tenacity polypropylene, knotless, flame-retardant, or better
	Mesh Size	1.5 mm or better
	Net Size	At least 30 x 40 Feet
	Pose of Meshes	Quadratic (square)
	Mesh Connection	Knotless braid
	Edge Design	Reinforced selvage cord of approx. 7 mm or better
	Max. Tensile Strength of a Mesh	250 N or better

	Standards and Rules	DIN 4102 (B1, flame-retarding), non-flaming dripping
	Certificate	MPA-Bau certification report P-NDS04-851, Oeko-Tex® certificate 12.0.02466 or equivalent
	Continuous Operating Temperature	-40 to +80 °C or better
	Melting Point	165 °C or better
	Tensile Strength After Two Years of Climatic Influences:	90% or better
	Weight per Unit Area:	<= 40 g/m² or better

S. No.	Lot 2: Field Robotics Lab and Support Equipment	
1	**Unmanned outdoor ground vehicle: [R6 ArduROS UGV or equivalent] Quantity: 1**	
	Base Chassis	Qty. 1
	Companion Housing	Qty. 1
	UGV Software	1 C3 software license or equivalent
	Tablet for Software	Qty. 1 Touch Tablet with installed UGV software license
	Autopilot	Qty. 1 Pixhawk 2.1 Autopilot- Standard
	GPS Can module	Qty. 1 HERE2 GPS CAN Module (M8N)
	Power Brick	Qty. 1
	Servo Cable	Qty. 3
	Battery	Qty. 1, Run time 3 hrs.
	Charger	Qty. 1
	Jetson Xavier Dev Kit	Qty. 1
	Ethernet Port	Qty. 1
	USB 3.0 Port	Qty. 1
	Micro USB Port	Qty. 1
	Micro USB PCB	Qty. 1
	Port Plugs	Qty. 1
	Power Switch	Qty. 1
	Antenna 2.4GHz	Qty. 2
	RP-SMA Extension kit	Qty. 1
	Software Combability	Must be pre-loaded with Ubuntu desktop, ROS, example ROS control package and NVIDIAs JetPack SDK, including the BSP, libraries for deep learning, computer vision, GPU computing and multimedia processing.
2	**Unmanned ground vehicle: [Segway RMPLite 220 or equivalent] Quantity: 4**	
	Dimensions	L*W*H (mm): 730*499*280
	Structure	Axil base*Wheelbase*Ground
	Parameters	clearance (mm): 513.5*413*69
	Tire size	11 inches (280mm) Hub motor
	Weight	33KG
	Standard Load	50kg
	Obstacle Avoidance	5cm/8°/Speed bump
	Suspension Travel	4mm (Rear)
	Drive	FWD, Differential Steering
	IP Rating	IP65
	Max Speed	3m/s
	Max Steering Speed	3rad/s
	Minimum Turning Radius	0m

	Braking	With No Load: 3m/s 0.9m, Braking Acc: 0.5g
	Control	Remote control, host computer control
	Braking Method	Electronic Brake
	Interface	UART, CAN
	Supporting system, API	C/C++, ROS
	Feedback Data	Encoder, Hall, IMU
	3D Model	Gazebo, Rviz model
	Battery	Range: 1152wh- Max Load:3m/s, Range:80Km
		Capacity: 48V 20Ah/24Ah
		Charging: Manual charging/Swappable battery/ Provided with automatic charging interface
		Host computer power: 48V 400W
	Buttons	Emergency stop button
		Push to move button
		Power button
	Status Indication	Power on/off status indicator
		Platform base status indicator
		Controls indication
		Battery level indicator
		Charging status indicator
	Extension Kits	Must have provision for adding following Light Strip Infrared Sensor Ultrasonic Sensor Bumper Sensor Mounting Rod
3	**Drone DJI Mavic 3 or equivalent** **Quantity: 1**	
	Weight	895 g or better
	Camera:	Sensor: 4/3 CMOS or better Resolution: 20 MP, DNG (RAW) or better Video: 5.1K/50fps, 4K/120fps or better
	Flight Time	46-minute (no wind) or better
	Video Transmission	Protocol: O3+ or equivalent or better Range: 15km or better Rate:1080p/60fps Transmission* or better
	Drone position	Complete Omnidirectional
	Tracking	ActiveTrack 5.0 or equivalent or better
	Return Feature	Advanced RTH or equivalent
	Remote Control	Standard RC
	Internal storage	8 GB or better
	Hybrid zoom	28x Zoom
	Flight route planning	MasterShots or equivalent or better
	Pilot Assistance System	APAS 5.0
4	**Quanser Self-Driving Car Research Studio or equivalent** **Quantity: 1**	
	Lidar	2D LIDAR
	Encoder	720 count encoder
	Audio	Dual microphones & speaker
	Mechanical	Robust mechanical design
	Camera	RGBD camera
	Light	Headlights, turn signals
	Connectivity	WiFi connectivity
	I/O	User expandable IO for SPI, I2C, GPIO
	Axis	9 axis IMU
5	**Modern Manipulator Arm Robot Anno Model J-601-B or equivalent** **Quantity: 1**	

	Reach:	482MM
	Payload:	1 KG
	Repeatability:	±0.5MM
	Protection level:	Protection level: IP54
	Programming:	Programming: G code
	Interface	USB (QFLEX 2)
	Communication method	RS232
	Total Weight	11.5KG

6	**Loco swarm bundle inclusive additional highlighted accessories** **Quantity: 3**

The bundle contains the LPS system configuration which supports TDoA where a virtually infinite amount of Crazyflies can be positioned simultaneously. It also contains 10 Crazyflies with the LPS decks for positioning.

Bundle content

Name	Quantity
Loco Positioning Nodes	08
Loco Positioning Deck	10
Crazyflie 2.1 kit	10
Crazyradio PA	3
240mAh LiPo battery including 500mA USB charger	20
Accessory – LED-ring deck	**10**

Specification of each equipment in a bundle

Loco Positioning Nodes

Features:
- Supports Anchor and Sniffer mode, as well as a limited TWR Tag mode (no position estimation)
- Can be used as a standalone system with some Nodes acting as Anchors and one Node acting as a Tag reporting distances to the Anchors.
- Multiple powering options
- On board MCU

Electrical Specification:
- Based on the Decawave DWM1000 module
- Implements IEEE 802.15.4 UWB
- STM32F072 MCU (Cortex-M0, 48MHz, 16kb SRAM, 128kb flash)
- High precision pressure sensor (LPS25H)
- uUSB connector
- Full speed USB device interface
- Powered by USB, 6 mm barrel jack (5 - 12V) or screw terminal (5 - 12V)
- FTDI debug port (not populated)
- Serial connector compatible with ESP8266 module (not populated)
- Power consumption 180 mA max

Ranging Specification:
- Ranging accuracy ±10 cm according to DWM1000 spec.
- Maximum tested range 10 m
- Nr of anchors required: theoretical minimum of 4 for 3D positioning.

Radio Specification:
- Operates at 3.2 - 7 GHz
- Channel bandwidth 500 MHz

Compatibility
- Works with the Loco Positioning Deck

Loco positioning deck

Features:
- Measures distances to Loco Positioning Node Anchors
- 4 status LEDs

	Electrical specifications: ▪ Based on the Decawave DWM1000 module ▪ Implements IEEE 802.15.4 UWB ▪ 1-wire memory for automatic expansion deck detection	
	Ranging specifications: ▪ Ranging accuracy ±10 cm according to DWM1000 spec. See the wiki for measurements. ▪ Maximum tested range 10 m ▪ Ranging rate 500 Hz, shared over all anchors. Around 80Hz per anchor with 6 anchors	
	Radio specifications Operates at 3.2 - 7 GHz Channel bandwidth 500 MHz	
	Power consumption ▪ Max 150 mA, depends on operation mode and configuration ▪ Crazyflie 2.X flight time with deck 6 minutes	
	Mechanical specifications ▪ Weight: 3.3 g ▪ Size (WxHxD): 28x35x4 mm ▪ Designed for mounting above or under the Crazyflie 2.X	
	Crazyflie 2.1	
	Features: ▪ Durable design ▪ Easy to assemble and no soldering required ▪ Supports expansion decks with automatic detection ▪ Supports flying from iOS and Android with Bluetooth LE, as well as from Windows/Mac OSX/Linux with the Crazyradio or Crazyradio PA ▪ Tested to further than 1 km radio range line-of-sight (LOS) with the Crazyradio PA ▪ Wireless firmware updates ▪ On-board charging via standard uUSB ▪ Dual-MCU architecture with dedicated radio/power management SoC for advanced applications ▪ Real-time logging, graphing and variable setting in addition to full use of expansion decks when using a Crazyradio or Crazyradio PA and a computer	
	Mechanical specifications: ▪ Takeoff weight: 27g ▪ Size (WxHxD): 92x92x29mm (motor-to-motor and including motor mount feet)	
	Radio specifications: ▪ 2.4GHz ISM band radio ▪ Increased range with 20 dBm radio amplifier, tested to > 1 km range LOS with Crazyradio PA (environmentally dependent) ▪ Bluetooth Low Energy support with iOS and Android clients available ▪ Dual antenna support with both on board chip antenna and U.FL connector	
	Microcontrollers: ▪ STM32F405 main application MCU (Cortex-M4, 168MHz, 192kb SRAM, 1Mb flash) ▪ nRF51822 radio and power management MCU (Cortex-M0, 32Mhz, 16kb SRAM, 128kb flash) ▪ uUSB connector ▪ On-board LiPo charger with 100mA, 500mA and 980mA modes available ▪ Full speed USB device interface ▪ Partial USB OTG capability (USB OTG present but no 5V output) ▪ 8KB EEPROM	
	IMU ▪ 3 axis accelerometer / gyroscope (BMI088) ▪ high precision pressure sensor (BMP388)	
	Flight specifications: ▪ Flight time with stock battery: 7 minutes ▪ Charging time with stock battery: 40 minutes ▪ Max recommended payload weight: 15 g	
	Supported clients/controllers	

- Win/Linux/OSX python client
  - The gamepads used by the Xbox 360 and the Playstation 3 are used as reference controllers
  - Any gamepad/controller with at least 4 analog axes
- Android mobile device
- iOS mobile device

Expansion connectors:

- VCC (3.0V, max 100mA)
- GND
- VCOM (unregulated VBAT or VUSB, max 1A)
- VUSB (both for input and output)
- I2C (400kHz)
- SPI
- 2 x UART
- 4 x GPIO/CS for SPI
- 1-wire bus for expansion identification
- 2 x GPIO connected to nRF51

Crazyradio PA 2.4 GHz USB dongle

Crazyradio PA is a long range open USB radio dongle based on the nRF24LU1+ from Nordic Semiconductor. It features a 20dBm power amplifier, LNA and comes pre-programmed with Crazyflie compatible firmware. The power amplifier boosts the range, giving a range up to 1km (line of sight) together with the Crazyflie 2.X and up to 2km Crazyradio PA to Crazyradio PA (line of sight).

Features:

- Radio power amplifier giving 20dBm output power
  1km range LOS with Crazyflie 2.X (best case scenario)
- 2x5 2.54mm header for prototyping (not mounted)
- Hardware support for PPM
- Same mechanical footprint as the first generation Crazyradio
- Open source firmware
- Firmware upgrade via USB
- Low latency

Specifications:

- Based on nRF24LU1+ chip from Nordic Semiconductor
  - 8051 MCU at up to 16MHz with 32Kb flash and 2Kb SRAM
  - 2.4GHz ISM band radio
  - USB device peripheral
  - 125 radio channels
  - 2Mbps, 1Mbps and 250Kps communication data-rate
  - Sends and receives data packets of up to 32 bytes payload
  - Automatically handles addresses and packet ack
  - Hardware SPI and UART
  - Combatible with Enhanced ShockBurst protocol from Nordic Semiconductor

Radio specification:

- 20dBm output power (100mW)
- Low Noise Amplifier (LNA)
- RP-SMA connector
- Can be powered with up to 13V via expansion header
- 2x5 2.54mm expansion header with following signals (not mounted):
- Hardware support for PPM input
  - Up to 13V input power
  - GND
  - PPM
  - SPI/UART
- Standard USB-A connector

Mechanical specifications:

- Weight: 6g
- Size (WxHxD): 58x16x6.5mm (including connectors)

250mAh LiPo battery including 500mA USB charger

Features:
- Operating Temperature: 0~45°C (Charging) / 0~60°C (Discharging)
- Connector: Molex 51005-2P (Pin 1 positive)

Electrical Specification:
- Capacity: 250mAh
- Nominal voltage: 3.7 V (1 Cell)
- Max discharge: 15C
- Charge: 2C

Mechanical specifications
- Weight: 7.1g
- Size (WxHxD): 20x7x30mm (not including cable)

LiPo battery charger:

Features
- 500mA single-cell Li-Po battery charger
- Charging indicator
- Connection points for chaining of multiple chargers

Electrical Specification:
- Max charging current: 500mA
- Supply voltage: 5V
- µUSB charging connector
- Based on the MCP73832 single-cell Li-Po charger
- Connection points allows chaining of multiple chargers (1x2, 2.54mm pitch)

Mechanical Specification:
- Weight: 1.2g
- Size (WxHxD): 10.5x16x1.6mm (not including cable)
- Connector for the Crazyflie 2.X stock battery

7 **Q10T 10x Time Optical Zoom EOS Camera gimbal auto tracking function gimbal for Multicopter**
Quantity: 4

Hardware Parameter	
Working voltage	12V
Input voltage	3S ~ 4S
Output voltage	5V (connect with PWM)
Dynamic current	320mA @ 12V
Idle current	240mA @ 12V
Power consumption	≤ 3.85W
Working environment temp.	-20℃ ~ +50℃
Output	micro HDMI(HD output 1080P 60fps)/IP
Local-storage	SD card (Up to 128G, class 10, FAT32 or ex FAT format)
Control method	PWM / TTL / S.BUS / TCP
Gimbal spec	
Pitch/Tilt	±90°
Roll	±85°
Yaw/Pan	±300°/±360°(IP output)

	Vibration angle	Pitch/Roll: ±0.02°, Yaw : ±0.03°
	Camera spec	
	Imager Sensor	1/3inch CMOS
	Picture quality	Full HD 1080 (1920*1080)
	Effective pixel	2.13MP
	Lens optical zoom	10x, F=4.9~49mm
	Digital zoom	12x (360x with optical zoom)
	Min object distance	1.5M
	Horizontal viewing angle	Horizontal: 53.2°(Wide end) ~ 5.65°(Tele end)
		Vertical: 39.8°(wide end) ~ 4.2°(tele end)
		Focus: 66.6°(wide end) ~ 7.2°(tele end)
	Sync system	Progressive scanning
	S/N ratio	38dB
	Min illumination	Color 0.05lux@F1.6
	Exposure control	Auto, Manual, Priority mode(shutter priority & iris priority), Bright, EV compensation, Slow AE
	Gain	Auto
	White balance	Auto/Manual
	Shutter speed	Auto
	Backlight compensation	Backlight compensation/strong light inhibition
	User presetting bit	20 sets
	Image rotation	180°, Horizontal/Vertical mirror image
	OSD	Yes
	Camera Object Tracking	
	Update rate of deviation pixel	50Hz
	Output delay of deviation pixel	<10ms
	Minimum object contrast	5%
	SNR	4
	Minimum object size	32*32 pixel
	Maximum object size	128*128 pixel
	Tracking speed	±48 ~ ±192 pixel/frame
	Object memory time	100 frames (4s)
	The mean square root values of pulse noise in the object position	< 0.5 pixel

S. No.	Lot 3: Embedded Systems and IoT Lab	
1	Arduino Portenta Machine Control Qty: 10	
	Processor	Stm32h747xi Dual Cortex®-M7+M4 32 Bit Low Power Arm® Mcu

		(Portenta H7)
	Input	8 Digital 24vdc 2 Channels Encoder Readings 3 Analog For Pt100/Pt1000/J/K Temperature Probes (3-Wire Cable With Compensation) 3 Analog Input (4-20ma/ 0-10v/Ntc 10k)
	Output	8 Digital 24vdc Up To 0,5a (Short Circuit Protection)4 Analog 0-10v (Up To 20ma Output Per Channel)
	Other I/O	12 Programmable Digital I/O (24v Logic)
	Communication Protocols	Can-Bus Programmable Serial Port 232/422/485
	Connectivity	Ethernet Usb Programming Port Wi-Fi Bluetooth® Low Energy
	Memory	16 Mb Onboard Flash Memory 8mb SDRAM
	Power	24v Dc +/- 20%
	Connector Type	Push-In Terminals For Fast Connection
	Operating Temperature	-40° C To +85° C (-40° F To 185°F)
2	Portenta H7 Qty: 10	
	Microcontroller	STM32H747XI dual Cortex®-M7+M4 32bit low power Arm® MCU (datasheet)
	Radio Module	Murata 1DX dual WiFi 802.11b/g/n 65 Mbps and Bluetooth® (Bluetooth® Low Energy. 5 via Cordio stack, Bluetooth® Low Energy 4.2 via Arduino Stack)
	Secure Element (Default)	NXP SE0502
	Board Power Supply	5V
	Supported Battery	Li-Po Single Cell, 3.7V, 700mAh Minimum (integrated charger)
	Circuit Operating Voltage	3.3V
	Display Connector	MIPI DSI host & MIPI D-PHY to interface with low-pin count large display
	GPU	Chrom-ART graphical hardware Accelerator™
	Timers	22x timers and watchdogs
	UART	4x ports (2 with flow control)
	Ethernet Phy	10 / 100 Mbps (through expansion port only)
	SD Card	Interface for SD Card connector (through expansion port only)
	Operational Temperature	-40 °C to +85 °C
	MKR Headers	Must support industrial MKR shields
	High-Density Connectors	Two 80 pin connectors will expose all of the board's peripherals to other devices
	Camera Interface	8-bit, up to 80 MHz
	ADC	3× ADCs with 16-bit max. resolution (up to 36 channels, up to 3.6 MSPS)
	DAC	2× 12-bit DAC (1 MHz)
	USB-C	Host / Device, DisplayPort out, High / Full Speed, Power delivery
3	Arduino MKR Connector Carrier (Grove compatible) Qty: 10	
	Interface	14 Grove Connectors
	Analog Inputs	A0, A1, A2, A3, A4 single grove Analog input A5, A6 double grove Analog input
	Digital Input/Output	5 V D0, D1, D2, D3, D4 single grove I/O D5, D6 double grove I/O
	Other Connectors	One 5V I2C, One 5V UART

