# TENDER DOCUMENTS

## Procurement of Innovation Lab

### NUTECH / SCM /Innovation Lab 2021 / TD-211

## NATIONAL UNIVERSITY OF TECHNOLOGY

**TENDER NOTICE**
**National University of Technology (NUTECH)**

**NUTECH / SCM /NSDD IT Lab 2021 / TD-208, NUTECH / SCM /Antivirus & Linux Support 2021/TD-209, NUTECH / SCM /UPS NUTL 2021/TD-210, NUTECH / SCM /Innovation Lab/TD-211, NUTECH / SCM /Furniture NUTL 2021/TD-212 & NUTECH / SCM /HVAC, Generator & Transformer 2021 / TD-207**

1.      Sealed bids are invited from Government / FBR Registered Firms for the procurement on **FOR Basis**.

2.      Tender documents containing terms, conditions and detailed specifications of items (including draft contract) can be downloaded from NUTECH website "https://nutech.edu.pk/downloads/procurement/scm-tenders/" w.e.f **19 March 2021**.

3.      Quotations shall be submitted as per requirement of the tender documents.

4.      Bidders will be required to submit **Bank Draft / CDR** equal to **5%** of quoted value as Bid Bond in favor of National University of Technology (NUTECH).

5.      Submit Rs 1500/- as Tender fee in favor of NUTECH HBL Account (**NUTECH Tendering and Contracts, 5037-7000210755). Please attach bank receipt with technical offer. Offers will not be entertained without payment of processing fee.**

6.      Details for Submission & Opening of bids for tender are as under: -

| Ser | Description | Submission | Tender Opening | Completion Days |
|---|---|---|---|---|
| a. | NSDD IT Lab (TD-208) | 1030 hrs on 05 Apr 2021 | 1100 hrs on 05 Apr 2021 | 45 Days |
| b. | Antivirus & Linux Support (TD-209) | 1100 hrs on 05 Apr 2021 | 1130 hrs on 05 Apr 2021 | 30 Days |
| c. | UPS NUTL (TD-210) | 1130 hrs on 05 Apr 2021 | 1200 hrs on 05 Apr 2021 | 60 Days |
| d. | Innovation Lab (TD-211) | 1030 hrs on 06 Apr 2021 | 1100 hrs on 06 Apr 2021 | 60 Days |
| e. | Furniture NUTL (TD-212) | 1130 hrs on 06 Apr 2021 | 1200 hrs on 06 Apr 2021 | 30 Days |
| f. | HVAC, Generator & Transformer (TD-207) | 1200 hrs on 06 Apr 2021 | 1300 hrs on 06 Apr 2021 | 60 Days |

**Deputy Director (Supply Chain Management)**
**NATIONAL UNIVERSITY OF TECHNOLOGY, IJP ROAD, I-12, ISLAMABAD**
**Tel: 0092-51-5476768, Ext: 278**

**NATIONAL UNIVERSITY OF TECHNOLOGY**
**SUPPLY CHAIN MANAGEMENT**
**INVITATION TO TENDER**

**Tender submission time**: **1030 hrs on 06 April 2021**

1.      NUTECH desires to procure the list of item(s) / Store(s) on **F O R b a s i s** as per **Annexure-A**. Interested bidders are requested to send their bids through courier or deliver at NUTECH under "Single Stage – Two Envelopes" (two envelopes placed together in third envelope), marked clearly as **"Technical Offer"** and **"Commercial Offer"** respectively to the undersigned, latest by or before above mentioned due date.

2.      **Conditions Governing Contracts.** The contract made as result of this IT will be in accordance with the draft contract published on NUTECH University website and other special conditions (Mentioned in this document) that may be added to given contract for the supply of Lab Equipment.