	Input Voltage (Screw Terminal Block)	7V - 16V
	Circuit Operating Voltage	3.3V
	Compatibility	MKR
4	Machine Vision Bundle (Portenta H7+Arduino Portenta Vision Shield) Qty: 10	
	Portenta H7	Specs as at **S. No. 2**
	Portenta Vision Shield	
	LoRa	868/915MHz ABZ-093 LoRa® Module with ARM Cortex-M0+
	Microphone	MP34DT05
	Camera	Himax HM-01B0 camera module
	Operating voltage	3.3V
5	Arduino Edge Control Qty: 10	
	Microcontroller	nRF52840 (64 MHz Arm® Cortex-M4F)
	Digital Input	6x edge sensitive wake up pins
	Digital Output	8x latching relay command outputs with drivers 8x latching relay command outputs without drivers
	Relays	4x 60V/2.5A galvanically isolated solid state relays
	Analog Input	4x 4-20mA inputs 8x 0-5V analog inputs 16x hydrostatic watermark sensor input
	Terminal Block Connectors	6x 18 pin plug in terminal block connectors
	Power Supply	12 V Acid/lead SLA Battery Supply (Recharged via solar panels)
	Power Consumption	Low power (up to 34 months on a 12V/5Ah battery) 200uA Sleep current
	Memory	1 MB onboard Flash memory 2 MB onboard QSPI Flash memory
	Sd Card	Interface for SD Card connector (through expansion port only)
	Connectivity	Bluetooth Wifi* 3G*NB-IoT* LoRaWAN®* * Requires Arduino MKR board
	Peripherals	Full-speed 12 Mbps USB Arm CryptoCell CC310 security subsystem QSPI/SPI/TWI/I²S/PDM/QDEC High speed 32 MHz SPI Quad SPI interface 32 MHz 12-bit 200 ksps ADC 128 bit AES/ECB/CCM/AAR co-processor
	Operational Temperature	-40° C to +85° C (-40° F to 185°F)
6	Engineering Kit Motors Backup Qty: 10	
	The Engineering Kit - Motors Backup includes a servo motor, a geared motor with encoder, and a micro DC motor with encoder.	
	Must come with official box	
	Tech Specs Servo	
	Operation Voltage Range	4.8 - 6V

	Standing Torque	2.3 kg.cm (4.8V)
	Control System	Positive PWM control 1500 usec Neutral
	Tech Specs DC motor w/ enc	
	Operating Voltage	12 V DC
	Stall Current	1.85A Ref
	Encoder Output Pulse	12 PPR
	Tech Specs MicroGeared DC Motor w/ enc	
	Input Voltage	3.5 - 16V
	Input Current	5 mA
	Encoder Output Pulse	3 PPR
	Gear Ratio	100
7	Arduino Student Kit Qty: 10	
	Official Arduino Student Kit Must come with official box Must contain the following:	
	Access code to exclusive online content including learning guidance notes, step-by-step lessons and extra materials such as resources, invention spotlights and a digital logbook with solutions.	
	1 Arduino Uno	
	1 USB cable	
	1 Board mounting base	
	1 Multimeter	
	1 9V battery snap	
	1 9V battery	
	20 LEDs (5 red, 5 green, 5 yellow & 5 blue)	
	5 Resistors 560 Ω	
	5 Resistors 220 Ω	
	1 Breadboard 400 points	
	1 Resistor 1kΩ	
	1 Resistor 10kΩ	
	1 Small Servo motor	
	2 Potentiometers 10kΩ	
	2 Knob potentiometers	
	2 Capacitors 100uF	
	Solid core jumper wires	
	5 Pushbuttons	
	1 Phototransistor	
	2 Resistors 4.7kΩ	
	1 Jumper wire black	
	1 Jumper wire red	
	1 Temperature sensor	
	1 Piezo	
	1 Jumper wire female to male red	
	1 Jumper wire female to male black	
	3 Nuts and Bolts	

8	Arduino Explore IoT Kit Qty: 10	
	Official Arduino Explore Kit Must come with official box Must include Access to an online platform with all the content, information, and activities to learn the basics of IoT in one place Must include 10 step-by-step hands-on activities, covering the fundamentals of IoT: Hardware, Networking, Algorithms and programming, Security, Data handling Must include Access to Arduino Cloud, an integrated online platform that enables to write code, access content, configure boards, and share projects. A free trial to the Arduino Cloud Maker Plan. with access to additional features.	
	1 x Arduino MKR1010	
	MKR IoT Carrier designed for this kit, including: 1. Two 24 V relays 2. SD card holder 3. Five Tactile buttons 4. Plug and play connectors for different sensors 5. Temperature sensor 6. Humidity sensor 7. Pressure sensor 8. UV sensor 9. Accelerometer 10. RGB 1.20” display 11. 18650 Li-Ion rechargeable battery holder 12. Five RGB LEDs	
	1 x Micro USB cable	
	1 x Moisture sensor	
	1 x PIR sensor	
	1 x Plug-and-play cables for all the sensors	
9	EMoRo 2560 Controller Qty: 10	
	Microcontroller	ATmega2560
	Operating Voltage	5 V
	Input Voltage (Recommended)	7-14 V
	Input Voltage (Limit)	6-18 V
	Digital I/O Pins	40 => (16 with LEDs + 8 ADC + 8 Servo motor (PWM) + 8 General Purpose)
	PWM Digital I/O Pins	6
	Flash Memory	256 KB (ATmega2560)
	Flash Memory for Bootloader	8 KB
	SRAM	8 KB (ATmega2560)
	EEPROM	4 KB (ATmega2560)
	Clock Speed	16 MHz
	Analog Input Ports (ADC)	8
10	Arduino Uno Rev3 Qty: 10	
	Official Arduino Uno Rev3 board (Green Color, Must bear official Arduino and Arduino.cc logo)	
	Microcontroller	ATmega328P (DIP)
	Operating Voltage	5V
	Input Voltage (Recommended)	7-12V
	Input Voltage (Limit)	6-20V
	Digital I/O Pins	14 (of which 6 provide PWM output)

	PWM Digital I/O Pins	6
	Analog Input Pins	6
	DC Current Per I/O Pin	20 mA
	DC Current For 3.3v Pin	50 mA
	Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
	SRAM	2 KB (ATmega328P)
	EEPROM	1 KB (ATmega328P)
	Clock Speed	16 MHz
	Led_Builtin	13
11	ARDUINO UNO WiFi REV2 Qty: 10	
	Microcontroller	ATmega4809
	Operating Voltage	5V
	Input Voltage (Recommended)	7 - 12V
	Digital I/O Pins	14 — 5 Provide PWM Output
	PWM Digital I/O Pins	5
	Analog Input Pins	6
	DC Current Per I/O Pin	20 mA
	DC Current For 3.3v Pin	50 mA
	Flash Memory	48 KB (ATmega4809)
	SRAM	6,144 Bytes (ATmega4809)
	EEPROM	256 Bytes (ATmega4809)
	Clock Speed	16 MHz
	Radio Module	u-blox NINA-W102 (datasheet)
	Secure Element	ATECC608A (datasheet)
	Inertial Measurement Unit	LSM6DS3TR (datasheet)
	Led_Builtin	25
12	Arduino Nano Qty: 10	
	Microcontroller	ATmega328
	Architecture	AVR
	Operating Voltage	5 V
	FLASH Memory	32 KB of which 2 KB used by bootloader
	SRAM	2 KB
	Clock Speed	16 MHz
	Analog In Pins	8
	EEPROM	1 KB
	DC Current Per I/O Pins	40 mA (I/O Pins)
	Input Voltage	7-12V
	Digital I/O Pins	22 (6 of which are PWM)
	PWM Output	6
	Power Consumption	19 mA
13	Arduino Engineering Kit Rev2 Qty: 5	
	The kit includes several customized parts, a complete set of electronics, and all the mechanical components needed to assemble each project (a webcam controlled rover, a self-balancing	

	motorcycle, and a drawing robot):	
	Arduino Nano 33 IoT	
	Nano Motor Carrier with IMU and battery charger	
	Three sets of mechanical pieces to assemble the projects	
	Li Ion 18650 battery	
	Two geared motors with encoders	
	DC motor with encoders	
	Servo motor	
	USB cable	
	Two whiteboard markers	
	Two wheels	
	Allen key	
	Webcam	
	Nylon thread	
	Screws, nuts, and bolts	
	A hard plastic, stackable toolbox ideal for storage and years of use	
	A one-year individual license for MATLAB® and Simulink®	
	Student e-learning platform with step-by-step guidance	
14	Box for Arduino Qty: 20	
	Must be compatible with Arduino Uno, Zero, Mega, Due	
	Must accommodate the board and shield	
	Ensure safety from short circuits and external hazards	
	Black Color	
15	USB 2.0 Cable Type A/B Qty: 20	
	Compatible with Arduino Uno, Arduino Mega 2560, Arduino 101 or any board with the USB female A port.	
	Cable length: ~180 cm.	
16	Soldering Stand : QuadHands Classic Helping Hands Tool Qty: 5	
	Soldering Stand	
	Four all-metal flexible gooseneck helping hands	
	Heavy 8" by 8" powder coated solid steel base	
	Stainless steel alligator clamps can be rotated 360 degrees then "locked" into place with knurled thumb nuts.	
17	Tinkerkit Braccio robot Qty: 10	
	The TinkerKit Braccio is a fully operational robotic arm, controlled via Arduino. It can be assembled in several ways for multiple tasks such as moving objects.	
	Power Adapter	Jack connection, A regulated 5 VDC @ 4000 mA power supply must be provided in the box.
	Plastic Parts x 21	
	Screws x 63	
	Flat Washer x 16	
	Hexagon Nut x 7	
	Springs x 2	

	Servo Motors:	2 x SR 311, 4 x SR 431
	Arduino compatible Shield x 1	
	Power Supply	5V, 4A x 1
	Phillips Screwdriver x 1	
	Spiral Cable Protection Wrap x 1	
	Operating Distance Range	80 cm
	Maximum Height	52 cm
	Base Width	14 cm
	Gripper Width	90 mm
	Cable Length	40 cm
	Load Capacity	Maximum weight at 32 cm operating distance: 150 g
		Maximum weight at the minimal Braccio configuration: 400g
	Servo Technical Specification	
	Model 1	Springrc Sr431 - Dual Output Servo or equivalent
	Control Signal	PWM Analog
	Torque	@ 4.8V: 169.5 oz-in (12.2 kg-cm)
		@ 6.0V: 201.4 oz-in (14.5 kg-cm)
	Weight	2.19 oz (62.0 g)
	Dimensions	1.65×0.81×1.56 in (42.0×20.5×39.5 mm)
	Speed	@ 4.8V: 0.20 sec/60°
		@ 6.0V: 0.18 sec/60°
	Rotation Support	Dual Bearings
	Gear Material	Metal
	Rotation Range	180°
	Connector Type	J (aka Futaba)
	Model 2	SPRINGRC SR311or equivalent
	Control Signal	PWM Analog
	Torque	@ 4.8V: 43.13 oz-in (3.1 kg-cm)
		@ 6.0V: 52.86 oz-in (3.8 kg-cm)
	Weight	0.95 oz (27.0 g) or better
	Dimensions	1.23×0.65×1.13 in (31.3×16.5×28.6 mm) or better
	Speed	@ 4.8V: 0.14 sec/60°
		@ 6.0V: 0.12 sec/60°
	Rotation Support	Dual Bearings
	Gear Material	Metal
	Rotation Range	180°
	Connector Type	J (aka Futaba)
18	Programmable miniaturized humanoid robot (Robotis Mini or equivalent) Qty: 10	
	Programming	Must support RoboPlus Task (R+Task) Must support R+Motion Must support OpenCM IDE
	Actuators	DYNAMIXEL XL-320 for various motion functions or equivalent
	Sensors	At least the following sensors: Color, Touch, Temperature, IR Sensor, Magnetic, Temperature

	ROBOTIS MINI App	Support for Android and iOS smart device
	ROBOTIS MINI App	Buttons, Gesture, Voice Recognition to control or change movements
	Connectivity	Must have Bluetooth connectivity
	Controller board	OpenCM9.04 or equivalent
	The kit must include all the accessories required by ROBOTIS MINI	
19	Spare parts for Humanoid Robots (S. No. 18) (Robotis Mini: Spare Parts Pack 1 or equivalent) Qty: 10	
	Must include the following 1 Li-ion battery 3.7V 1300mAh LB-041 1 Li-ion Battery Charger Set LBB-041 1 USB Micro B Cable 50 SRV-1LSH/1LSP (Pin & Rivet) 200 SRV-1SH/1SP (Pin & Rivet) 28 M2_0X06_Tapping Screw 160 M2_0X04_Tapping Screw 2 CABLE_3P_160MM 6 CABLE_3P_130MM 8 CABLE_3P_110MM	
20	Step Motor (28H2P3205A4 or equivalent) Qty: 20	
	Phase	2
	Step Angle	1.8°
	Voltage	12/24
	Resistance	11ohm
	Rate Current	0.45A/Phase
	Phase Resistance	7.5ohm/Phase
	Phase inductance	5mH/Phase
	Holding Torque	0.6Kg.cm
	Lead Wire	4
	Insulation Class	B
21	Grove - Line Finder v1.1 Qty: 20	
	Power supply	5V DC
	Digital output mode	TTL (High when black is detected, Low when white is detected)
	Connector	4 pin Buckled Grove interface
	Comparator	LMV358
	Photo reflective diode	RS-06WD
22	DYNAMIXEL Shield for Arduino MKR Series Qty: 20	
	Compatibility	Compatible with Arduino MKR Compatible with ROBOTIS DYNAMIXEL TTL Series Battery connector must be compatible with ROBOTIS 3S Li-Po 11.1V batteries LB-010 or LB-020 JST DYNAMIXEL connector must support controlling individual servos and daisy-chains.
	Parts list	DYNAMIXEL MKR Shield (1) JST(S3B-EH) Connector (2) Molex(5268-02A) Connector (2) DC Jack Harness (1) Battery Connector (SMW250-02) (1) XL-320 Convertible cable (1)
23	DYNAMIXEL XL-320 Qty: 10	
	Baud Rate	7343 bps ~ 1 Mbps
	Resolution	0.29°

	Running Degree	0° ~ 300° Endless Turn
	Gear Ratio	238 : 1
	Stall Torque	0.39Nm @ 7.4V, 1.1A
	No Load Speed	114rpm @ 7.4V, 0.18A
	Operating Temperature	-5°C ~ +65°C
	Input Voltage	6 ~ 8.4V
	Command Signal	Digital Packet
	Protocol Type	Half Duplex Asynchronous Serial Communication (8bit, 1stop, No Parity)
	Physical Connection	TTL Level Multidrop Bus(Daisy Chain Type Connector)
	ID	0 ~ 252
	Feedback	Position, Temperature, Load, Input Voltage, etc
	Material	Engineering Plastic
24	Grove - Servo Qty: 20	
	Working Voltage	4.8 – 6 V
	Torque	1.5/1.8 Kg.cm
	Speed	0.12/0.16 s/60°
	Size	32X11.5X24 mm or better
	Weight	8.5g or better
25	IO Expansion Shield for Arduino (Gravity v 7.1 or equivalent) Qty: 20	
	3.3V/5V operating voltage select Switch for wireless communication & program Colorful header for illustrating digital or analog pins Immersion gold surface	
	Input Voltage	7-12 V
	Servo Power	4.8-6V
	Compatible module voltage	5V/3.3V
	Support interface	I2C, SPI, Xbee (Xbee pro), Bluetooth, APC220
26	I2C Motor Driver TB6612FNG (Grove or equivalent) Qty: 10	
	Should be able to drive two DC motors up to 12V/1.2A or one stepper motor up to 12V/1.2A Compatible with Arduino via the Grove I2C interface On board MCU Two input signals, IN1 and IN2, CW/CCW/short brake/stop function modes Built-in thermal shutdown circuit and low voltage detecting circuit Standby (Power save) system	
27	Arduino MKR Motor Carrier Qty: 10	
	Compatible with all the boards in the MKR family Four servo motor outputs Four DC motor outputs (two high performance + two standard performance) Sensing of current feedback for the high-performance motors Two inputs for encoder sensors Four inputs for analog sensors (3-pin compatible) Possibility to read the status of the batteries ON-OFF switch with Power ON LED LiPo battery connector (2S or 3S compatible) and power terminal block for alternative power source LEDs to visually indicate the direction of the rotation of the DC motors On-board processor for automated control of some of the outputs I2C connector as a 4-pin male header	
	Microcontroller	ATSAMD11 (Arm Cortex-M0+ processor)

	Max Current (MC33926)	5 Amps Peak, RMS current depending on the degree of heat sink provided
	Max Current (DRV8871)	3 Amps peak, current limited by current sense resistor.
	Rated Voltage	6.5 to 11.1V
	Reverse Current Protection	Yes
	Over Temperature Shutdown Protection (For DC Motor Drivers)	Yes
	Clock Speed	48 Mhz
	On Board Voltage Regulator	5V
	Interface	Terminal block and 3 pin/4 pin header connector
	Compatibility	MKR Family
28	Arduino Motor Shield Rev3 Qty: 20	
	Must be based on the L298 and designed to drive inductive loads such as relays, solenoids, DC and stepping motors. Must be able to drive two DC motors with Arduino board, controlling the speed and direction of each one independently. Must have the provision to measure the motor current absorption of each motor, among other features. Must be TinkerKit compatible. Free Running Stop and Brake function	
	Operating Voltage	5V to 12V
	Motor Controller	L298P, Drives 2 DC motors or 1 stepper motor
	Max Current	2A per channel or 4A max (with external power supply)
	Current Sensing	1.65V/A
29	Feetech Continuous Rotation Micro Servo motor Qty: 20	
	Dimensions	23.2 x 12.5 x 22 mm
	Weight	9 g
	Operating Speed	110RPM (4.8V) 130RPM (6V)
	Stall Torque	1.3kg.cm/18.09oz.in (4.8V) 1.5kg.cm/20.86oz.in(6V)
	Operating Voltage	4.8V~6V
	Control System	Analog
	Direction	CCW
	Operating Angle	360degrees
	Required Pulse	900us-2100us
	Bearing Type	None
	Gear Type	Plastic
	Motor Type	Metal
	Connector Wire Length	~20 cm
30	Feetech 6 KG 360 Degrees Continuous Rotation Servo motor Qty: 20	
	Dimensions	0.8 x 20.1 x 38 mm
	Weight	40 g or better
	Operating Speed	0.18sec/60degrees (4.8V) 0.16sec/60degrees (14V)
	Stall Torque	5kg.cm/69.56oz.in (4.8V) 6kg.cm/83.47oz.in(6V)
	Operating Voltage	4.8V~6V
	Control System	Analog
	Direction	CCW
	Operating Angle	360degrees