3.      **Delivery of Tender.** The offer is to be submitted as under:-

a.      **Technical Offer.** Technical Offer should contain only Annexure-A, Annexure-A-1 & Annexure B duly filled in (supported with relevant technical literature / details / catalogues etc) and receipt of tender processing fee. Copy of bid bond WITHOUT MENTIONING PRICE should be attached with technical offer. Only relevant technical details i.e literature/brochures) without mentioning the financial aspect of the offer in DUPLICATE should be enclosed in an envelope. In technical proposal, all items must have the brand names, model number, manufacturer's name, country of origin, manufacturer's warranty including parts with complete specs and brochures. Re-conditioned and re-furbished equipment shall not be acceptable. Following information will be clearly marked on the envelope:

(1)      Technical Offer

(2)      Original Performa Invoice (without price)

(3)      Tender number

(4)      Date/ time of opening

b.      **Commercial Offer.** Commercial Offer will contain Annexure-C and bid bond (Dully mentioned and placed in separate envelope. The offer indicating the quoted price FE/Local Currency (in Local Currency for FOR cases & in FE for FOB cases) in figures as well as in words

would be enclosed in an envelope. Following information will be clearly marked on the envelope;

      (1)     Commercial Offer

      (2)     Original Performa invoice with price

      (3)     Tender number

c.     Both the envelopes i.e. commercial offer and technical offer would be enclosed in yet another properly sealed envelope that will be marked with address of this office only. There should be clear indication that this envelope contains tender documents.

d.     The tender duly sealed will be addressed to the following:-

Deputy Director (Supply Chain Management Office)
NATIONAL UNIVERSITY OF TECHNOLOGY (NUTECH)
IJ P ROAD, I-12, ISLAMABAD
Tel: 0092-51-5476768, Ext: 227

4.     **Date and Time for Receipt of Tender.** Sealed bids with detailed specifications should reach SCM office latest by **1030 hrs on 06 April 2021.** Delay occurring in post shall not be accepted. Tenders received after the appointed / fixed time will NOT be entertained. The appointed time will, however, fall on next working day in case of closed / forced holiday.

5.     **Tender opening.** The offers shall be opened **30 minutes** after submission time. Commercial offers will be opened at later stage if Technical Offer is found acceptable on examination by technical authorities. Date and time for opening of commercial offer shall intimated later. Only legitimate / registered representatives of firm will be allowed to attend tender opening.

6.     **Validity of Offer.** The validity period of quotations must be indicated and should be **90 days** from the date of opening of financial offer.

7.     **With drawal of offer** If the firm withdraws its offer within validity period, the competent authority may place such firm under embargo for a period which may be extended up to one year. Moreover, the Earnest Money of the firm will be confiscated.

8.     **Documents.** Following information / copy of documents must be provided / attached with offer:-

a.     A copy of letter showing firm's financial capability.

b.     NTN/GST number be mentioned on the offer and copy of registration Certificate issued by Sales Tax Department, attached.

    c.      Foreign supplier to provide its Registration Number issued by respective Department of Commerce authorizing export of subject stores **(in FOB cases).**

    d.      Annexes A, A-1, B and C and special conditions must be signed and stamped. ATTACH ONLY RELEVANT DOCUMENTS.

    e.      Complete all Annexes as per given format. Do not use your format or letter head. Offer may be rejected if given format is not followed.

    f.      OEM/principal agency agreement must be provided.

9.      **Disqualification.** Offers are liable to be rejected if:-

    a.      Validity of offer is not quoted as required in IT documents.

    b.      Any deviation from the General/ Special / Technical Instructions.

    c.      Offers are found conditional or incomplete in any respect.

    d.      Copy of EM/Bid Bond & Tender processing fee (with tech offer) and original EM/Bid Bond (with fin offer) are NOT attached.

    e.      Manufacturer's relevant brochures and technical details on major equipment assemblies are not attached in support of specifications.

    f.      Offer received later than appointed / fixed date and time.

    g.      Subject to restriction of export license.

    h.      Offers (Commercial / technical) containing non-initialled / unauthenticated amendments / corrections / overwriting. If the validity of the agency agreement has expired. The commercial offer against FOB / CIF / C&F tender quoted in local currency.

    i.      If the offer is found to be based on cartel action in connivance with other sources/participants of the tender.