	Required Pulse	500us-2500us
	Bearing Type	2BB
	Gear Type	Plastic
	Connector Wire Length	~30 cm
31	AI Powered Sensor Board (Nicla Sense ME or equivalent) Qty: 10	
	Microcontroller	64 MHz Arm® Cortex M4 (nRF52832)
	Sensors	BHI260AP - Self-learning AI smart sensor with integrated accelerometer and gyroscope BMP390 - Digital pressure sensor BMM150 - Geomagnetic sensor BME688 - Digital low power gas, pressure, temperature & humidity sensor with AI
	I/O	Castellated pins with the following features: 1x I2C bus (with ext. ESLOV connector), 1x serial port 1x SPI 2x ADC Programmable I/O voltage from 1.8-3.3V
	Connectivity	Bluetooth® 4.2
	Power	Micro USB (USB-B), Pin Header, 3.7V Li-po battery with Integrated battery charger
	Memory	512KB Flash / 64KB RAM 2MB SPI Flash for storage 2MB QSPI dedicated for BHI260AP
	Interface	USB interface with debug functionality
32	HCHO Sensor (Grove or equivalent) Qty: 10	
	Must be based on WSP2110 or better Must be able to detect the gas whose concentration is up to 1 ppm or better Must be able to detect formaldehyde, benzene, toluene and other volatile components.	
33	Arduino MKR ENV Shield rev2 Qty: 10	
	Atmospheric pressure sensor	ST LPS22HB or equivalent
	Temperature and humidity sensor	ST HTS221 or equivalent
	Lux of the ambient sensor	VISHAY TEMT6000 or equivalent
	Input Voltage	3.3V
	Operating Voltage	3.3V
	Ranges	Pressure: 260 to 1260 hPa rH sensitivity: 0.004% rH/LSB Humidity accuracy: ± 3.5% rH, 20 to +80% rH UVA, UVB and UVBI measurement 0 0 to 650 Lux
	Communication	I2C/Analog
34	High Precision Barometric Pressure Sensor Grove(DPS310) or equivalent Qty: 20	
	Based on DPS310 or equivalent Must measure air pressure change caused by height changes in the centimeter level	
35	Grove - Dust Sensor（PPD42NS）or equivalent Qty: 20	
	Battery	Exclude
	VCC	4.75~5.75V
	Standby Current Supply	90mA
	Detectable range of concentration	0~28,000 / 0 ~ 8000 pcs/liter / pcs/0.01cf
	Operating Temperature	0~45 °C

	Range	
	Output Method	Negative Logic, Digital output, High: over 4.0V(Rev.2), Low: under 0.7V
	Detecting the particle diameter	>1μm
	Humidity Range	95% rh or less
36	Gravity: UART Infrared CO2 Sensor (0-50000ppm) Qty: 10	
	Operation Voltage	4.5～5.5V
	Output	Gravity: UART (0～3.3V Level)
	Measurement Principle	NDIR (non-dispersive infrared)
	Measurement Range	0～50000 ppm
	Accuracy	±(100ppm + 6% readings)
	Response Time	<30s
	Average Power	<430mW@5V
	Operation Temperature	0℃～50℃
	Operation Humidity	0～95% RH (No condensation)
	Lifespan	>5 years
	Features	1.High Accuracy 2.Large Range 3.Long Lifespan 4.Auto Temperature Compensation 5.Water Vapor Interference Resistance 6.3.3V UART Output
37	Grove - Gas Sensor (MQ3) Qty: 10	
	Must be suitable for detecting Alcohol, Benzine, CH4, Hexane, LPG, CO. The sensitivity of the sensor can be adjusted by using the potentiometer.	
38	Gravity: Analog CO2 Gas Sensor (MG-811 Sensor) Qty: 10	
	Must be based on SMG-811 sensor module (highly sensitive to CO2 and less sensitive to alcohol and CO, low humidity & temperature dependency.) Operating Voltage:5V Interface: Gravity Analog One digital output High-quality connector Immersion gold surface Onboard heating circuit	
39	Solar Power Manager For 12V Lead-Acid Battery Qty: 10	
	Must be able to charge a 12V lead-acid battery with a maximum of 4A using a standard 18V solar panel. Must feature MPPT (Maximum Power Point Tracking) function Must provide dual high-power outputs 5V 5A (OUT1) and 12V 8A (OUT2) and dual USB outputs 5V 2.5A (USB1/USB2). Must be compatible with 3.3V/5V controllers' I/O. Must have Over Charge/Over Discharge/Reverse Connection Protections Must have Short Circuit/Over Current/Overheat Protections	

	Solar Power Management IC: CN3767 Solar Input Voltage: 15V-25V Maximum Charge Current: 4A(Solar) Topology: DC-DC Buck
40	Gravity: Analog Capacitive Soil Moisture Sensor - Corrosion Resistant Qty: 50
	Must be made of corrosion resistant material Must have On-board voltage regulator Operating voltage range: 3.3 ~ 5.5V. I Must be compatible with MCUs (both 3.3V and 5V logic)
41	Digital Infrared Temperature Sensor (Grove or equivalent) Qty: 10
	Non-contact temperature measurement Based on MLX90615. Must contain IR sensitive thermopile detector chip and the signal conditioning chip in the same package. Communication with Arduino using SMBus Up to 127 sensors can be read via common 2 wires. 16-bit ADC Accuracy of 1℃ over wide temperature rage and a high measurement resolution of 0.02℃. - 40 to 85°C for sensor temperature - 40 to 115°C for object temperature
42	Solar Power Manager (for 9V/12V/18V solar panel) Qty: 10
	Battery Protection: Over Charge/Over Discharge/Over Current/Reverse Connection Protections Output Protection: Short Circuit/Over Current/Overheat Protections Solar Power Management IC: CN3165 Solar Input Voltage: 4.4V-6V Maximum Charge Current: 900mA(Solar/USB) Topology: Linear Regulator Battery: 3.7V Lithium Battery MPPT: 5V Fixed USB ChargeIN: Yes USB OUT: 5V 1A Regulated OUT: One Regulated Output 5V 1A Features: A small and easy-to-use 5V solar power management module. Applications: Solar Power Bank, Solar Environment Monitors For 5V Solar Panels within 10W
43	Multi-function Environmental Module - CCS811+BME280 Qty: 10
	Multi-function environment sensor Based on the combination of CCS811+BME280 chip I2C interface Must be able to detect temperature, humidity, barometric pressure, altitude, TVOC, and eCO2. ±0.5℃ temperature error ±2%RH humidity error Offset temperature coefficient: ±1.5 Pa/K, equiv. to ±12.6 cm at 1 °C temperature change.
44	Gravity: Non-contact Digital Water / Liquid Level Sensor For Arduino Qty: 20
	Non-contact water / liquid level sensor for Arduino Chip: (XKC-Y25-T12V)
45	Gravity: I2C Oxygen Sensor Qty: 10
	Measure the ambient O_2 Must support I2C output, Compatible with mainboards like Arduino Uno, esp32, Raspberry Pi. Effective range: 0~25%Vol Resolution can reach to 0.15%Vol. Input voltage: 3.3V to 5.5V. Lifetime : 2 years.
46	Gravity: Analog Electrical Conductivity Sensor / Meter For Arduino Qty: 10
	Operating Voltage: +5.00 V Measuring Range: 1ms/cm -- 20ms/cm Operating Temperature: 5 - 40 ℃ Accuracy: < ±10% F.S (using Arduino 10 bits ADC) PH2.0 Interface (3-pin SMD)

	Conductivity Electrode (Electrode Constant K = 1, BNC connector) Cable Length of the Electrode: about 60cm (23.62") DS18B20 Temperature Sensor (Waterproof) Power Indicator	
	Package must contain Conductivity Electrode (BNC Connector) x1 EC Meter Circuit Board x1 Analog cable x1 DS18B20 Temperature Sensor (waterproof) x1 Terminal Sensor Adapter x1 Digital cable x1 Conductivity Standard Solution (1413us/cm and 12.88ms/cm) x1	
47	Air Quality Sensor-Breakout (CCS811 DFRobot or equivalent) Qty: 20	
	Must be able to measure the eCO_2 (equivalent CO_2) and TVOC (Total Volatile Organic Compounds) density. Must use AMS's unique micro-hot plate technology or equivalent Must have Internally integrated ADCs and MCUs allow data to be collected, calculated, and returned via I2C. Must support a concentration alarm, which is triggered when the concentration exceeds the threshold. Must support multiple modes Must have sleep mode	
48	Water Sensor (Grove or equivalent) Qty: 20	
	Grove compatible interface Low power consumption ~ 2.0cm x 2.0cm High sensitivity Working Voltage: 4.75-5.25 V Current <20mA Working Humidity (Without Condensation) 10-90 % Must come with the interface wire pack	
49	Temperature Sensor (Grove or equivalent) Qty: 20	
	Voltage: 3.3 ~ 5V Zero power resistance: 100 KΩ Resistance Tolerance: ±1% Operating temperature range: -40 ~ +125 ℃ Nominal B-Constant：4250 ~ 4299K Must come with the interface wire pack	
50	Temp & Humidity & Barometer Sensor (BME280 Grove or equivalent) Qty: 10	
	Input Voltage	3.3V or 5V
	I/O Voltage	3.3V or 5V
	Operating Current	0.4mA
	Operating Temperature	-40 - 85 ℃
	Atmospheric Pressure Sensor Measurement Range	300 - 1100 hPa (1 hPa= one hundred Pa) with ±1.0 hPa accuracy
	Temperature Sensor Measurement Range	-40 - 85 ℃, with ±1.0°C accuracy
	Humidity Sensor Measurements Range	0% - 100% relative humidity , with ±3% accuracy
	Measurement Modes	Piezo & Temperature, forced or periodic
	Chip	BME280(datasheet)
	Interface Bus	SPI, I2C (use either one of them)
	Parameter	Value
	Input Voltage	3.3V or 5V
	I/O Voltage	3.3V or 5V

	Operating Current	0.4mA
	Operating Temperature	-40 - 85 ℃
	Atmospheric Pressure Sensor Measurement Range	300 - 1100 hPa (1 hPa= one hundred Pa) with ±1.0 hPa accuracy
	Temperature Sensor Measurement Range	-40 - 85 ℃, with ±1.0°C accuracy
	Humidity Sensor Measurements Range	0% - 100% relative humidity , with ±3% accuracy
51	Moisture Sensor (Grove or equivalent) Qty: 20	
	Operating voltage	3.3~5V
	Operating current	35mA
	Sensor Output Value in dry soil	0~ 300
	Sensor Output Value in humid soil	300~700
	Sensor Output Value in water	700 ~ 950
52	Hall Sensor (Grove or equivalent) Qty: 10	
	400ns transition period for rise and fall.	
53	Analog pH Sensor / Meter Pro Kit For Arduino (Gravity or equivalent) Qty: 10	
	Professional pH Sensor Meter Kit with industrial electrode. Life (up to 1 year) Module Power : 5.00V Measuring Range :0-14PH Measuring Temperature :0-60 ℃ Accuracy : ± 0.1pH (25 ℃) Response Time : ≤ 1min Industry pH Electrode with BNC Connector PH2.0 Interface (3 foot patch) Gain Adjustment Potentiometer Power Indicator LED Kit must contain the following: Industry pH electrode (BNC connector) x1 pH sensor circuit board x1 Analog cable x1	
54	Ozone Sensor (0-10ppm) (Gravity or equivalent) Qty: 10	
	Detection Gas: Ozone Working Voltage: 3.3 ~ 5.5V DC Interface: Gravity-4Pin Output Signal: I2C output Measuring Range: 0 ~ 10ppm Resolution: 0.01ppm (10ppb) Warm-up Time: ≤3 minutes Response Time: ≤90 seconds Recovery Time: ≤90 seconds Working Temperature: -20 ~ 50 ℃ Operating Humidity: 15 ~ 95% RH (non-condensing) Storage Temperature: -20 ~ 50 ℃ Life:> 2 years (in air)	
55	SOIL HUMIDITY SENSOR, WATERMARK 2 M / 75 CM (Pack of 6) Qty: 10	
	Range 0 – 239 cbars, Frost resistant Watermark sensors must be glued/riveted on a semi-tender PVC tube that is re-molded back in 2 diameters 25/22 mm	
56	Voice Controlled Light Bundle Qty: 5	

	Compatible with Alexa The bundle must contain 1 x Arduino MKR WIFI 1010. Compatible with the Arduino IoT Cloud and Amazon Alexa's Smart Home Skill 1 x Arduino MKR RGB Shield. With 84 RGB LEDs	
57	PCBite kit with 4x SP10 probes and test wires Qty: 5	
	4× PCBite holder 1× Large Base plate (A4) 4× SP10 probes with pin tipped test needles 4x Extra crown tipped test needles 1x Set of yellow insulation washers 5x Dupont to dupont test wires 2x Banana to dupont test wires 1x Micro fiber cloth	
58	LA104 Logic Analyzer Qty: 10	
	Channels	4
	Max Sample Rate	100MHz
	Min Captured Pulse Width	10ns
	Input Voltage Range	0-5V
	Equivalent Input Impedance	1MΩ
	Threshold Voltage	1.2-3V
	Programmable Output Channel	4
	Programmable Output Type	PWM,SPI,I2C,UART
	Programmable Output Amplitude	3V
	3v Power Output Channel	1
	Storage	8MB USB Flash Disk Memory
	Battery	Built-in 500mAh Lithium Battery
	Display	2.8'' Color LCD Screen
59	Arduino MKR WiFi 1010 Qty: 20	
	Microcontroller	SAMD21 Cortex®-M0+ 32bit low power ARM® MCU (datasheet)
	Radio Module	u-blox NINA-W102 (datasheet)
	Board Power Supply (USB/Vin)	5V
	Secure Element	ATECC508 (datasheet)
	Supported Battery	Li-Po Single Cell, 3.7V, 1024mAh Minimum
	Circuit Operating Voltage	3.3V
	Digital I/O Pins	8
	PWM Pins	13 (0 .. 8, 10, 12, 18 / A3, 19 / A4)
	UART	1
	SPI	1
	I2C	1
	Analog Input Pins	7 (ADC 8/10/12 bit)
	Analog Output Pins	1 (DAC 10 bit)
	External Interrupts	10 (0, 1, 4, 5, 6, 7, 8,9, 16 / A1, 17 / A2)
	DC Current Per I/O Pin	7 mA
	CPU Flash Memory	256 KB (internal)

	SRAM	32 KB
	EEPROM	no
	Clock Speed	32.768 kHz (RTC), 48 MHz
	Led_Builtin	6
	USB	Full-Speed USB Device and embedded Host
60	Arduino Sensor Kit - Base Qty: 10	
	1 Base Shield that is designed to fit on top of an Arduino UNO board. Must come equipped with 16 grove connectors, which, when placed on top of the UNO, provide functionality to various pins. Kit must include the following: 7x digital connections 4x analog connections 4x I2C connections 1x UART connection 10 Grove modules included can be connected to the base shield, either through the digital, analog or I2C connectors on the shield	
61	Arduino MKR WAN 1310 Qty: 10	
	Microcontroller	SAMD21 Cortex®-M0+ 32bit low power ARM MCU
	Radio Module	CMWX1ZZABZ
	Board Power Supply (USB/Vin)	5V
	Secure Element	ATECC508
	Supported Batteries	rechargeable Li-Ion, or Li-Po, 1024 mAh minimum capacity
	Circuit Operating Voltage	3.3V
	Digital I/O Pins	8
	PWM PINS	13 (0 .. 8, 10, 12, 18 / A3, 19 / A4)
	UART	1
	SPI	1
	I2C	1
	Analog Input Pins	7 (ADC 8/10/12 bit)
	Analog Output Pins	1 (DAC 10 bit)
	External Interrupts	8 (0, 1, 4, 5, 6, 7, 8, 16 / A1, 17 / A2)
	DC Current Per I/O Pin	7 mA
	CPU Flash Memory	256 KB (internal)
	QSPI Flash Memory	2MByte (external)
	SRAM	32 KB
	EEPROM	no
	Clock Speed	32.768 kHz (RTC), 48 MHz
	Led_Builtin	6
	USB	Full-Speed USB Device and embedded Host
	Antenna Gain	2dB (bundled pentaband antenna)
	Carrier Frequency	433/868/915 MHz
62	Arduino Nano 33 IoT with headers Qty: 5	
	Microcontroller	SAMD21 Cortex®-M0+ 32bit low power ARM MCU
	Radio module	u-blox NINA-W102
	Secure element	ATECC608A

	Operating voltage	3.3V
	Input voltage (limit)	21V
	DC Current Per I/O Pin	7 mA
	Clock Speed	48MHz
	CPU Flash Memory	256KB
	SRAM	32KB
	EEPROM	none
	Digital Input / Output Pins	14
	PWM PINS	11 (2, 3, 5, 6, 9, 10, 11, 12, 16 / A2, 17 / A3, 19 / A5)
	UART	1
	SPI	1
	I2C	1
	Analog input pins	8 (ADC 8/10/12 bit)
	Analog output pins	1 (DAC 10 bit)
	External interrupts	All digital pins (all analog pins can also be used as interrput pins, but will have duplicated interrupt numbers)
	Led Built-in	13
	USB	Native in the SAMD21 Processor
	IMU	LSM6DS3
63	WiFi Module - ESP8266 (4MB Flash) Qty: 20	
	802.11 b/g/n Wi-Fi Direct (P2P), soft-AP Integrated TCP/IP protocol stack Integrated TR switch, balun, LNA, power amplifier and matching network Integrated PLLs, regulators, DCXO and power management units +19.5dBm output power in 802.11b mode Power down leakage current of <10uA 4MB Flash Memory Integrated low power 32-bit CPU SDIO 1.1 / 2.0, SPI, UART STBC, 1×1 MIMO, 2×1 MIMO A-MPDU & A-MSDU aggregation & 0.4ms guard interval Wake up and transmit packets in < 2ms Standby power consumption of < 1.0mW (DTIM3) Soldered Headers	
64	ESP-01S Wifi Module with relay Qty: 20	
	Supply Voltage: DC 5V Relay load capacity: 10A 250VAC ,10A 125VAC, 10A 30VDC, 10A 28VDC	
65	ESP-01s USB Programmer Qty: 10	
	USB to ESP-01 adapter module CH340G USB to TTL driver IC onboard, Working voltage: 4.5V - 5.5V (On-board 3.3v LDO Regulator) Working current: 300mA(LDO regulator can supply) Selectable working mode: On-board toggle switch. UART side for serial TTL debugging by AT commands, PROG for firmware programming USB to serial TTL chip: CH340G Logic level: 3.3V	
66	WiFi LoRa 32 Dev Board (Heltec or equivalent) Qty: 10	
	Processor: Tensilica LX6 dual-core processor, clocked at 240MHz, computing power up to 600DMIPS, SRAM: chip built-in 520 KB SRAM Wi-Fi: ESP32 series 802.11b/g/n HT40 Wi-Fi transceiver, baseband, protocol stack and LWIP Integrated dual-mode Bluetooth (traditional Bluetooth and BLE low power Bluetooth).	