10.      **Earnest Money / Bid Bond.** Commercial Offer must be accompanied with a Bid Bond (CDR/Pay Order/Bank Draft) in agreement of faithful compliance of the conditions of Contract. This amount will be equivalent to 5% of the total quoted value. The Bid Bond amount submitted by the successful bidder will however be refunded on effective termination of Contract. (The Bid Bond will be forfeited in case of default by the bidder from his commitments made through his offer). Submission of Bid Bond is mandatory; otherwise your offer will be rejected. Bid Bond will be used as performance guarantee till the delivery of stores, otherwise separate performance guarantee valued at 5 % of contract will be submitted by successful firm till stores are delivered and inspected.

11. **Return of Earnest Money/Bid Bond.**

    a. Bid Bond to the unsuccessful bidders will be returned on finalization of the lowest evaluated bidder.

    b. Bid Bond of the successful bidder/bidders will be returned on submission of Bank Guarantee/Bid bond against warranty period OR Bid bond retained for the warranty period as the case may be.

12. **Terms of Payment/ LC Charges**

**(In FOB cases)**

    a. All categories payment will be made through letter of credit (LC). LC opening charges in Pakistan are to be borne by NUTECH. Payment will be made through irrevocable LC in favour of Manufacturer.

**In FOR cases**

    b. 50% payment will be paid in advance if demanded by the firm against CDR/BG/PO/DD/BC through cross cheque or inland LC.

    c. 50 % payment will be paid after installation, commissioning of the store through cross cheque or inland LC.

Or

    d. 50% payment may be considered on delivery of the store also through cross cheque or inland LC.

13. **Warranty/ Bank Guarantee (BG)**. **2 Years for serial (1 to 5,8,11 to 22, 27 to 43)** against **5% Bank Guarantee/CDR/Pay Order/Bank Draft** of the store value will be required from the successful bidders from the date of commissioning as performance bond. BG submitted shall remain valid for up to 60 days beyond completion of warranty period.

14. **Taxes/ Duties/ Custom clearance** All taxes /duties /import Licenses Fee as applicable under government laws in Pakistan as well as country of supplier shall be on Seller **(in FOR Case)**. NUTECH will provide applicable exemption certificates and documents **(In FOB Cases only)**.

15. **Insurance:-** Insurance will be NUTECH's responsibility through NICL **(in FOB Cases)**.

16. **Freight charges /Misc charges:** All charges such as packing, forwarding, local freight, loading and unloading, installation and commissioning, custom clearance, orientations, on job training or any other will be part of quoted price. Delivery till NUTECH will be seller's responsibility and all associated costs will be

part of quotation as well.

17. **Delivery Schedule.** Store will be delivered within **60 days** from contract signing date.

18. **Force Majeure.** If non-compliance with the period of delivery or services can be proved to be due to Force Majeure, such as but not limited to mobilization, war, riot, strike, lockout, pandemics/epidemics or the occurrence of unforeseen events, the period shall be reasonably extended.

19. **Subletting** Suppliers are not allowed to sublet wholly or part of the contract to any other firm /company without prior permission by NUTECH. Firm found in breach of the clause will be dealt with as per purchaser's right and discretion.

20. **Arbitration.** Will be as under:-
"All Claims ,disputes ,controversies, differences arising out of or in connection with    this contract ,including any question regarding its existence, validity, interpretation performance, breach or termination ,shall be referred to and shall finally be solved by binding arbitration. An Arbitration Committee Shall be constituted comprising Rector NUTECH and two Arbitration to be nominated on mutual agreement by each party. The venue of the Arbitration shall be the place of issuance of this contract or as Rector NUTECH may determine. In case of any difference, the clauses of Arbitration Act 1940, Rules and Regulation made thereof for time being enforce shall prevail. The award shall be final and binding on both parties.

   a. Provided that written record of any such arbitration and its award shall be arranged properly. An award of such arbitration may be confirmed in a court of competent jurisdiction at Islamabad.
   b.  Provided further that incase of any other question /dispute not covered under this clause, the decision of Rector NUTECH shall be final."

21. **Redress Of Grievance.** In case of dispute, case shall be reviewed by 'NUTECH Redress of grievance committee and decision of NUTECH shall be final and binding on both parties.

22. **Export License/Permit /End User Cert.** It shall be the responsibility of the Supplier to obtain from the Government concerned all permits and export licenses, etc required to enable each consignment to be shipped immediately as per the delivery schedule. In case the supplier fails to arrange export license within 30 days of signing the contract the purchaser reserves the right to cancel the contract on the

risk and expense of the supplier without prior notice. The purchaser will provide End User Certificate for acquisition of export license to the supplier (format to be provided by the supplier for respective country within 10 day of signing of the contract).

23.    **Technical Specification:** The supplier will provide OEM certificate, quality certificate /inspection document to the purchaser confirming the quality of the product being supplied under this contract .Store must bear the manufacturer's identification marking /monogram.

24.    **Inspection /Testing of Store**: Inspection testing will be carried out at NUTECH by the concerned inspection team as detailed by the respective department in accordance with the laid down Acceptance Criteria. (Acceptance Test Procedure (ATPs)/Drawing /Test standard and specification). The supplier will provide ATPs with technical offer. Mutually agreed/approved ATPs will form part of contract to govern the inspection of store subsequently.

25.    **Change In Specification / Mfr / Model.** No alternation marked/brand and quality of store will be entertained after the tender have been opened.

26.    **Checking of Store at Consignee/User End.** All stores will be checked at Consignee's end in the presence of the supplier's representative. If for some reason, the supplier decides not to nominate his representative for such checking, an advance written notice to this effect will be given by the supplier to the consignee prior to immediately on shipment of store. In such an event the supplier will clearly undertake that decision of consignee with regard to quantities and description of consignment will be taken as final and discrepancy found will be accordingly made up by supplier. In all other cases the consignee will inform the supplier about arrival of consignment immediately on receipt of store through registered email/letter and telephone. If no response from the supplier is received within 15 days from initiation letter the consignee will have the right to proceed with the checking without supplier's representative. User/Consignee's report on checking of the stores will be binding on the seller in such cases.

27.    **Packing /Marking.** The supplier shall be responsible for proper packing of the Store in standard export packing worthy of transportation by sea /air /road rail so as to ensure their content being free from lose or damages due to faulty packing on arrival at the ultimate destination. Packing of stores will be done at the expenses of the supplier. All packing cases, containers and other packing material shall become the property of the NUTECH on receipt. Any loss occurred /demurrage paid due to wrong marking will be made good by the supplier.

28. **Original Performa Invoice**: Original Performa invoice must have following components incorporated:-

    a.  HS Code

    b.  Incoterm

    c.  Payment Terms

    d.  Origin of good

    e.  Port of shipment

    f.  Address of OEM

    g.  Seller acceptance (on Performa Invoice)

    h.  Invoice Date

    i.  Latest date of shipment

    j.  Seller complete bank detail

**Note:**    Performa Invoice in the name of NUTECH in case of FOB cases & in the name of local partner in case of FOR cases.

29. **General Instructions:** Following must be noted:-

    a.  The firm should provide point to point acceptance of each clause of IT and special instructions attached with IT.

    b.  Firm will render a certificate with technical offer that firm is neither defaulter nor blacklisted by any Government / semi Government organization directly or indirectly. (On Judicial Paper)

    c.  Rates should be quoted on Free Delivery basis at NUTECH Islamabad.

    d.  The stipulated delivery period should be strictly adhered to. Any anticipated delay that is beyond the control of Seller will be informed (in writing) well in advance of the expiry of the due date of the activity along with reasons thereof, requesting for the grant of extension in delivery period. If the Seller fails to do so, or the Buyer is not convinced with the rationale provided by the Seller, Liquidated Damages up to/at 2% per month or part thereof, will be imposed. However, the maximum limit of the Liquidated Damages will not exceed 10% of the delayed store value.

    e.  If even after applicability of 10% LD, the Seller fails to deliver the required stores, the Buyer will be at liberty to Cancel the contract, and /or procure the stores from an alternate source, on the Seller's "Risk & Cost/Expense". In that case, the Seller will be bound to make payment to the new source through NUTECH. The purchaser's

decision under this clause shall NOT be subjected to arbitration.

f.  NUTECH reserves the right to cancel the Contract without assigning any reason whatsoever during its currency / execution / after placement, if the firm is found to be involved in any dubious activity, litigation, lacking to meet contractual obligations with the purchaser or is blacklisted with any other Public procurement agency. No claims / loss /damage of whatsoever nature shall be entertained and NUTECH's decision in this regard will be final / binding on the Seller.

g.  An appropriate amount may be paid for mobilization against Bank Guarantee/CDR/Demand Draft/Pay Order.

h.  Firms with previous pending/outstanding projects/business and unsatisfactory performance with NUTECH may not be considered for award of any further business.

i.  Lowest evaluated bidders must send their authorized representatives for signing of the contract within three days of sharing of the draft contract.

j.  For technical opening firm will send a representative who has knowledge about the quoted items otherwise representative will not be allowed to sit in tender opening.