	Lora: SX1276 chip, 868/915MHz frequency, -139dBm high sensitivity, +20 dBm power output, high reliability, transmission distance (measured open area communication distance 2.8Km). Onboard 32MByte Flash 0.96-inch blue OLED display Lithium battery charging circuit and interface CP2102 USB to serial chip Operating voltage: 3.3V to 7V Operating temperature range: -40 ° C to + 90 ° C Supports Sniffer, Station, softAP and Wi-Fi Direct modes Data rate: 150 Mbps 11n HT40,72 Mbps 11n HT20,54 Mbps 11g, 11 Mbps 11b Transmit power: 19.5 dBm 11b, 16.5 dBm 11g, 15.5 dBm 11n Receiver sensitivity up to - 139 dBm UDP continues to throughput by 135 Mbps Antenna Specifications: Connector type: ipex Band definition: 868-915MHz Standing wave ratio: ≦ 1.5 Gain: 3dBi Maximum power: 10W Input impedance: 50Ω Package must include 1 * ESP32 Development Board with OLED 1 * 868/915MHz Antenna 1 * Pin sticker 2 * Pin headers
67	LoRa Test Board Kit (LLCC68 based E220-900T30S or equivalent) Qty: 2
	For testing the EBYTE E220-900T30S Lora Transceiver All pins of E220-900T30S module have been led out Pre-welded E220-900T30S Must be Equipped with USB interface, can be directly plugged into the computer to use Working Frequency: 850.125-930.125MHz IC: LLCC68 or equivalent Operating Voltage: 3.3-5.5V Power: 30dBm Receiving Sensitivity: -129dBm Antenna must be included
68	LoRa LLCC68 Development Kit 430 MHz 470 MHz Qty: 2
	For testing the EBYTE E220-400T30S Lora Transceiver All pins of E220-400T30S module have been led out Pre-welded E220-400T30S Must be Equipped with USB interface, can be directly plugged into the computer to use Working Frequency: 430Mhz-470Mhz IC: LLCC68 or equivalent Operating Voltage: 3.3-5.5V Power: 30dBm Receiving Sensitivity: -129dBm Antenna must be included Must include USB power supply cable
69	LLCC68 LoRa Module 868MHz 915MHz 30dBm UART Qty: 10
	Certification: CE, FCC, RoHS Working Frequency: 868MHz 915MHz Model Number: E220-900T30D IC: LLCC68 Working Frequency: 850.125~930.125MHz Power: 30dBm Distance: 10km Communication Distance: UART Package Type: DIP Antenna Type: SMA-K
70	LLCC68 LoRa Module 433MHz 470MHz 30dBm UART Qty: 10

	Certification: CE, FCC, RoHS Origin: CN(Origin) Working Frequency: 433MHz Model Number: E220-400T30D IC: LLCC68 Working Frequency: 410.125~493.125MHz Power: 30dBm Distance: 10km Antenna Type: SMA-K Communication Distance: UART
71	Antenna for LLCC68 LoRa Module 868MHz 915MHz 30dBm UART Qty: 10
	Antenna compatible with item specs (S. No. 69)
72	Antenna for LLCC68 LoRa Module 433MHz 470MHz 30dBm UART Qty: 10
	Antenna compatible with item specs (S. No. 70)
73	Fingerprint Sensor Module (Adafruit or equivalent) Qty: 10
	Supply voltage: 3.6 - 6.0VDC Operating current: 120mA max Peak current: 150mA max Fingerprint imaging time: <1.0 seconds Signature file: 256 bytes Template file: 512 bytes Storage capacity: 162 templates Safety ratings (1-5 low to high safety) False Acceptance Rate: <0.001% (Security level 3) False Reject Rate: <1.0% (Security level 3) Interface: TTL Serial Baud rate: 9600, 19200, 28800, 38400, 57600 (default is 57600) Working temperature rating: -20C to +50C Working humidity: 40%-85% RH
74	Adafruit DS1307 Real Time Clock Assembled Breakout Board Qty: 10
	RTC: DS1307 Breakout board with headers Battery cell must be included
75	DS3231 Precision RTC Breakout (Adafruit or equivalent) Qty: 5
	RTC: DS3231 Breakout board with headers Battery cell must be included
76	MicroSD card breakout board+(Adafruit or equivalent) Qty: 10
	Onboard 5v->3v regulator able to provide up to 150mA for power-hungry cards 3v/5v level shifting Activity LED lights up when the SD card is being read or written Compatible with Arduino
77	HDMI Cables for Raspberry Pi 4 B+ (Micro HDMI to HDMI) Qty: 10
	HDMI A (Standard) to HDMI D (micro) 19-pin HDMI Type D(M) to 19-pin HDMI Type A(M) Nickel-plated plugs 4Kp60 compliant RoHS compliant 3Mohm 300VDC insulation withstands 300VDC for 0.1s 1-meter length, ~ 3 feets Compliant with HDMI high-speed cable standards Must support both audio and video Must support Ethernet and Audio Return Channel (CEC)
78	Ethernet Cable Qty: 20
	RJ45 connectors at both ends of the cable Type: CAT5E Gigabit Ethernet cable

	Data speed: Up to 1 Gbps Length: ~1.8 meter
79	Raspberry Pi 8MP Camera Module V2.1 Qty: 10
	8MP SONY IMX219 image sensor Wider image, capable of 3280x2464 stills, 1080p30 video and so forth Fixed focus lens on-board Integral with IR (infrared) filter 150mm CSI camera cable included 8-megapixel native resolution sensor-capable of 3280 x 2464 pixel static images Supports 1080p30, 720p60 and 640x480p90 video Connects to the Raspberry Pi board via a short ribbon cable (must be supplied)
80	Raspberry Pi 7 Inch Touch Screen Display (Official) Qty: 5
	Screen Dimensions: 194mm x 110mm x 20mm (including standoffs) Viewable screen size: 155mm x 86mm Screen Resolution: 800 x 480 pixels 10 finger capacitive touch. Connects to the Raspberry Pi board using a ribbon cable connected to the DSI port.
81	Hot Air Soldering Rework Station w/ Three Nozzles – Quick 957DW+ Qty: 2
	Closed-loop temperature control range between 100-450°C Digital display Intelligent cooling system so the airflow remains on until it gets to below 100°C. Max air flow is 100L/minute Technical Details Hose Length: 105 cm / 41.5” 120VAC – 580 Watts Outer Diameters of Three Nozzles: 3mm / 0.12” 6.4mm / 0.25” 8.4mm / 0.33”
82	Engineer Professional Silicone-Tip Solder Sucker Qty: 2
	Dimensions: 8.1 x 3.4 x 0.7 inches or better Cylinder Capacity: 9cc
83	USB MicroSD Card Reader/Writer – microSD/microSDHC /microSDXC Qty: 10
	Compatible with USB 3.0 and backwards-compatible with USB 2.0 microSD/microSDHC /microSDXC PC & Mac Computers Compatible with Windows® 10 and later, and Mac OS 10.6+ Fast Transfer Speeds Fast UHS-I transfer speeds of up to 170MB/s*
84	64GB Extreme microSDHC UHS-I Memory Card with Adapter Qty: 10
	Class: 10 Up to 160MB/s read speeds to save time transferring high-res images and 4K UHD videos Up to 60MB/s write speeds for fast shooting. 4K UHD and Full HD-ready with UHS Speed Class 3 (U3) and Video Speed Class 30 (V30)(5) Rated A2 for faster loading and in-app performance Built for and tested in harsh conditions: temperature-proof, water-proof, shock-proof and x-ray proof
85	32GB Ultra microSDHC UHS-I Memory Card with Adapter Qty: 10
	Class: 10 Up to 160MB/s read speeds to save time transferring high-res images and 4K UHD videos Up to 60MB/s write speeds for fast shooting. 4K UHD and Full HD-ready with UHS Speed Class 3 (U3) and Video Speed Class 30 (V30)(5) Rated A2 for faster loading and in-app performance Built for and tested in harsh conditions: temperature-proof, water-proof, shock-proof and x-ray proof
86	Wire Stripper Qty: 5
	Must be able to strip, cut and loop 10, 12, 14, 16, 18 AWG solid and 12, 14, 16, 18, 20 AWG stranded wire. Body Material: Metal Handle Material: Plastic

	Make: Klein Tools, Pro'skit or equivalent
87	Breadboard power supply Qty: 20
	Must be mountable on breadboard and provide both 5V and 3.3V simultaneously. Input Voltage : DC 6.5-12V or USB Power Supply Must include the compatible DC Power adapter Output Voltage : DC 3.3V/5V Must have ON/OFF switch and indicator Output current: At least 700mA
88	Vero board Qty: 20
	Size: 100 by 240 mm Material: Fiber Glass FR4 Surface: Copper PCB Hole Diameter: 1.0mm Hole Pitch: 2.54mm Copper Thickness: 25 microns Sided: Single-Sided
89	Soldering Wire + Paste Qty: 20
	Solder Wire: Diameter: 0.6mm Weight: 50g Wire solder alloy: 60% Tin (Sn) and 40% Lead (Pb) Rosin core flux: 1.6% Melting point: 184°C **Soldering Paste:** Must facilitate the flow of solder, as it flows wherever the solder wire flux is applied Must prevent corrosion or oxidation on the soldered area Must keep the soldering area clean and smooth.
90	Magnifying glass for soldering Qty: 5
	3 kinds of magnifying lens: 2.5X 90mm (diameter), 7.5X 34mm, 10X 34mm. Independent bright illuminating light with 5 pcs of LEDs. Base surface: steel sheet. Stand: Must include a stand. Lens diameter: 90mm & 34mm Power adapter: Input 110-240V 50/60Hz, Output: DC 4.8V 250mA Plug standard: EU plug
91	Breadboard Qty: 20
	2 Distribution Strips, 200 tie-points 630 tie-points in IC/ circuit areas ABS plastic with color legend Dimension: 6.5*4.4*0.3 inch Hole/Pitch Style: Square wire holes (2.54mm) ABS heat Distortion Temperature: 84° C (183° F) Rating: 300/3 to 5Amps Insulation Resistance: 500MΩ / DC500V Withstanding Voltage: 1,000V AC / 1 minute Insertion Wire Size: 21 to 26 AWG wire
92	DE1-SoC Development Kit including cables and power adapter Qty: 5
	Detailed Specs: Cyclone V SoC FPGA 5CSEMA5F31 with EPCQ256 256-Mbit serial configuration device ARM* Cortex-A9 dual core (925 MHz) Nios® II processor
93	DE10-Lite Qty: 20
	Intel® MAX® 10 FPGA 10M50DAF484C7G with integrated dual ADCs. Each ADC supports one dedicated analog input and eight dual function pins Nios II processor

94	Raspberry Pi Kit with Accessories Qty: 20
	The Kit should Include: Raspberry Pi 4 Model B, 8GB RAM Power Adpter for Raspberry Pi 4 Model B Micro HDMI to HDMI Cable (~ 3 ft) Pi Tin for the Raspberry Pi 64 GB microSD microSD USB Reader Compatible fan for cooling Pi Wedge compatible with Raspberry Pi 4 Model B FTDI Basic Breakout 3.3V Breadboard Full Size (bare) Multicore Buttons (4 pack) Assorted LED (20 pack) Resistor 220 Ohm 1/6 Watt PTH-----20 pack Raspberry Pi GPIO Ribbon Cable -----40-pin, 6 ‘’ Jumper wires Premium 6`` M/F------ 10 Pack Jumper Wires Standard 7``M/M------30 Pack
95	Arduino Starter Kit Qty: 20
	The Kit Should have Audrino UNO R3 (1 pc) Bread Board (1 pc) F-F Jumper Strip (2pc) M-M Jumper Strip (1pc) Bluetooth HC-05 (1pc) ADXL 345 (GY291) (1pc) Servo SG90 9G (1pc) LCD 16×2 (1pc) Line Follower Sensor (1pc) LM 35 Temperature Sensor (1pc) Variable Resistor (2pc) Distance Sensor HC-SR04 (1pc) DC Motor Small (1pc) 2N2222 Transistor (1pc) Male Pin Headed (1pc) Push Button (6 pc) LEDs (6pc) Resistor
96	Super Value Ultimate 37 in 1 Sensor Modules Kit for Arduino & MCU Qty: 20
	1 x Small passive buzzer module KY-006 – 1 x 2-color LED module KY-011 1 x Hit sensor module KY-031 1 x Vibration switch module KY-002 1 x Photo resistor module KY-018 1 x Key switch module KY-004 1 x Tilt switch module KY-020 1 x 3-color full-color LED SMD modules KY-009 1 x Infrared emission sensor module KY-005 1 x 3-color LED module KY-016 1 x Mercury open optical module KY-017 1 x Yin Yi 2-color LED module 3MM KY-029 1 x Active buzzer module KY-012 1 x Temperature sensor module KY-013 1 x Automatic flashing colorful LED module KY-034 1 x Mini magnetic reed modules KY-021 1 x Hall magnetic sensor module KY-003 1 x Infrared sensor receiver module KY-022 1 x Class Bihor magnetic sensor KY-035 1 x Magic light cup module KY-027 1 x Rotary encoder module KY-040 1 x Optical broken module KY-010 1 x Detect the heartbeat module KY-039 1 x Reed module KY-025 1 x Obstacle avoidance sensor module KY-032

	1 x Hunt sensor module KY-033 1 x Microphone sound sensor module KY-038 1 x Laser sensor module KY-008 1 x 5V relay module KY-019 1 x Temperature sensor module KY-001 1 x Temperature sensor module KY-028 1 x Linear magnetic Hall sensors KY-024 1 x Flame sensor module KY-026 1 x Sensitive microphone sensor module KY-037 1 x Temperature and humidity sensor module KY-015 1 x XY-axis joystick module KY-023 1 x Metal touch sensor module KY-036 1 x Arduino 37 Sensor Kit 1 x Organizer Case
97	ZedBoard Zynq-7000 ARM/FPGA SoC Development Board Qty: 10
	ZedBoard APSoC development board 12 V AC/DC power supply 4 GB SD Card USB A to micro-B cable USB Adapter: Male Micro-B to Female Standard-A
98	PYNQ-Z1: Python Productivity for Zynq-7000 ARM/FPGA SoC with Accessory Kit Qty: 20
	PYNQ-Z1 with Accessory Kit including microSD card Ethernet cable micro USB power supply
99	Eclypse Z7: Zynq-7000 SoC Development Board with SYZYGY-compatible Expansion Qty: 1
	Eclypse Z7 bundled with a Zmod AWG 1411 and Zmod Scope 1410-105
100	ZedBoard Advanced Image Processing Kit (Quad Pcam option) Qty: 5
	4 Pcam 5Cs 10 cm ribbon cable FMC Pcam Adapter
101	PMOD sensors Qty: 5
	1. Pmod ISNS20: 20A Current Sensor 2. Pmod TMP3: Digital Temperature Sensor 3. Pmod ALS: Ambient Light Sensor 4. Pmod TMP2: Temperature Sensor 5. Pmod COLOR: Color Sensor Module 6. Pmod AQS: Digital Gas Sensor for Air Quality 7. Pmod DPG1: Differential Pressure Gauge Sensor 8. Pmod HYGRO: Digital Humidity and Temperature Sensor 9. Pmod LS1: Infrared Light Detector 10. Pmod PS2: Keyboard / Mouse Connector 11. Pmod PIR: Passive Infrared Motion Sensor 12. Pmod TC1: K-Type Thermocouple Module with Wire 13. Pmod GPS: GPS Receiver 14. Pmod ACL: 3-axis Accelerometer 15. Pmod GYRO: 3-axis Digital Gyroscope 16. Pmod NAV: 9-axis IMU Plus Barometer 17. Pmod MAXSONAR: Maxbotix Ultrasonic Range Finder 18. Pmod MIC3: MEMS Microphone with Adjustable Gain 19. Pmod CMPS2: 3-Axis Compass 20. Pmod CDC1: Capacitative Input Buttons 21. Pmod DPOT: Digital Potentiometer 22. Pmod CON4: RCA Audio Jacks 23. Pmod RJ45: RJ45 connector (Pair) 24. Pmod CON1: Wire Terminal Connectors 25. Pmod BTN: 4 User Pushbuttons 26. Pmod AMP2: Audio Amplifier 27. Pmod NIC100: Network Interface Controller 28. Pmod RTCC: Real-time Clock / Calendar

	29. Pmod HB5: H-bridge Driver with Feedback Inputs 30. Pmod BB: Wire Wrap / Breadboard 31. Pmod PMON1: Power Monitor 32. Pmod AD1: Two 12-bit A/D Inputs 33. Pmod TPH: 6-pin Test Point Header 34. Pmod RS232: Serial Converter and Interface Standard 35. Pmod BT2: Bluetooth Interface 36. Pmod LED: Four High-brightness LEDs 37. Pmod R2R: Resistor Ladder D/A Converter 38. Pmod DA1: Four 8-bit D/A Outputs 39. Pmod OC1: Open Collector Output 40. Pmod OD1: Open Drain Output 41. Pmod KYPD: 16-button Keypad 42. Pmod CLS: Character LCD with Serial Interface 43. Pmod USBUART: USB to UART Interface 44. Pmod ENC: Rotary Encoder 45. Pmod DA3: One 16-bit D/A Output 46. Pmod CON3: R/C Servo Connectors 47. Pmod SSD: Seven-segment Display 48. Pmod AMP3: Stereo Power Amplifier 49. Pmod RF2: IEEE 802.15 RF Transceiver 50. Pmod LVLSHFT: Logic Level Shifter 51. Pmod SWT: 4 User Slide Switches 52. Pmod Adapter for NI myRIO 53. Pmod AD5: 4-channel 4.8 kHz 24-bit A/D Converter 54. Pmod WiFi: WiFi Interface 802.11g 55. Pmod DHB1: Dual H-bridge 56. Pmod ToF: Time of Flight Sensor 57. Pmod SSR: Solid State Relay Electronic Switch 58. Pmod JSTK2: Two-axis Joystick 59. Pmod MTDS: Multi-Touch Display System 60. Pmod BLE: Bluetooth Low Energy Interface
102	Connectors and Adapters Qty: 20
	2x6-pin to Dual 6-pin Pmod Splitter Cable Pmod Clip: Mechanical Mount for Pmod boards Pmod DIP: DIP to 12-pin Pmod Adapter Pmod Cable Kit: 6-pin Pmod Cable Kit: 2x6-pin and 2x6 Pin to Dual 6-pin Pmod Splitter Cable Pmod HAT Adapter: Pmod Expansion for Raspberry Pi Pmod Shield: Adapter Board for Uno R3 Standard to Pmod
103	ZU-5EV (Zynq Ultrascale+ MPSoC Development Board) Qty: 1
	XCZU5EV-SFVC784-1-E (with heat sink and fan) 4 GiB DDR4 SODIMM module Multimedia: 1.2a dual-lane display port 2x Pcam dual-lane Audio codec H.264/H.265 HDMI Network connectivity: 2.4 GHz onboard Wi-Fi Ethernet SIM card slot WLAN/WWAN/LoRa option: MiniPCIe Expansion: 1x FMC expansion connector 1x FMC gigabit 1x SYZYGY port 4x Pmod ports
104	Xilinx Virtex-7 FPGA VC707 Evaluation Kit Qty: 1
	VC707 evaluation board with the Virtex-7 XC7VX485T2FFG1761CES FPGA Full-seat ISE Design Suite Logic Edition, device-locked for the Virtex-7 XC7VX485T-2FFG1761CES FPGA
105	Universal Programmer (Xeltek Superpro 610p or equivalent) Qty: 5
	Must have support for ~34000 ICs from ~250 manufacturers

	Must have In-system programming (ISP / ICP) capability. Must have Programming / testing features for TTL/CMOS logic ICs and memories. Must Support devices with Vcc from 1.2V to 5V. Must be Built with 48 universal pin-drivers. Must have PC hosted mode Must support only IC manufacturer approved programming algorithms. Must have the support for processes such as device selection, file loading, device configuration setting, program option, and batch file setting into one touch step. Must have the support to set Password for project files and production volume control Must have Batch command for device operations like program, verify, security into a single command at any sequence. Must have Serial numbers generators as standard or customer-specific functions. Must generate a Log file. Over-current and over-voltage protection for safety of the chip and programmer hardware. WINDOWS XP/Vista compatibility/Win7/Win10 Supported devices: EPROM, Paged EPROM, Parallel and Serial EEPROM, BPROM, NVRAM, SPLD, CPLD, EPLD, Firmware HUB, Microcontroller, MCU. Packages supported: DIP, SDIP, PLCC, JLCC, SOIC, QFP, TQFP, PQFP, VQFP, TSOP, SOP, TSOPII, PSOP, TSSOP, SON, CSP, SCS. PC interface: USB2.0 Electrical spec. of the AC adapter: AC 100-240V, output 12V/2A; power:15W Contents: USB Interfaced Universal Programmer (Xeltek SuperPro 610P or equivalent) AC Power Adapter USB Cable CD with Software User Manual
106	Zigbee module with antenna (XBee S2C ZigBee (Wire Antenna) or equivalent) Qty: 10
	SPECIFICATION Interoperable with other ZigBee compliant devices* Must support binding and multicasting, for easy integration into a Home Automation platform 15 general-purpose I/O lines Link budgets of 110 dB for XBee sleep current of sub 1uA Firmware upgrades via UART, SPI or over the air Data Rate: RF 250 Kbps, Serial up to 1 Mbps Indoor/Urban Range: 200ft (60m) Outdoor/RF Line-of-Sight Range: 4000ft (1200m) Transmit Power: 3.1mW Receiver Sensitivity: -100dBm Serial Data Interface: UART, SPI Configuration Method: API or AT command, local or over-the-air Frequency Band: ISM 2.4GHz Form Factor: Through-Hole, Surface Mount Interference Immunity: DSSS (Direct Sequence Spread Spectrum) ADC Inputs: (4) 10-bit ADC inputs Digital I/O: 15 Antenna: Integrated Wire

Sr. No.	**Lot No. 4: Computers for AI Computer Lab**	
1	**Desktop Computers** **Quantity: 40**	
	Model	Dell OptiPlex 7090 Mini tower or Equivalent
	Processor	Intel® Core™ i7-11700 Processor (8-Core, 16M Cache, up to 4.90 GHz) or better
	RAM	32GB 2x16GB DDR4 or Higher
	Hard Drive	512 GB SSD or higher
	Graphic Card	Zotac RTX 3060TI 8 GB or better (Intel® Integrated Graphics)
	Ports	Front:

		1 USB 2.0 ports with Power Share 1 USB 2.0 ports 1 USB 3.2 Gen 2 port USB 3.2 Gen2x2 Type-C (with Power Delivery) 1 universal audio port Rear: 3 USB 3.2 Gen 1 port 1 USB 3.2 Gen 2 port 2 USB 2.0 port with SmartPower On 2 PS/2 port 1 Serial port 2 DisplayPort 1.4 ports 1 Re-tasking Line-out/Line-in audio port 1 RJ45 Ethernet port 1 VGA port 1 HDMI 2.0b port 1 DisplayPort 1.4 port
	Network and Communication	Wireless LAN Intel Wi-Fi 6 AX201, Dual-band 2x2 802.11ax with MU-MIMO Bluetooth Yes, 5.1 with Internal Antenna
	Operating System	Windows 10 Pro (Includes Windows 11 Pro License) English, French, Spanish
	Warranty	3 Year or more
2	**Monitors** **Quantity: 40**	
	Dimension	23 inches or above
	Minimum Resolution	1920*1080 @ 60 Hz or better
	Panel Type	IPS
	Aspect Ratio	16:09
	Response time	8 ms (Normal); 5 ms (Fast) - (gray to gray)
	Brightness	250cd/m2 or better
	Device Type	LED Edge light System
	Input	1 Display Port v 1.2, 1HDMI port v 1.4, 1 VGA Port, 1 USB 3.0 upstream, 2 x USB 3.0 and 2 x USB 2.0 ports downstream
	Compliant Standard	ENERGY STAR certified monitor, EPWAT Gold, RoHS-compliant, TCO certified displays, BFR/PVC free monitor, Arsenic-Free and Mercury-Free for the panel

Lot No. 5: Furniture for AI Computer Lab		
Sr. No	**Chairs** **QTY: 100**	
1	**Base:** Steel (CRC Confirming to ASTMA A 1008/A or equivalent standard, Powder Coated with mobility under load 136Kg (BIFMA) with load bearing capacity 11,100N Wheels. PU Coated Nylon wheels (Noise Free) Gas Lift, Height Adjustable. **Mechanism:** 2 Locks multifunctional System. Test Load 102Kgs (BIFMA) **Seat Foam:** High Pressure PU Rigid foam, Retention durability 136Kgs (BIFMA) **Back Foam:** Steel frame covered with Puleathrite. **Upholstery:** i) PU Leathrite having mass value 650gr/M2, 100% polyester fibers with napped corrosion value 5, ii) 100% Polyester, Min 230gr/M2 as per client choice **Armrest:** PP Fixed Loop Armrest Height adjustable armrest (7 Position click type) Armrest horizontally testing load 670N (function) / 1334 N resistance Leg Froward & Backward.b334N (Function) /556 N (Resistance)	
2	**Table (3-Person)** **Quantity: 15**	
	Freestanding table frame (double bar) for 03 Person {Metal Frame 3 Person Office Desk} Consist of Freestanding table frame (double bar) Dimensions: W2440*D610*H750 Included 2pcs metal legs + 2pcs side to side connection bar straight tabletop with W2440*D610*T25 T=25mm, straight PVC edge, practical board or MDF with customized color Fabric desk screen 3x(H700*W700) T12mm MDF covered with fabric, 12mm gap in the middle (2) of the screen, 4mm Iron bracket with screws thin edge pedestal with dimensions W400*D480*H590 Full metal, box + box + filing, full pull-out drawer 18-inch telescopic slides, have bottom cover, Iron thickness 0.8mm, with 1pcs file hanging bar and plastic pencial tray.	

	Table (2-Person) **Quantity: 12**	
3	Freestanding table frame (double bar) for 02 Person {Metal Frame 3 Person Office Desk} Consist of Freestanding table frame (double bar) Dimensions: W2440*D750*H750 Included 2pcs metal legs + 2pcs side to side connection bar straight tabletop with W2440*D750*T25 T=25mm, straight PVC edge, practical board or MDF with customized color Fabric desk screen 2x(H700*W1100) T12mm MDF covered with fabric, 12mm gap in the middle (2) of the screen, 4mm Iron bracket with screws thin edge pedestal with dimensions W400*D480*H590 Full metal, box + box + filing, full pull-out drawer 18-inch telescopic slides, have bottom cover, Iron thickness 0.8mm, with 1pcs file hanging bar and plastic pencil tray.	

Note:

1. PAF-IAST may re-adjust the quantities specified against the specifications of same genre in any of the Lots or increase the quantities as permissible under PPRA Rules.
2. The Bidder shall indicate in their offer,
    a. detailed specifications of their offered product(s),
    b. standard accessories,
    c. make and origin, as part of confirming Compliance as per the format given in Form – D.
3. The Unit Price, Total Bid Price, and Additional Warranty Price of the quoted items shall be indicated as per the given format in Form – G.
4. Bidders are required to provide/attach third party report or assessment in case items are quoted as per the provision of “Equivalent” given in Tender Document.

Section 5b: Special Terms and Conditions

Standard

- The goods supplied must be capable of functioning properly under the climatic conditions of Haripur.
- There shall be no deviation from specification and country of make as provided with each item. In case of any ambiguity in specification/ accessories needed for the full functioning of the equipment, the firm must clear it with the Procurement Committee. However, the decision of the Procurement Committee will be final.
- The goods with standard accessories supplied under this tender shall confirm to the standard maintenance in the technical specification.
- Visit to already installed and operational equipment if required as per Section 5, shall be provided within the time specified and unless otherwise specified by the Purchaser, at no expense to the Institute. The PAF-IAST may ask the bidders to carry out testing/analysis of samples (to be provided) to evaluate the performance of already installed and operational unit of similar specifications.

Training

- The firm supplying the item/ equipment(s) will demonstrate the operation/ working of the supplied goods to the satisfaction of PAF- IAST and provide training. Suppliers are advised to provide details on formal training for the LOT(s) covering aspects as mentioned below, but not limited to, as required in Form – E (Section 3).

	LOT(s)
Level	**1 to 5**
Basic	Demonstrate the operations/ working to end users; Identify the do's and don'ts; and aspects deem necessary for long-life functioning of supplied goods.
Hands-on	Demonstrate technical features; Elaborate technical configuration(s) performed for integration with the overall setup; Documented guidelines for generating reports using software and/ or systems' interface
Advanced	Provide trainings to Operators for troubleshooting and smooth operations using system manuals

- The Bidder shall be responsible for all the necessary training programs available for the operation, maintenance and troubleshooting of the equipment at no additional cost to the institute. Unless otherwise specified, such training as well as training materials shall be provided in the language of the Bid as specified in the BDS.

Calibration of item/equipment

- The supplier will install the good(s) in the presence and satisfaction of the Procurement Committee, if need be. In case of any defect in the supplied good(s) or if it is not in accordance with the desired specification(s), the goods will be changed at the cost of the supplier.

Warranty/ Guarantee

- The Supplier will give comprehensive onsite warranty/ guarantee that the goods/ stores/ articles would continue to conform to the description and quality as specified for a period of at least One (01) year and additional two (02) years as Extended Warranty from the date of delivery, installation and commissioning of the said goods/ stores/ articles to be purchased and that notwithstanding the fact that the purchaser may have inspected and/ or approved the said goods/ stores/ article, if during the aforesaid period, the said goods/ stores/ articles, be discovered not to conform to the description and quality aforesaid or have determined (and the decision of the Procurement Committee in that context will be final and conclusive), the PAF: IAST will be entitled to reject the said goods/ stores/ articles or such portion thereof as may be discovered not to conform to the said description and quality, on such rejection the goods/ articles/ stores will be at the supplier's risk and all the provisions relating to rejection of goods etc. shall apply.
- The Supplier shall, if so called upon to do, replace the goods etc., or such portion thereof as is rejected by Procurement Committee, otherwise the supplier shall pay such damage as may arise by the reason of the breach of the condition herein contained. Nothing herein contained shall prejudice any other right of the Procurement Committee in that behalf under this contract or otherwise.
- The Supplier shall also replace equipment, in case it is found defective which cannot be put to operation due to manufacturing defect, etc. In case of equipment specified by the Procurement Committee, the supplier shall be responsible from carrying out annual maintenance and repairs on the terms and conditions as may be agreed. The supplier shall also be responsible to ensure adequate regular supply of spare parts needed for a specific type of equipment whether under their annual maintenance and repairs contract or otherwise. In case of change of model, supplier will give sufficient notice to the Procurement Committee who may like to purchase spare parts from them to maintain the equipment in perfect condition.

Section 6: Returnable Bidding Forms / Checklist

This section serves as a checklist for preparation of your Bid. Please complete the Returnable Bidding Forms in accordance with the instructions in the forms and return them as part of your Bid submission. No alteration to format of forms shall be permitted and no substitution shall be accepted.

Before submitting your Bid, please ensure compliance with the Bid Submission instructions of the BDS 22.

Bid Proposal:

Have you duly completed all the Returnable Bidding Forms?	
✦ Form A: Bid Submission Form	☐
✦ Form B: Joint Venture/Consortium/ Association Information Form	☐
✦ Form C: Bidder Information Form	☐
✦ Form D: Qualification Form	☐
✦ Form E: Bid Proposal Form	☐
✦ Form F: Specifications Compliance Form	☐
✦ Form G: Price Schedule Form	☐
Have you provided the required documents to establish compliance with the evaluation criteria in Section 4?	☐

Form A: Bid Submission Form

(To be Submitted in an envelope duly sealed and marked as Technical Proposal)

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
ITB reference:	PAF: IAST-AIE-ITB-115-22		

We, the undersigned, submit our Bid for the award of contract to supply the goods and related services required for [Insert Title of goods and services] in accordance with your Invitation to Bid No. [Insert ITB Reference Number]. We hereby submit our Bid, which includes this Bid proposal.

We hereby declare that our firm, its affiliates or subsidiaries or employees, including any JV/ Consortium/ Association members or subcontractors or suppliers for any part of the contract:

a) is not under procurement prohibition by any of the Government/ Semi-government/ Autonomous organization;

b) have not been suspended, debarred, sanctioned or otherwise identified as ineligible by any
Organization in Pakistan;

c) have not declared bankruptcy, are not involved in bankruptcy or receivership proceedings, and there is no judgment or pending legal action against us that could impair our operations in the foreseeable future;

d) undertake not to engage in proscribed practices, including but not limited to corruption, fraud, coercion, collusion, obstruction, or any other unethical practice, with the PAF: IAST, and to conduct business in a manner that averts any financial, operational, reputational or other undue risk to the PAF: IAST.

We declare that all the information and statements made in this Bid are true and we accept that any misinterpretation or misrepresentation contained in this Bid may lead to our disqualification and/ or sanctioning by the PAF-IAST.

We offer to supply the goods and related services in conformity with the Bidding documents, including the PAF-IAST General Conditions of Contract and in accordance with the Schedule of Requirements and Specifications.

Our Bid shall be valid and remain binding upon us for the period specified in the Bid Data Sheet.

We understand and recognize that you are not bound to accept any Bid you receive.

I, the undersigned, certify that I am duly authorized by [Insert Name of Bidder] to sign this Bid and bind it should PAF- IAST accept this Bid.

Name: _____

Title: _____

Date: _____

Signature: _____

[*Stamp with official stamp of the Bidder*]

Form B: Joint Venture/ Consortium/ Association Information Form

(To be Submitted in an envelope duly sealed and marked as Technical Proposal)

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
ITB reference:	PAF: IAST-AIE-ITB-115-22		

To be completed and returned with your Bid if the Bid is submitted as a Joint Venture/Consortium/Association.