Deputy Director
Supply Chain Management Office

Annex-A

## Technical Specifications

## NUTECH / SCM /UPS NUTL 2021 / TD-210

| Ser | Part No | Items | Description | A/U | Country of Origin | Qty Req | Bidder Compliance | | Tech Scrutiny to be done by user | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Yes | No | Accepted | Rejected |
| | | | | | | | | | **Reason of Rejection** | |
| 1. | | 3D Scanner | • Time needed for a single scan: 4 seconds<br>• Time needed for a 360° scan in Auto Scan mode: 1 minute<br>• Plug-and-play. Easy set-up with automated calibration<br>• Uses a safe structured white light, no laser or other light sources that require protection glasses<br>**Technical specifications (Minimum):** | No | European / North American | 1 | | | | |

| Scan Mode | Auto scan | Fixed scan |
|---|---|---|
| Scan Speed | 1 min. | 4 s |
| Mode of Alignment | Feature; Manual | Turntable; Manual |
| Single Shot Accuracy | ≤ 0.05 mm | ≤ 0.05 mm |
| Maximum Scan Volume / Minimum Scan Volume | 200 x 200 x 200 mm / 30 x 30 x 30 mm | 1200 x 1200 x 1200 mm / 30 x 30 x 30 mm |
| Range of Single Capture | 200 x 150 mm | 200 x 150 mm |
| Point Distance | 0.17 mm ~ 0.2 | 0.17 mm ~ 0.2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | mm | mm | | |
| | | Texture | Yes | Yes | | |
| | | File Format | OBJ, STL, ASC, PLY | OBJ, STL, ASC, PLY | | |
| | | Camera Resolution | 1.3 Megapixel | 1.3 Megapixel | | |
| | | Light Source | White Light | White Light | | |
| | | Stand-off Distance | 290 ~ 480 mm | 290 ~ 480 mm | | |
| | | Weight unpacked / packed | 4.2 kg / 7.0 kg | 4.2 kg / 7.0 kg | | |
| | | Dimension | 570 x 210 x 210 mm | 570 x 210 x 210 mm | | |
| | | Power Supply | 50 W | 50 W | | |
| | | Input Voltage | DC: 12 V / 3.33 A | DC: 12 V / 3.33 A | | |

| 2. | | 3D Printer (SLA) | 3D Printer should be compatible with 3rd party 3D printing resins flexibility to try the different type of resin such as castable resin, tough resin, biocompatible resin<br>3D printer should use the self-developed Full HD 1080p resolution light engine, which can ensure more stable LED intensity and better printing quality<br>Touch screen should be available<br>Advanced architecture main board and self-developed proprietary light engine work together perfectly. Dual-core 800 MHz ARM processor ensures high-performance and better user experience. The mainboard is designed and made in a 10-layer high precision board, safeguarding EMC, the integrity and the stability of the projection signal.<br>**TECHNICAL SPECIFICATIONS (Minimum):** | No | European / North American | 1 | | | |

| 3D Printing | DLP (Digital |
|---|---|

| Technology | Light Processing) |
|---|---|
| Printing Size | 120 × 67.5 × 150 mm (L x B xH) |
| Z axis layer height | 25/50 µm (0.025 / 0.05 mm) |
| X-Y axis resolution | 62.5 µm (0.0625 mm) |
| Light source | 405 nm LED; 50,000 hours life span |
| 3D Printing Software | FlashPrint |
| 3D File format | STL |
| Connectivity | USB Cable, USB Stick, Wi-Fi |
| Printer dimensions | 360 x 310 x 565 mm |
| Printer weight | 17.8 kg |
| Power | 100-240v, 50-60Hz, 1A |