No	**Name of Partner and contact information** *(address, telephone numbers, fax numbers, e-mail address)*	**Proposed proportion of responsibilities (in %) and type of goods and/or services to be performed**
1	[Complete]	[Complete]
2	[Complete]	[Complete]
3	[Complete]	[Complete]

Name of leading partner (with authority to bind the JV, Consortium, Association during the ITB process and, in the event a Contract is awarded, during contract execution)	[Complete]

We have attached a copy of the below referenced document signed by every partner, which details the likely legal structure of and the confirmation of joint and severable liability of the members of the said joint venture:

☐ Letter of intent to form a joint venture ***OR*** ☐ JV/Consortium/Association agreement

We hereby confirm that if the contract is awarded, all parties of the Joint Venture/Consortium/Association shall be jointly and severally liable to PAF: IAST for the fulfillment of the provisions of the Contract.

Name of partner: _____ Name of partner: _____

Signature: _____ Signature: _____

Date: _____ Date: _____

Form C: Bidder Information Form

(To be Submitted in an envelope duly sealed and marked as Technical Proposal)

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
ITB reference:	PAF: IAST-AIE-ITB-115-22		

Legal name of Bidder	[Complete]
Legal address & Branch Offices	[Complete]
Year of registration	[Complete]
Bidder's Authorized Representative Information	Name and Title: [Complete] Telephone numbers: [Complete] Email: [Complete]
Are you a PAF: IAST registered vendor?	☐ Yes ☐ No If yes, [insert PAF- IAST vendor number]
Countries of operation	[Complete]
No. of full-time employees	[Complete]
No. of Technical Staff	
Quality Assurance Certification (e.g. ISO 9000 or Equivalent) *(If yes, provide a Copy of the valid Certificate):*	[Complete]
Does your Company hold any accreditation such as ISO 14001 or ISO 14064 or equivalent related to the environment? *(If yes, provide a Copy of the valid Certificate):*	[Complete]
Does your Company have a written Statement of its Environmental Policy? *(If yes, provide a Copy)*	[Complete]
Does your organization demonstrates significant commitment to sustainability through some other means, for example internal company policy documents on women	[Complete]

empowerment, renewable energies, education, vocational trainings, social responsibility towards people with Special needs, or membership of trade institutions promoting such issues	
Contact person that PAF: IAST may contact for requests for clarifications during Bid evaluation (Only Lead Bidder)	Name and Title: [Complete] Telephone numbers: [Complete] Email: [Complete]
Please attach the following documents:	1. Company Profile, which should not exceed fifteen (15) pages, including printed brochures and product catalogues relevant to the goods and/ or services being procured. 2. Proposed timetable for delivery, installation and commissioning plan for the required and quoted items to PAF: IAST after the award of Contract. 3. Certificate of Registration of the business. 4. Principal's Authorization Letter in favor of Bidder to participate in this Tender. 5. A proofing document confirms the offered warranty for at least One (01) year, supported by the manufacturer's certificates, if applicable. 6. A proofing document confirming supply of same or similar items of this magnitude to various clients/ customers in Pakistan. 7. Proven records of no less than the required Projects of similar nature/ value/ complexity in which delivery and services were extended. 8. Full detailed description of the specifications of the proposed items in addition to catalogues clearly showing the proposed specifications responding to the requirements. 9. Supporting photos of the proposed items, if applicable. 10. Quality certifications: ISO 9001:2015 (if applicable) 11. Latest Audited Financial Statements (Income Statement and Balance Sheet) including Auditor's Report for the past (2 years).

Note: To be filled in by each partner in case Bid is submitted as a JV/ Consortium/ Association

Form D: Qualification Form

(To be submitted in an envelope duly sealed and marked as Technical Proposal)

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
ITB reference:	PAF: IAST-AIE-ITB-115-22		

If JV/ Consortium/ Association, to be completed by each partner.

PREVIOUS RELEVANT EXPERIENCE

Please list all Projects successfully completed in the last 3 years, covering following aspects; a) Scope of the projects/ assignments.

b) Activities performed for the successful completion of the project.

c) Support Services Contracts in hand with SLA for the supplied goods.

List only those assignments for which the Bidder was legally contracted or sub-contracted by the Client as a company or was one of the Consortium/ JV partners. Assignments completed by the Bidder's individual experts working privately or through other firms cannot be claimed as the relevant experience of the Bidder, or that of the Bidder's partners or sub-consultants, but can be claimed by the Experts themselves in their CVs. The Bidder should be prepared to substantiate the claimed experience by presenting copies of relevant documents and references if so requested by PAF- IAST.

Project name & Country of Assignment	Client & Reference Contact Details	Contract Value	Period of activity and status	Types of activities undertaken

Bidders may also attach their own Project Data Sheets with more details for assignments above.

HISTORY OF NON-PERFORMING CONTRACTS

☐ Non-performing contracts did not occur during the last 3 years

☐ Contract(s) not performed in the last 3 years

Year	Non- performed portion of contract	Contract Identification	Total Contract Amount (current value in US$)
		Name of Client: Address of Client: Reason(s) for non-performance:	

FINANCIAL STANDING

Annual Turnover for the last 3 years	Year	PKR
	Year	PKR
	Year	PKR
Latest Credit Rating (if any), indicate the source		

Financial information (in PKR equivalent)	**Historic information for the last 3 years**		
	Year 1	Year 2	Year 3
	Information from Balance Sheet		
Total Assets (TA)			
Total Liabilities (TL)			
Current Assets (CA)			
Current Liabilities (CL)			
	Information from Income Statement		
Total / Gross Revenue (TR)			
Profits Before Taxes (PBT)			
Net Profit			
Current Ratio			

☐ Attached are copies of the audited financial statements (balance sheets, including all related notes, and income statements) for the years required above complying with the following condition:

a) Must reflect the financial situation of the Bidder or party to a JV, and not sister or parent companies;

b) Historic financial statements must be audited by a certified public accountant;

c) Historic financial statements must correspond to accounting periods already completed and audited. No statements for partial periods shall be accepted.

Form E: Technical Bid Proposal Form

(To be submitted in an envelope duly sealed and marked as Technical Proposal)

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
ITB reference:	PAF: IAST-AIE-ITB-115-22		

The Bidder's Bid should be organized to follow this format of the Technical Bid Proposal. Where the bidder is presented with a requirement or asked to use a specific approach, the bidder must not only state its acceptance, but also describe how it intends to comply with the requirements. Where a descriptive response is requested, failure to provide the same may be viewed as non-responsive.

SECTION 1: Qualification, capacity and expertise

1.1 Bidder's general organizational capability: management structure, financial stability and project financing capacity, project management controls, extent of work to be subcontracted (if so, provide details).

1.2 Bidder's relevance of specialized knowledge and experience on similar engagements done in the region/ country. Bidder should submit a detailed description of the projects executed (quantities, value, beneficiary)

1.3 Manufacturer's strengths covering the regional/ global market presence, hi-tech products portfolio, manufacturing capacity, R&D activities resulting in national and international patents, quality control and assurance practices, and international certifications in relevant areas.

SECTION 2: Management Structure and Key Personnel

2.1 Describe the overall management approach toward planning and implementing the project. Include an organization chart for the management of project describing relationship of key positions and designations.

2.2 Provide CVs for key personnel that will be provided to support the implementation of this project using the format below. CVs should demonstrate qualifications in areas relevant to scope of goods and/or services.

Format for CV of Proposed Key Personnel

Name of Personnel	[Insert]
Position	[Insert]
Nationality	[Insert]
Language proficiency	[Insert]
Education/ Qualifications	*[Summarize college/university and other specialized education of personnel member, giving names of schools, dates attended, and degrees/qualifications obtained.]* [Insert]
Professional certifications	*[Provide details of professional certifications relevant to the scope of goods and/or services]* ✦ Name of institution: [Insert] ✦ Date of certification: [Insert]
Employment Record/ Experience	*[List all positions held by personnel (starting with present position, list in reverse order), giving dates, names of employing organization, title of position and location of employment.* [Insert]

I, the undersigned, certify that to the best of my knowledge and belief, the data provided above correctly describes my qualifications, my experiences, and other relevant information about myself.

_____ _____

Signature of Personnel Date (Day/Month/Year)

SECTION 3: Scope of Supply, Technical Specifications and Training(s)

This section should demonstrate the Bidder's responsiveness to the specification by identifying the specific components proposed, addressing the requirements, as specified, point by point; providing a detailed description of the essential performance characteristics proposed; and demonstrating how the proposed bid meets or exceeds the requirements/specifications. All important aspects should be addressed in sufficient detail.

3.1 A detailed description of how the Bidder will deliver the required goods and services, keeping in mind the appropriateness to local conditions and project environment. Details how the different service elements shall be organized, controlled and delivered.

3.2 Explain whether any work would be subcontracted, to whom, how much percentage of the requirements, the rationale for such, and the roles of the proposed sub-contractors and how everyone will function as a team.

3.3 Implementation plan including a Gantt Chart or Project Schedule indicating the detailed sequence of activities that will be undertaken and their corresponding timing.

3.4 Details on post-deployment trainings on-site hands-on training for all LOTs.

SECTION 4: Registration & Certifications

This section should demonstrate the Bidder's responsiveness towards its registration with the relevant national body and international organizations Certifying the bidder's qualifications with respect to Quality and Project Management.

4.1 Provide a copy of valid registration with the Pakistan Engineering Council (if applicable).

4.2 Provide a copy of valid Certificate issued by International Organization for Standardization certifying the bidder's compliance and practices towards quality management principles and standards in their offered products/ solutions and services.

4.3 Provide a copy of valid Certificate issued by International Organization for Standardization certifying the bidder's compliance and practices towards information security management principles and standards in their offered products/ solutions and services.

SECTION 5: Warranty and Support Services

This section should demonstrate the Bidder's responsiveness to the post-commissioning warranty and support services of the goods supplied, addressing the requirements, as specified, point by point; providing a detailed description of the essential performance characteristics proposed; and demonstrating how the proposed bid meets or exceeds the requirements. All important aspects should be addressed in sufficient detail.

5.1 A detailed description of how the Bidder will provide the Warranty claims to the users, keeping in mind the span and complexity of the project in context of local conditions and project environment.

5.2 Explain whether any services or work would be subcontracted, to whom, how much percentage of the requirements, the rationale for such, and the roles of the proposed sub-contractors and how everyone will function as a team.

5.3 Details how the post-delivery/ deployment Support Services will be provided to the users keeping in consideration the criticality of systems, and dependency of university administration and operations on such systems.

Form F: Specifications Compliance Form

(To be submitted in an envelope duly sealed and marked as Technical Proposal)

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
ITB reference:	PAF: IAST-AIE-ITB-115-22		

The Bidder's Bid should be organized to follow this format of the Technical Bid Proposal. Where the bidder is presented with a requirement or asked to use a specific approach, the bidder must not only state its acceptance, but also describe how it intends to comply with the requirements. Where a descriptive response is requested, failure to provide the same may be viewed as non-responsive.

		Your response Compliance with specifications		
Goods and services to be Supplied *(based on the **Technical Specifications** provided in Section 5a & Section 5b)*		**Comply (Yes/ No)** *(If No, indicate discrepancies)*	**Quoted Specifications**	**Type/ Model no. & Country of Origin**
Required Items		**Offered Items**		
LOT #1: Customized Multi-copters and support equipment				
1.	Custom-Build Agile Multi-copter		(Bidders are required to attach Compliance Comparison Sheet supported by Product Data Sheet against the Specifications provided in Section – 5)	
2.	Custom-Built Carrier Multi-copter			
3.	RTK-GNSS Base station (Here+V2 or equivalent)			
4.	Extra Aerial & Ground Batteries			
5.	Safety net for Multi-copters (M500BK FR or better)			
LOT #2: Field Robotics Lab and Support Equipment				
1.	Unmanned outdoor ground vehicle: [R6 ArduROS UGV or equivalent]			
2.	Unmanned ground vehicle: [Segway RMPLite 220 or equivalent]			
3.	Drone DJI Mavic 3 or equivalent		(Bidders are required to attach Compliance Comparison Sheet supported by Product Data Sheet against the Specifications provided in Section – 5)	
4.	Quanser Self-Driving Car Research Studio or equivalent			
5.	Modern Manipulator Arm Robot Anno Model J-601-B or equivalent			
6.	Loco swarm bundle inclusive additional highlighted accessories			
7.	Q10T 10x Time Optical Zoom EOS Camera gimbal auto tracking function gimbal for Multicopter			

LOT # 3: Embedded Systems & IoT Lab				
1	Arduino Portenta Machine Control		(Bidders are required to attach Compliance Comparison Sheet supported by Product Data Sheet against the Specifications provided in Section – 5)	
2	Portenta H7			
3	Arduino MKR Connector Carrier (Grove compatible)			
4	Machine Vision Bundle			
5	Arduino Edge Control			
6	Engineering Kit Motors Backup			
7	Arduino Student Kit			
8	Arduino Explore IoT Kit			
9	EMoRo 2560 Controller			
10	Arduino Uno Rev3			
11	ARDUINO UNO WiFi REV2			
12	Arduino Nano			
13	Arduino Engineering Kit Rev2			
14	Box for Arduino			
15	USB 2.0 Cable Type A/B			
16	Soldering Stand: QuadHands Classic Helping Hands Tool			
17	Tinkerkit Braccio robot			
18	Robotis Mini			
19	Robotis Mini: Spare Parts Pack 1			
20	Step Motor (28H2P3205A4)			
21	Grove - Line Finder v1.1			
22	DYNAMIXEL Shield for Arduino MKR Series			
23	DYNAMIXEL XL-320			
24	Grove - Servo			
25	Gravity: IO Expansion Shield for Arduino v 7.1			
26	Grove - I2C Motor Driver (TB6612FNG)			
27	Arduino MKR Motor Carrier			
28	Arduino Motor Shield Rev3			
29	Feetech Continuous Rotation Micro Servo motor			
30	Feetech 6 KG 360 Degrees Continuous Rotation Servo motor			
31	Nicla Sense ME			
32	Grove - HCHO Sensor			
33	Arduino MKR ENV Shield rev2			

34	Grove - High Precision Barometric Pressure Sensor (DPS310)			
35	Grove - Dust Sensor（PPD42NS）			
36	Gravity: UART Infrared CO2 Sensor (0-50000ppm)			
37	Grove - Gas Sensor (MQ3)			
38	Gravity: Analog CO2 Gas Sensor (MG-811 Sensor)			
39	Solar Power Manager For 12V Lead-Acid Battery			
40	Gravity: Analog Capacitive Soil Moisture Sensor - Corrosion Resistant			
41	Grove - Digital Infrared Temperature Sensor			
42	Solar Power Manager (for 9V/12V/18V solar panel)			
43	Multi-function Environmental Module - CCS811+BME280			
44	Gravity: Non-contact Digital Water / Liquid Level Sensor For Arduino			
45	Gravity: I2C Oxygen Sensor			
46	Gravity: Analog Electrical Conductivity Sensor / Meter For Arduino			
47	CCS811 Air Quality Sensor-Breakout			
48	Grove - Water Sensor			
49	Grove - Temperature Sensor			
50	Grove - Temp & Humi & Barometer Sensor (BME280)			
51	Grove - Moisture Sensor			
52	Grove - Hall Sensor			
53	Gravity: Analog pH Sensor / Meter Pro Kit For Arduino			
54	Gravity: I2C Ozone Sensor (0-10ppm)			
55	SOIL HUMIDITY SENSOR, WATERMARK 2 M / 75 CM (Pack of 6)			
56	Voice Controlled Light Bundle			
57	PCBite kit with 4x SP10 probes and test wires			
58	LA104 Logic Analyzer			
59	Arduino MKR WiFi 1010			
60	Arduino Sensor Kit - Base			
61	Arduino MKR WAN 1310			

62	Arduino Nano 33 IoT with headers			
63	WiFi Module - ESP8266 (4MB Flash)			
64	ESP-01S Wifi Module with relay			
65	ESP-01s USB Programmer			
66	WiFi LoRa 32 Dev Board (Heltec or equivalent)			
67	LoRa Test Board Kit (LLCC68 based E220-900T30S or equivalent)			
68	LoRa LLCC68 Development Kit 430 MHz 470 MHz			
69	LLCC68 LoRa Module 868MHz 915MHz 30dBm UART			
70	LLCC68 LoRa Module 433MHz 470MHz 30dBm UART			
71	Antenna for LLCC68 LoRa Module 868MHz 915MHz 30dBm UART			
72	Antenna for LLCC68 LoRa Module 433MHz 470MHz 30dBm UART			
73	Fingerprint Sensor Module (Adafruit or equivalent)			
74	Adafruit DS1307 Real Time Clock Assembled Breakout Board			
75	DS3231 Precision RTC Breakout (Adafruit or equivalent)			
76	MicroSD card breakout board+(Adafruit or equivalent)			
77	HDMI Cables for Raspberry Pi 4 B+ (Micro HDMI to HDMI)			
78	Ethernet Cable			
79	Raspberry Pi 8MP Camera Module V2.1			
80	Raspberry Pi 7 Inch Touch Screen Display (Official)			
81	Hot Air Soldering Rework Station w/ Three Nozzles – Quick 957DW+			
82	Engineer Professional Silicone-Tip Solder Sucker			
83	USB MicroSD Card Reader/Writer – microSD/microSDHC /microSDXC			
84	64GB Extreme microSDHC UHS-I Memory Card with Adapter			
85	32GB Ultra microSDHC UHS-I Memory Card with Adapter			
86	Wire Stripper			
87	Breadboard power supply			
88	Vero board			