**3D PRINTING SPECIFICATIONS (Minimum):**

| Build volume (in liters) | 1.215 |
|---|---|
| Build volume (in millimeters) | 120 × 67.5 × 150 mm |
| Layer resolution | Z: 25 / 50 microns (0.025 / 0.05 mm) \| X-Y: 62.5 microns (0.0625 mm) |
| Print technology | Digital Light Processing (405 nm LED with 50,000 hours life span) |

**CONNECTIVITY:**

| USB | Yes |
|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Wi-Fi | Yes | | | | | |
| | | | **SIZE & WEIGHT (Minimum):** | | | | | | |
| | | | Product dimensions | 360 x 310 x 565 mm | | | | | |
| | | | Product weight | 17.8 kg | | | | | |
| | | | **SOFTWARE** | | | | | | |
| | | | File formats | STL | | | | | |
| | | | Included software | FlashPrint | | | | | |
| 3. | | Digital Oscilloscope | **Technical Specification (Minimum):**<br>• 10M sample standard and 20M sample interleaved<br>• 30000 to 50000 waveforms/s update rate<br>• 100MHz dual channel<br>• Sensitivity down to 1mV/div(2mV/div)<br>• low noise<br>• Math functions such as +, -, *, /, FFT<br><br>**OR Equivalent** | | No | European / North American | 2 | | | |
| 4. | | Function<br><br>Generator | **Technical Specification (Minimum):**<br>Frequency range: 0.5 Hz...5 MHz (sine); arbitrary 0.5 Hz...5 MHz (or higher)<br>Waveforms: Sine, square/pulse, ramp, white noise, arbitrary (exp. rise/fall, sin(x)/x, staircase etc.; 45 built-in signal and user definable arbitrary waveforms)<br><br>**OR Equivalent** | | No | European / North American | 2 | | | |
| 5. | | Handheld Multi<br><br>Meter | **Technical Specification (Minimum):**<br>• 0.05% basic accuracy<br>• True RMS<br>• Auto power off | | No | European / North American | 4 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | • Overload protection<br>• DC ranges: 0.1 mV to 1000 V<br>• Resolution:10 µV to 100 mV<br>• AC ranges: 200 mV- 2 V, 20 V- 750 V (or higher)<br>• Fuse for short circuit protection<br><br>**OR Equivalent** | | | | | | |
| 6. | | Workstation<br><br>(3 Level<br><br>Adjustable) | • Work Station (Size6'x2'x6')<br>• Wooden with metallic base (pipe size 1.5 inches)<br>• Power Sockets and additional accessories are not required. Just 3 level workstation is required.<br>**Purpose:**<br>This workbench will be used as a computer desk, having space to accommodate computer accessories, development boards, trainers, and accessories for electronic projects. Preferably Workstation should be assembled at premises.<br><br>Picture attached in the Annex "A" for reference. | No | Local/<br>Imported | 4 | | | |
| 7. | | Workbench<br><br>Computer | • Top Material: Manufactured Wood<br>• Base Material: Metal<br>• Assembly Required: Yes<br><br>**Requirements (Minimum):**<br><br>Shape: Rectangular<br>Base Material: Metal<br>Base Wood Construction Details: Powder Coated Metal<br>Top Material: E1 Grade Lamination sheet<br>Top Construction: MDF | No | Local/<br>Imported | 4 | | | |

| | | | Details | |
|---|---|---|---|---|
| | | | Edges | Covered with Abs (Doolken-Germany) edging |
| | | | Wood Tone | White & Grey |
| | | | Cabinet Included | No |
| | | | Side Rack | Yes |
| | | | Locking Drawers | Yes |
| | | | No of Drawers | 3 |
| | | | Pedestal Included | Yes |
| | | | Drawer Glide Mechanism | Ball Bearing Glides |
| | | | Termite Control Treatment | Yes |

**Dimension in mm (Minimum):**

| Main Desk | 1500 W x 750 D x 760 H |
|---|---|
| Side Rack | 1050 W x  450 D x 710 H |

Picture attached in the Annex "A-2" for reference.

| 8. | | Power Supply | • Variable Output Voltage:   0-32V ±40% (DC) <br> • Variable Output Current:   0-20A ±40% <br> (even at        max 32V) | No | European / North American | 4 | | | |
|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | • Input Voltage: 100- 240VAC 50/60 Hz<br>• Dual 3-digit LED display<br>• USB interface<br>• Front panel auxiliary        output<br>• Overvoltage, over   temperature and overload        protection<br><br>**OR Equivalent** | | | | | | |
| 9. | | USB  Digital Microscope Endoscope Magnifying Glass Camera Zoom for PCB Inspection Phone Repair | • Digital Microscope: Provide high-definition image and video at 1600X1200 resolution,1-200X Zoom and 30fps with 2.0MP CMOS sensor, clearly view details.<br>• Microscope: Can capture live AVI video or take images in BMP format while connecting USB electronic microscope to our computer. And it is a powerful PCB microscope.<br>• Adjustable Light Source: Includes 8 led lights, support dim or brighten light conditions, easy to adjust with sliding regulator<br>• Durable and Portable usb digital microscope: Finished with aluminum , durable for daily use. With simple constructions, easy to install, also lightweight and easy to store for home use. Can be connected to device and start the program.<br>• Compatibility: It should work with Windows 7, 8 and 10, and Mac<br><br>**OR Equivalent** | No | Imported | 2 | | | |
| 10. | | Powered bread board | **Technical Specification (Minimum):**<br>DC output voltages<br>• 0~+15VDC/500mA<br>• 0~-15VDC/500mA<br>• 0~15VAC/500mA<br>• 12,+5VDC/1A<br>Solderless breadboard<br>• 2420 tie points | No | Local | 4 | | | |

| | | | OR Equivalent | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 11. | | Laser Cutter | **Technical Specification (Minimum):** Laser Technology CO2 Laser Working Size 1600*1000mm Laser Type Sealed CO2 Glass Laser Tube Laser Power 60W/80W/100W/130W/150W/280W/300W Cutting Speed 0-40000mm/Min Engraving Speed 0-60000mm/Min Cutting Depth Depend Control System DSP Offline / USB Compatible Software Autocad/Coreldraw/Photoshop Voltage 220V/50Hz(110V/60Hz) Trademark MC | No | Imported | 1 | | | |

| 12. | | Digital Vibration Meter | **Technical Specification (Minimum):**<br>Velocity Lo-RMS: 0.1 - 199.9 mm/s<br><br>Velocity Hi-AVE: 0.1 - 199.9 m/s²<br><br>Displacement, peak to peak Hi-PEAK: 0.001 - 1999 mm<br><br>Dimension: 185 mm x 68 mm x 30 mm with integrated or with external probe, incl. workshop test certificate<br><br>compact analyser for predective maintenance of production machinery and for a quick checking of unbalance, misalignment, bearings and gears etc.<br><br>LCD display with digit height 18 mm<br><br>accuracy ± 5% of display value (± 2 digits) with integrated accelerometer and with hand strap rugged, polyamid plastic housing, with keypad large LCD display with clear reading, with backlight<br><br>On-switch, automatic power-Off after approx. 1 min., with battery indicator low frequency mode "Lo-RMS" to test low vibrations high frequency mode "Hi-AVE" to test avarage acceleration displacement peak to peak mode "Hi-Peak"   large frequency range: 1 Hz up to 1 kHz (Lo), 1 kHz up to 15 kHz (Hi) | No | European / North American | 1 | | | |