89	Soldering Wire + Paste			
90	Magnifying glass for soldering			
91	Breadboard			
92	DE1-SoC Development Kit including cables and power adapter			
93	DE10-Lite			
94	Raspberry Pi Kit with Accessories			
95	Arduino Starter Kit			
96	Super Value Ultimate 37 in 1 Sensor Modules Kit for Arduino & MCU			
97	ZedBoard Zynq-7000 ARM/FPGA SoC Development Board			
98	PYNQ-Z1: Python Productivity for Zynq-7000 ARM/FPGA SoC with Accessory Kit			
99	Eclypse Z7: Zynq-7000 SoC Development Board with SYZYGY-compatible Expansion			
100	ZedBoard Advanced Image Processing Kit (Quad Pcam option)			
101	PMOD Sensors			
102	Connectors and Adapters			
103	ZU-5EV (Zynq Ultrascale+ MPSoC Development Board)			
104	Xilinx Virtex-7 FPGA VC707 Evaluation Kit			
105	Universal Programmer (Xeltek Superpro 610p or equivalent)			
106	Zigbee module with antenna (XBee S2C ZigBee (Wire Antenna) or equivalent)			
LOT #4: Computers for AI Computer Lab				
1.	Desktop Computers		(Bidders are required to attach Compliance Comparison Sheet supported by Product Data Sheet against the Specifications provided in Section – 5)	
2.	Monitors			
LOT #5: Furniture for AI Computer Lab				
1	Chairs		(Bidders are required to attach Compliance Comparison Sheet supported by Product Data Sheet against the Specifications provided in Section – 5)	
2	Table (3-Person)			
3	Table (2-Person)			

Form G: Price Schedule Form

(To be Submitted in a separate and sealed envelope duly marked as Financial Proposal)

Name of Bidder:	[Insert Name of Bidder]	Date:	Select date
ITB reference:	PAF: IAST-AIE-ITB-115-22		

[*The Bidder is required to prepare the Price Schedule following the below format. The Price Schedule must include a detailed cost breakdown of all goods and related services to be provided.*]

We, the <<Name of Bidder>>, hereby submit our Financial Bid for the Supply of Items as below. We assure you of our full compliance to the required specifications, delivery schedule and other terms without any deviation and/ or reservations. We reiterate our acceptance to the terms and conditions of the Tender Document. Our Financial proposal as below is submitted for your kind consideration;

QUOTE PRICE IN PKR

	Quoted Items in compliance to the Technical Specifications as referred in Section – 5a and Section – 5b	**Quantity (a)**	**Unit Price [in Rs.] (b)**	**GST [in Rs.] (c)**	**Total Price [in Rs.] d=a*[b+c]**
	Lot # 1: Customized Multi-copters and support equipment				
1.	Custom-Build Agile Multi-copter	**4**			
2.	Custom-Built Carrier Multi-copter	**2**			
3.	RTK-GNSS Base station (Here+V2 or Equivalent)	**1**			
4.	Extra Aerial & Ground Batteries	**2**			
5.	Safety net for Multi-copters (M500BK FR or better)	**1**			
	LOT #2: Field Robotics Lab and Support Equipment				
1.	Unmanned outdoor ground vehicle: [R6 ArduROS UGV or equivalent]	**1**			
2.	Unmanned ground vehicle: [Segway RMPLite 220 or equivalent]	**4**			
3.	Drone DJI Mavic 3 or equivalent	**1**			
4.	Quanser Self-Driving Car Research Studio or equivalent	**1**			
5.	Modern Manipulator Arm Robot Anno Model J-601-B or equivalent	**1**			
6.	Loco swarm bundle inclusive additional highlighted accessories	**3**			
7.	Q10T 10x Time Optical Zoom EOS Camera gimbal auto tracking function gimbal for Multi-copter	**4**			
	LOT #3: Embedded Systems & IoT Lab				
1.	Arduino Portenta Machine Control	**10**			
2.	Portenta H7	**10**			
3.	Arduino MKR Connector Carrier (Grove compatible)	**10**			
4.	Machine Vision Bundle	**10**			
5.	Arduino Edge Control	**10**			

6.	Engineering Kit Motors Backup	**10**			
7.	Arduino Student Kit	**10**			
8.	Arduino Explore IoT Kit	**10**			
9.	EMoRo 2560 Controller	**10**			
10.	Arduino Uno Rev3	**10**			
11.	ARDUINO UNO WiFi REV2	**10**			
12.	Arduino Nano	**10**			
13.	Arduino Engineering Kit Rev2	**5**			
14.	Box for Arduino	**20**			
15.	USB 2.0 Cable Type A/B	**20**			
16.	QuadHands Classic Helping Hands Tool	**5**			
17.	Tinkerkit Braccio robot	**10**			
18.	Robotis Mini	**10**			
19.	Robotis Mini: Spare Parts Pack 1	**10**			
20.	Step Motor (28H2P3205A4)	**20**			
21.	Grove - Line Finder v1.1	**20**			
22.	DYNAMIXEL Shield for Arduino MKR Series	**20**			
23.	DYNAMIXEL XL-320	**10**			
24.	Grove - Servo	**20**			
25.	Gravity: IO Expansion Shield for Arduino v 7.1	**20**			
26.	Grove - I2C Motor Driver (TB6612FNG)	**10**			
27.	Arduino MKR Motor Carrier	**10**			
28.	Arduino Motor Shield Rev3	**20**			
29.	Feetech Continuous Rotation Micro Servo motor	**20**			
30.	Feetech 6 KG 360 Degrees Continuous Rotation Servo motor	**20**			
31.	Nicla Sense ME	**10**			
32.	Grove - HCHO Sensor	**10**			
33.	Arduino MKR ENV Shield rev2	**10**			
34.	Grove - High Precision Barometric Pressure Sensor (DPS310)	**20**			
35.	Grove - Dust Sensor（PPD42NS）	**20**			
36.	Gravity: UART Infrared CO2 Sensor (0-50000ppm)	**10**			
37.	Grove - Gas Sensor (MQ3)	**10**			
38.	Gravity: Analog CO2 Gas Sensor (MG-811 Sensor)	**10**			
39.	Solar Power Manager For 12V Lead-Acid Battery	**10**			
40.	Gravity: Analog Capacitive Soil Moisture Sensor - Corrosion Resistant	**50**			
41.	Grove - Digital Infrared Temperature Sensor	**10**			
42.	Solar Power Manager (for 9V/12V/18V solar panel)	**10**			
43.	Multi-function Environmental Module - CCS811+BME280	**10**			
44.	Gravity: Non-contact Digital Water / Liquid Level Sensor For Arduino	**20**			
45.	Gravity: I2C Oxygen Sensor	**10**			

46.	Gravity: Analog Electrical Conductivity Sensor / Meter For Arduino	**10**			
47.	CCS811 Air Quality Sensor-Breakout	**20**			
48.	Grove - Water Sensor	**20**			
49.	Grove - Temperature Sensor	**20**			
50.	Grove - Temp & Humi & Barometer Sensor (BME280)	**10**			
51.	Grove - Moisture Sensor	**20**			
52.	Grove - Hall Sensor	**10**			
53.	Gravity: Analog pH Sensor / Meter Pro Kit For Arduino	**10**			
54.	Gravity: I2C Ozone Sensor (0-10ppm)	**10**			
55.	SOIL HUMIDITY SENSOR, WATERMARK 2 M / 75 CM (Pack of 6)	**10**			
56.	Voice Controlled Light Bundle	**5**			
57.	PCBite kit with 4x SP10 probes and test wires	**5**			
58.	LA104 Logic Analyzer	**10**			
59.	Arduino MKR WiFi 1010	**20**			
60.	Arduino Sensor Kit - Base	**10**			
61.	Arduino MKR WAN 1310	**10**			
62.	Arduino Nano 33 IoT with headers	**5**			
63.	WiFi Module - ESP8266 (4MB Flash)	**20**			
64.	ESP-01S Wifi Module with relay	**20**			
65.	ESP-01s USB Programmer	**10**			
66.	WiFi LoRa 32 Dev Board (Heltec or equivalent)	**10**			
67.	LoRa Test Board Kit (LLCC68 based E220-900T30S or equivalent)	**2**			
68.	LoRa LLCC68 Development Kit 430 MHz 470 MHz	**2**			
69.	LLCC68 LoRa Module 868MHz 915MHz 30dBm UART	**10**			
70.	LLCC68 LoRa Module 433MHz 470MHz 30dBm UART	**10**			
71.	Antenna for LLCC68 LoRa Module 868MHz 915MHz 30dBm UART	**10**			
72.	Antenna for LLCC68 LoRa Module 433MHz 470MHz 30dBm UART	**10**			
73.	Fingerprint Sensor Module (Adafruit or equivalent)	**10**			
74.	Adafruit DS1307 Real Time Clock Assembled Breakout Board	**10**			
75.	DS3231 Precision RTC Breakout (Adafruit or equivalent)	**5**			
76.	MicroSD card breakout board+(Adafruit or equivalent)	**10**			
77.	HDMI Cables for Raspberry Pi 4 B+ (Micro HDMI to HDMI)	**10**			
78.	Ethernet Cable	**20**			
79.	Raspberry Pi 8MP Camera Module V2.1	**10**			
80.	Raspberry Pi 7 Inch Touch Screen Display (Official)	**5**			
81.	Hot Air Soldering Rework Station w/ Three Nozzles – Quick 957DW+	**2**			
82.	Engineer Professional Silicone-Tip Solder Sucker	**2**			

83.	USB MicroSD Card Reader/Writer – microSD/microSDHC /microSDXC	**10**			
84.	64GB Extreme microSDHC UHS-I Memory Card with Adapter	**10**			
85.	32GB Ultra microSDHC UHS-I Memory Card with Adapter	**10**			
86.	Wire Stripper	**5**			
87.	Breadboard power supply	**20**			
88.	Vero board	**20**			
89.	Soldering Wire + Paste	**20**			
90.	Magnifying glass for soldering	**5**			
91.	Breadboard	**20**			
92.	DE1-SoC Development Kit including cables and power adapter	**5**			
93.	DE10-Lite	**20**			
94.	Raspberry Pi Kit with Accessories	**20**			
95.	Arduino Starter Kit	**20**			
96.	Super Value Ultimate 37 in 1 Sensor Modules Kit for Arduino & MCU	**20**			
97.	ZedBoard Zynq-7000 ARM/FPGA SoC Development Board	**10**			
98.	PYNQ-Z1: Python Productivity for Zynq-7000 ARM/FPGA SoC with Accessory Kit	**20**			
99.	Eclypse Z7: Zynq-7000 SoC Development Board with SYZYGY-compatible Expansion	**1**			
100	ZedBoard Advanced Image Processing Kit (Quad Pcam option)	**5**			
101	PMOD Sensors	**5**			
102	Connectors and Adapters	**20**			
103	ZU-5EV (Zynq Ultrascale+ MPSoC Development Board)	**1**			
104	Xilinx Virtex-7 FPGA VC707 Evaluation Kit	**1**			
105	Universal Programmer (Xeltek Superpro 610p or equivalent)	**5**			
106	Zigbee module with antenna (XBee S2C ZigBee (Wire Antenna) or equivalent)	**10**			
	LOT #4: Computers for AI Computer Lab				
1.	Desktop Computers	**40**			
2.	Monitors	**40**			
	LOT #5: Furniture for AI Computer Lab				
1.	Chairs	**100**			
2.	Table (3-Person)	**15**			
3.	Table (2-Person)	**12**			

Extended Warranty Price (at discretion of PAF-IAST)

QUOTE PRICE IN PKR

	Annual Warranty & Support Services beyond Standard Warranty of the Quoted Items	**2nd Year (PKR)**	**3rd Year (PKR)**	**4th Year (PKR)**

	Lot # 1: Customized Multi-copters and support equipment			
1.	Custom-Build Agile Multi-copter			
2.	Custom-Built Carrier Multi-copter			
3.	RTK-GNSS Base station (Here+V2 or Equivalent)			
4.	Extra Aerial & Ground Batteries			
5.	Safety net for Multi-copters (M500BK FR or better)			
	LOT #2: Smart City Laboratory			
1	Unmanned outdoor ground vehicle: [R6 ArduROS UGV or equivalent]			
2	Unmanned ground vehicle: [Segway RMPLite 220 or equivalent]			
3	Drone DJI Mavic 3 or equivalent			
4	Quanser Self-Driving Car Research Studio or equivalent			
5	Modern Manipulator Arm Robot Anno Model J-601-B or equivalent			
6	Loco swarm bundle inclusive additional highlighted accessories			
7	Q10T 10x Time Optical Zoom EOS Camera gimbal auto tracking function gimbal for Multi-copter			
	LOT #3: Embedded Systems & IoT Lab			
1.	Arduino Portenta Machine Control			
2.	Portenta H7			
3.	Arduino MKR Connector Carrier (Grove compatible)			
4.	Machine Vision Bundle			
5.	Arduino Edge Control			
6.	Engineering Kit Motors Backup			
7.	Arduino Student Kit			
8.	Arduino Explore IoT Kit			
9.	EMoRo 2560 Controller			
10.	Arduino Uno Rev3			
11.	ARDUINO UNO WiFi REV2			
12.	Arduino Nano			
13.	Arduino Engineering Kit Rev2			
14.	Box for Arduino			
15.	USB 2.0 Cable Type A/B			
16.	QuadHands Classic Helping Hands Tool			
17.	Tinkerkit Braccio robot			
18.	Robotis Mini			
19.	Robotis Mini: Spare Parts Pack 1			
20.	Step Motor (28H2P3205A4)			
21.	Grove - Line Finder v1.1			
22.	DYNAMIXEL Shield for Arduino MKR Series			
23.	DYNAMIXEL XL-320			

24.	Grove - Servo			
25.	Gravity: IO Expansion Shield for Arduino v 7.1			
26.	Grove - I2C Motor Driver (TB6612FNG)			
27.	Arduino MKR Motor Carrier			
28.	Arduino Motor Shield Rev3			
29.	Feetech Continuous Rotation Micro Servo motor			
30.	Feetech 6 KG 360 Degrees Continuous Rotation Servo motor			
31.	Nicla Sense ME			
32.	Grove - HCHO Sensor			
33.	Arduino MKR ENV Shield rev2			
34.	Grove - High Precision Barometric Pressure Sensor (DPS310)			
35.	Grove - Dust Sensor（PPD42NS）			
36.	Gravity: UART Infrared CO2 Sensor (0-50000ppm)			
37.	Grove - Gas Sensor (MQ3)			
38.	Gravity: Analog CO2 Gas Sensor (MG-811 Sensor)			
39.	Solar Power Manager For 12V Lead-Acid Battery			
40.	Gravity: Analog Capacitive Soil Moisture Sensor - Corrosion Resistant			
41.	Grove - Digital Infrared Temperature Sensor			
42.	Solar Power Manager (for 9V/12V/18V solar panel)			
43.	Multi-function Environmental Module - CCS811+BME280			
44.	Gravity: Non-contact Digital Water / Liquid Level Sensor For Arduino			
45.	Gravity: I2C Oxygen Sensor			
46.	Gravity: Analog Electrical Conductivity Sensor / Meter For Arduino			
47.	CCS811 Air Quality Sensor-Breakout			
48.	Grove - Water Sensor			
49.	Grove - Temperature Sensor			
50.	Grove - Temp & Humi & Barometer Sensor (BME280)			
51.	Grove - Moisture Sensor			
52.	Grove - Hall Sensor			
53.	Gravity: Analog pH Sensor / Meter Pro Kit For Arduino			
54.	Gravity: I2C Ozone Sensor (0-10ppm)			
55.	SOIL HUMIDITY SENSOR, WATERMARK 2 M / 75 CM (Pack of 6)			
56.	Voice Controlled Light Bundle			
57.	PCBite kit with 4x SP10 probes and test wires			
58.	LA104 Logic Analyzer			
59.	Arduino MKR WiFi 1010			
60.	Arduino Sensor Kit - Base			
61.	Arduino MKR WAN 1310			

62.	Arduino Nano 33 IoT with headers			
63.	WiFi Module - ESP8266 (4MB Flash)			
64.	ESP-01S Wifi Module with relay			
65.	ESP-01s USB Programmer			
66.	WiFi LoRa 32 Dev Board (Heltec or equivalent)			
67.	LoRa Test Board Kit (LLCC68 based E220-900T30S or equivalent)			
68.	LoRa LLCC68 Development Kit 430 MHz 470 MHz			
69.	LLCC68 LoRa Module 868MHz 915MHz 30dBm UART			
70.	LLCC68 LoRa Module 433MHz 470MHz 30dBm UART			
71.	Antenna for LLCC68 LoRa Module 868MHz 915MHz 30dBm UART			
72.	Antenna for LLCC68 LoRa Module 433MHz 470MHz 30dBm UART			
73.	Fingerprint Sensor Module (Adafruit or equivalent)			
74.	Adafruit DS1307 Real Time Clock Assembled Breakout Board			
75.	DS3231 Precision RTC Breakout (Adafruit or equivalent)			
76.	MicroSD card breakout board+(Adafruit or equivalent)			
77.	HDMI Cables for Raspberry Pi 4 B+ (Micro HDMI to HDMI)			
78.	Ethernet Cable			
79.	Raspberry Pi 8MP Camera Module V2.1			
80.	Raspberry Pi 7 Inch Touch Screen Display (Official)			
81.	Hot Air Soldering Rework Station w/ Three Nozzles – Quick 957DW+			
82.	Engineer Professional Silicone-Tip Solder Sucker			
83.	USB MicroSD Card Reader/Writer – microSD/microSDHC /microSDXC			
84.	64GB Extreme microSDHC UHS-I Memory Card with Adapter			
85.	32GB Ultra microSDHC UHS-I Memory Card with Adapter			
86.	Wire Stripper			
87.	Breadboard power supply			
88.	Vero board			
89.	Soldering Wire + Paste			
90.	Magnifying glass for soldering			
91.	Breadboard			
92.	DE1-SoC Development Kit including cables and power adapter			
93.	DE10-Lite			
94.	Raspberry Pi Kit with Accessories			
95.	Arduino Starter Kit			
96.	Super Value Ultimate 37 in 1 Sensor Modules Kit for Arduino & MCU			
97.	ZedBoard Zynq-7000 ARM/FPGA SoC Development Board			

98.	PYNQ-Z1: Python Productivity for Zynq-7000 ARM/FPGA SoC with Accessory Kit			
99.	Eclypse Z7: Zynq-7000 SoC Development Board with SYZYGY-compatible Expansion			
100	ZedBoard Advanced Image Processing Kit (Quad Pcam option)			
101	PMOD Sensors			
102	Connectors and Adapters			
103	ZU-5EV (Zynq Ultrascale+ MPSoC Development Board)			
104	Xilinx Virtex-7 FPGA VC707 Evaluation Kit			
105	Universal Programmer (Xeltek Superpro 610p or equivalent)			
106	Zigbee module with antenna (XBee S2C ZigBee (Wire Antenna) or equivalent)			
	LOT #4: Computers for AI Computer Lab			
1.	Desktop Computers			
2.	Monitors			
	LOT #5: Furniture for AI Computer Lab			
1.	Chairs			
2.	Table (3-Person)			
3.	Table (2-Person)			

Total Bid Value in Figures (including Extended Warranty Price): PKR_____

Total Bid Value in words (including Extended Warranty Price): PKR_____

_____

Offered Percentage Discount in case LC (Letter of Credit) is opted as Mode of Payment:

_____

Final Bid Value in Figures (including Extended Warranty & Discount):_____

Final Bid Value in words (including Extended Warranty & Discount):_____

_____

Name & Designation of Authorized Person:_____

Signature: _____ (Please affix company stamp here)

Note: Quoted price must be inclusive of all taxes and duties.

QUOTE PRICE IN USD

	Quoted Items in compliance to the Technical Specifications as referred in Section – 5a and Section – 5b	Quantity y (a)	Unit Price [in US$] (b)	Total Price [in US$] d=a*b
	Lot # 1: Customized Multi-copters and support equipment			
1.	Custom-Build Agile Multi-copter	**4**		
2.	Custom-Built Carrier Multi-copter	**2**		
3.	RTK-GNSS Base station (Here+V2 or Equivalent)	**1**		
4.	Extra Aerial & Ground Batteries	**2**		
5.	Safety net for Multi-copters (M500BK FR or better)	**1**		
	LOT #2: Field Robotics Lab and Support Equipment			
1.	Unmanned outdoor ground vehicle: [R6 ArduROS UGV or equivalent]	**1**		
2.	Unmanned ground vehicle: [Segway RMPLite 220 or equivalent]	**4**		
3.	Drone DJI Mavic 3 or equivalent	**1**		
4.	Quanser Self-Driving Car Research Studio or equivalent	**1**		
5.	Modern Manipulator Arm Robot Anno Model J-601-B or equivalent	**1**		
6.	Loco swarm bundle inclusive additional highlighted accessories	**3**		
7.	Q10T 10x Time Optical Zoom EOS Camera gimbal auto tracking function gimbal for Multi-copter	**4**		
	LOT #3: Embedded Systems & IoT Lab			
1.	Arduino Portenta Machine Control	**10**		
2.	Portenta H7	**10**		
3.	Arduino MKR Connector Carrier (Grove compatible)	**10**		
4.	Machine Vision Bundle	**10**		
5.	Arduino Edge Control	**10**		
6.	Engineering Kit Motors Backup	**10**		
7.	Arduino Student Kit	**10**		
8.	Arduino Explore IoT Kit	**10**		
9.	EMoRo 2560 Controller	**10**		
10.	Arduino Uno Rev3	**10**		
11.	ARDUINO UNO WiFi REV2	**10**		
12.	Arduino Nano	**10**		
13.	Arduino Engineering Kit Rev2	**5**		

14.	Box for Arduino	**20**		
15.	USB 2.0 Cable Type A/B	**20**		
16.	QuadHands Classic Helping Hands Tool	**5**		
17.	Tinkerkit Braccio robot	**10**		
18.	Robotis Mini	**10**		
19.	Robotis Mini: Spare Parts Pack 1	**10**		
20.	Step Motor (28H2P3205A4)	**20**		
21.	Grove - Line Finder v1.1	**20**		
22.	DYNAMIXEL Shield for Arduino MKR Series	**20**		
23.	DYNAMIXEL XL-320	**10**		
24.	Grove - Servo	**20**		
25.	Gravity: IO Expansion Shield for Arduino v 7.1	**20**		
26.	Grove - I2C Motor Driver (TB6612FNG)	**10**		
27.	Arduino MKR Motor Carrier	**10**		
28.	Arduino Motor Shield Rev3	**20**		
29.	Feetech Continuous Rotation Micro Servo motor	**20**		
30.	Feetech 6 KG 360 Degrees Continuous Rotation Servo motor	**20**		
31.	Nicla Sense ME	**10**		
32.	Grove - HCHO Sensor	**10**		
33.	Arduino MKR ENV Shield rev2	**10**		
34.	Grove - High Precision Barometric Pressure Sensor (DPS310)	**20**		
35.	Grove - Dust Sensor（PPD42NS）	**20**		
36.	Gravity: UART Infrared CO2 Sensor (0-50000ppm)	**10**		
37.	Grove - Gas Sensor (MQ3)	**10**		
38.	Gravity: Analog CO2 Gas Sensor (MG-811 Sensor)	**10**		
39.	Solar Power Manager For 12V Lead-Acid Battery	**10**		
40.	Gravity: Analog Capacitive Soil Moisture Sensor - Corrosion Resistant	**50**		
41.	Grove - Digital Infrared Temperature Sensor	**10**		
42.	Solar Power Manager (for 9V/12V/18V solar panel)	**10**		
43.	Multi-function Environmental Module - CCS811+BME280	**10**		
44.	Gravity: Non-contact Digital Water / Liquid Level Sensor For Arduino	**20**		
45.	Gravity: I2C Oxygen Sensor	**10**		

46.	Gravity: Analog Electrical Conductivity Sensor / Meter For Arduino	**10**		
47.	CCS811 Air Quality Sensor-Breakout	**20**		
48.	Grove - Water Sensor	**20**		
49.	Grove - Temperature Sensor	**20**		
50.	Grove - Temp & Humi & Barometer Sensor (BME280)	**10**		
51.	Grove - Moisture Sensor	**20**		
52.	Grove - Hall Sensor	**10**		
53.	Gravity: Analog pH Sensor / Meter Pro Kit For Arduino	**10**		
54.	Gravity: I2C Ozone Sensor (0-10ppm)	**10**		
55.	SOIL HUMIDITY SENSOR, WATERMARK 2 M / 75 CM (Pack of 6)	**10**		
56.	Voice Controlled Light Bundle	**5**		
57.	PCBite kit with 4x SP10 probes and test wires	**5**		
58.	LA104 Logic Analyzer	**10**		
59.	Arduino MKR WiFi 1010	**20**		
60.	Arduino Sensor Kit - Base	**10**		
61.	Arduino MKR WAN 1310	**10**		
62.	Arduino Nano 33 IoT with headers	**5**		
63.	WiFi Module - ESP8266 (4MB Flash)	**20**		
64.	ESP-01S Wifi Module with relay	**20**		
65.	ESP-01s USB Programmer	**10**		
66.	WiFi LoRa 32 Dev Board (Heltec or equivalent)	**10**		
67.	LoRa Test Board Kit (LLCC68 based E220-900T30S or equivalent)	**2**		
68.	LoRa LLCC68 Development Kit 430 MHz 470 MHz	**2**		
69.	LLCC68 LoRa Module 868MHz 915MHz 30dBm UART	**10**		
70.	LLCC68 LoRa Module 433MHz 470MHz 30dBm UART	**10**		
71.	Antenna for LLCC68 LoRa Module 868MHz 915MHz 30dBm UART	**10**		
72.	Antenna for LLCC68 LoRa Module 433MHz 470MHz 30dBm UART	**10**		
73.	Fingerprint Sensor Module (Adafruit or equivalent)	**10**		
74.	Adafruit DS1307 Real Time Clock Assembled Breakout Board	**10**		
75.	DS3231 Precision RTC Breakout (Adafruit or equivalent)	**5**		
76.	MicroSD card breakout board+(Adafruit or equivalent)	**10**		
77.	HDMI Cables for Raspberry Pi 4 B+ (Micro HDMI to HDMI)	**10**		
78.	Ethernet Cable	**20**		
79.	Raspberry Pi 8MP Camera Module V2.1	**10**		

80.	Raspberry Pi 7 Inch Touch Screen Display (Official)	**5**		
81.	Hot Air Soldering Rework Station w/ Three Nozzles – Quick 957DW+	**2**		
82.	Engineer Professional Silicone-Tip Solder Sucker	**2**		
83.	USB MicroSD Card Reader/Writer – microSD/microSDHC /microSDXC	**10**		
84.	64GB Extreme microSDHC UHS-I Memory Card with Adapter	**10**		
85.	32GB Ultra microSDHC UHS-I Memory Card with Adapter	**10**		
86.	Wire Stripper	**5**		
87.	Breadboard power supply	**20**		
88.	Vero board	**20**		
89.	Soldering Wire + Paste	**20**		
90.	Magnifying glass for soldering	**5**		
91.	Breadboard	**20**		
92.	DE1-SoC Development Kit including cables and power adapter	**5**		
93.	DE10-Lite	**20**		
94.	Raspberry Pi Kit with Accessories	**20**		
95.	Arduino Starter Kit	**20**		
96.	Super Value Ultimate 37 in 1 Sensor Modules Kit for Arduino & MCU	**20**		
97.	ZedBoard Zynq-7000 ARM/FPGA SoC Development Board	**10**		
98.	PYNQ-Z1: Python Productivity for Zynq-7000 ARM/FPGA SoC with Accessory Kit	**20**		
99.	Eclypse Z7: Zynq-7000 SoC Development Board with SYZYGY-compatible Expansion	**1**		
100	ZedBoard Advanced Image Processing Kit (Quad Pcam option)	**5**		
101	PMOD Sensors	**5**		
102	Connectors and Adapters	**20**		
103	ZU-5EV (Zynq Ultrascale+ MPSoC Development Board)	**1**		
104	Xilinx Virtex-7 FPGA VC707 Evaluation Kit	**1**		
105	Universal Programmer (Xeltek Superpro 610p or equivalent)	**5**		
106	Zigbee module with antenna (XBee S2C ZigBee (Wire Antenna) or equivalent)	**10**		
	LOT #4: Computers for AI Computer Lab			
1.	Desktop Computers	**40**		

2.	Monitors	**40**		
	LOT #5: Furniture for AI Computer Lab			
1.	Chairs	**100**		
2.	Table (3-Person)	**15**		
3.	Table (2-Person)	**12**		

Extended Warranty Price (at discretion of PAF-IAST)

QUOTE PRICE IN USD

	Annual Warranty & Support Services beyond Standard Warranty of the Quoted Items	2nd Year (US$)	3rd Year (US$)	4th Year (US$)
	Lot # 1: Customized Multi-copters and support equipment			
1.	Custom-Build Agile Multi-copter			
2.	Custom-Built Carrier Multi-copter			
3.	RTK-GNSS Base station (Here+V2 or Equivalent)			
4.	Extra Aerial & Ground Batteries			
5.	Safety net for Multi-copters (M500BK FR or better)			
	LOT #2: Field Robotics Lab and Support Equipment			
1	Unmanned outdoor ground vehicle: [R6 ArduROS UGV or equivalent]			
2	Unmanned ground vehicle: [Segway RMPLite 220 or equivalent]			
3	Drone DJI Mavic 3 or equivalent			
4	Quanser Self-Driving Car Research Studio or equivalent			
5	Modern Manipulator Arm Robot Anno Model J-601-B or equivalent			
6	Loco swarm bundle inclusive additional highlighted accessories			
7	Q10T 10x Time Optical Zoom EOS Camera gimbal auto tracking function gimbal for Multi-copter			
	LOT #3: Embedded Systems & IoT Lab			
1	Arduino Portenta Machine Control			
2	Portenta H7			
3	Arduino MKR Connector Carrier (Grove compatible)			
4	Machine Vision Bundle			
5	Arduino Edge Control			
6	Engineering Kit Motors Backup			
7	Arduino Student Kit			
8	Arduino Explore IoT Kit			
9	EMoRo 2560 Controller			
10	Arduino Uno Rev3			
11	ARDUINO UNO WiFi REV2			
12	Arduino Nano			
13	Arduino Engineering Kit Rev2			
14	Box for Arduino			
15	USB 2.0 Cable Type A/B			
16	QuadHands Classic Helping Hands Tool			
17	Tinkerkit Braccio robot			

18	Robotis Mini			
19	Robotis Mini: Spare Parts Pack 1			
20	Step Motor (28H2P3205A4)			
21	Grove - Line Finder v1.1			
22	DYNAMIXEL Shield for Arduino MKR Series			
23	DYNAMIXEL XL-320			
24	Grove - Servo			
25	Gravity: IO Expansion Shield for Arduino v 7.1			
26	Grove - I2C Motor Driver (TB6612FNG)			
27	Arduino MKR Motor Carrier			
28	Arduino Motor Shield Rev3			
29	Feetech Continuous Rotation Micro Servo motor			
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33	Arduino MKR ENV Shield rev2			
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38	Gravity: Analog CO2 Gas Sensor (MG-811 Sensor)			
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40	Gravity: Analog Capacitive Soil Moisture Sensor - Corrosion Resistant			
41	Grove - Digital Infrared Temperature Sensor			
42	Solar Power Manager (for 9V/12V/18V solar panel)			
43	Multi-function Environmental Module - CCS811+BME280			
44	Gravity: Non-contact Digital Water / Liquid Level Sensor For Arduino			
45	Gravity: I2C Oxygen Sensor			
46	Gravity: Analog Electrical Conductivity Sensor / Meter For Arduino			
47	CCS811 Air Quality Sensor-Breakout			
48	Grove - Water Sensor			
49	Grove - Temperature Sensor			
50	Grove - Temp & Humi & Barometer Sensor (BME280)			
51	Grove - Moisture Sensor			
52	Grove - Hall Sensor			
53	Gravity: Analog pH Sensor / Meter Pro Kit For Arduino			
54	Gravity: I2C Ozone Sensor (0-10ppm)			
55	SOIL HUMIDITY SENSOR, WATERMARK 2 M / 75 CM (Pack of 6)			

56	Voice Controlled Light Bundle			
57	PCBite kit with 4x SP10 probes and test wires			
58	LA104 Logic Analyzer			
59	Arduino MKR WiFi 1010			
60	Arduino Sensor Kit - Base			
61	Arduino MKR WAN 1310			
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63	WiFi Module - ESP8266 (4MB Flash)			
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82	Engineer Professional Silicone-Tip Solder Sucker			
83	USB MicroSD Card Reader/Writer – microSD/microSDHC /microSDXC			
84	64GB Extreme microSDHC UHS-I Memory Card with Adapter			
85	32GB Ultra microSDHC UHS-I Memory Card with Adapter			
86	Wire Stripper			
87	Breadboard power supply			
88	Vero board			
89	Soldering Wire + Paste			
90	Magnifying glass for soldering			
91	Breadboard			

92	DE1-SoC Development Kit including cables and power adapter			
93	DE10-Lite			
94	Raspberry Pi Kit with Accessories			
95	Arduino Starter Kit			
96	Super Value Ultimate 37 in 1 Sensor Modules Kit for Arduino & MCU			
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102	Connectors and Adapters			
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104	Xilinx Virtex-7 FPGA VC707 Evaluation Kit			
105	Universal Programmer (Xeltek Superpro 610p or equivalent)			
106	Zigbee module with antenna (XBee S2C ZigBee (Wire Antenna) or equivalent)			
	LOT #4: Computers for AI Computer Lab			
1	Desktop Computers			
2	Monitors			
	LOT #5: Furniture for AI Computer Lab			
1	Chairs			
2	Table (3-Person)			
3	Table (2-Person)			

Total Bid Value in Figures (including Extended Warranty Price): USD_____

Total Bid Value in words (including Extended Warranty Price): USD_____

_____

Name & Designation of Authorized Person:_____

Signature: _____ (Please affix company stamp here)

Annex – I: Integrity Pact

The Bidders will be required to submit the below text on stamp paper after filling in the details and duly signed as well as stamped, as part of their Technical Proposal.

DECLARATION OF FEES, COMMISSION AND BROKERAGE ETC PAYABLE BY THE SUPPLIER OF GOODS, SERVICES & WORK IN CONTRACTS WORTH RS. 10.0 MILLION OR MORE

(To be filled by the bidder as a part of technical proposal)

Contract Number: _____ Dated: _____

Contract Value: _____

Contract Title: _____

_____ hereby declare that it has not obtained or induced the procurement of any contract, right, interest, privilege or other obligation or benefit from Government of Pakistan or any administrative subdivision or agency thereof or any other entity owned or controlled by it (GoP) through any corrupt business partner.

Without limiting the generality of the forgoing, _____ represents and warrants that it has fully declared the brokerage, commission, fees etc. paid or payable to anyone and not given or not given or agreed to give and shall not give or agree to give to anyone within or outside Pakistan either directly or indirectly through any nature or juridical person, including its affiliate, agent, associate, broker, consultant, director, promoter, shareholder, sponsor or subsidiary, any commission, gratification, bribe, finder's fee or kickback, whether described as consultant fee or otherwise, with the object of obtaining or inducing the procurement of a contract, right, interest, privilege or other obligation or benefit in whatever from GoP, except that which has been expressly declared pursuant hereto.

_____ certifies that it has made and will make full disclosure of all agreements and arrangements with all persons in respect of or related to the transaction with GoP and has not taken any action or will not take any action to circumvent the above declaration, representation or warranty.

_____ accept full responsibility and strict liability for making any false declaration, not making full discloser, misrepresenting facts or taking any action likely to defeat the purpose of this declaration, representation and warranty. It agrees that any contract, right, interest, privilege or other obligation or benefit obtained or procured as aforesaid shall, without prejudice to any other right and remedies available to GoP under any law, contract or other instrument, be voidable at the option of GoP.

Notwithstanding any rights and remedies exercised by GoP in this regard, _____ agrees to identify GoP for any loss or damage incurred by it on account of its corrupt business practices and further pay compensation to GoP in an amount equivalent to ten time the sum of any commission, gratification, bribe, finder's fee or kickback given by _____ as aforesaid for the purpose of obtaining or inducing the procurement of any contract, right, interest, privilege or other obligation or benefit in whatsoever from GoP.

_____ _____

[Buyer] [Seller / Supplier]

Annex – II: Draft Contract Sample

Available at PAF: IAST website at http://www.paf-iast.edu.pk/downloads