Transport Package
Standard Wooden Box
Specification
1600*1000mm

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | incl. 2 exchangeable probe tips, for different measuring functions:<br><br>   - short probe tip for standard vibration measurements<br><br>   - long, small probe tip for vibration measurements on small or narrow objects, etc.<br><br>   - without probe tip for vibration measurements or smooth object surfaces, etc.<br><br>   operation temperature 0°C ~ +40°C, humidity 30 - 90%RH<br><br>   incl. 1x 9 V battery (type 6LR61, art.-no.: 60 9281), with operation manual | | | | | | |
| 13. | | Embedded systems for AI applications<br><br>Nvidia Jetson Nano or Equivalent | **Technical Specification (Minimum):**<br>GPU: 128-core Maxwell<br>CPU: Quad-core ARM A57 @ 1.43 GHz<br>Memory: 4 GB 64-bit LPDDR4 25.6 GB/s<br>Storage: microSD (not included)<br>Video Encode: 4K @ 30 \| 4x 1080p @ 30 \| 9x 720p @ 30 (H.264/H.265)<br>Video Decode: 4K @ 60 \| 2x 4K @ 30 \| 8x 1080p @ 30 \| 18x 720p @ 30 (H.264/H.265)<br><br>• Camera: 2x MIPI CSI-2 DPHY lanes<br><br>• Connectivity    Gigabit Ethernet, M.2 Key E<br><br>• Display    HDMI and display port<br><br>• USB    4x USB 3.0, USB 2.0 Micro-B<br><br>Others GPIO, I2C, I2S, SPI, UART<br>Mechanical    69 mm x 45 mm, 260-pin edge connector | No | European / North American | 10 | | | |

| | | | OR Equivalent | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 14. | | Embedded systems for advanced AI applications<br><br>Nvidia Jetson Xavier AGX Dev kit or equivalent | **Technical Specification (Minimum):**<br><br>• PCIe X16: x8 PCIe Gen4/x8 SLVS-EC<br>• RJ45: Gigabit Ethernet<br>• USB-C: 2x USB 3.1, DP (Optional), PD (Optional) Close-System Debug and Flashing Support on 1 Port<br>• Camera Connector: (16x) CSI-2 Lanes<br>• M.2 Key M: NVMe<br>• M.2 Key E: PCIe x1 + USB 2.0 + UART (for Wi-Fi/LTE) / I2S / PCM<br>• 40-Pin: Header UART + SPI + CAN + I2C + I2S + DMIC + GPIOs<br>• HD Audio Header: High-Definition Audio<br>• eSATAp + USB3.0 Type A: SATA Through PCIe x1 Bridge (PD + Data for 2.5-inch SATA) + USB 3.0<br>• HDMI Type A: HDMI 2.0<br>• uSD/UFS Card Socket: SD/UFS<br><br>**OR Equivalent** | No | European / North American | 5 | | | |
| 15. | | Embedded systems for professional AI applications<br><br>NVIDIA Jetson TX2 Developer Kit or equivalent | **Technical Specification (Minimum):**<br><br>Module<br>• NVIDIA Pascal™ Architecture GPU 2 Denver 64-bit CPUs + Quad-Core A57 Complex<br>• 8 GB L128 bit DDR4 Memory<br>• 32 GB eMMC 5.1 Flash Storage<br>• Connectivity to 802.11ac Wi-Fi and Bluetooth-Enabled Devices<br>• 10/100/1000BASE-T | No | European / North American | 10 | | | |

| | | | Etherne |
|---|---|---|---|
| | | | I/O |
| | | | <ul><li>USB 3.0 Type A</li><li>USB 2.0 Micro AB (supports recovery and host mode)</li><li>HDMI</li><li>M.2 Key E</li><li>PCI-E x4</li><li>Gigabit Ethernet</li><li>Full-Size SD</li><li>SATA Data and Power</li><li>GPIOs, I2C, I2S, SPI, CAN*</li><li>TTL UART with flow control</li><li>Display Expansion Header*</li><li>Camera Expansion Header</li></ul><br>**OR Equivalent** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 16. | | Bio Medical Certified Embedded systems for respiratory apparatus applications<br><br>Toradex IMx6 with Ixora Carrier Board or Equivalent | **Technical Specification (Minimum):**<br><ul><li>USB 2.0 (1x Host, 1x OTG)</li><li>USB 3.0 (2x Host)</li><li>PCIe (1x Mini PCIe)</li><li>I2C (2x)</li><li>SPI (1x)</li><li>UART (3x RS232)</li><li>PWM (4x)</li><li>GPIO (up to 40)</li><li>Analog Input (4x)</li><li>Ethernet (1x 10/100/1000 Mbit)</li><li>SATA (1x mSATA)</li><li>SDIO/SD/MMC (1x 4 Bit Micro SD)</li><li>CAN (2x)</li><li>LVDS (1x Dual Channel)</li><li>S/PDIF In/Out (1x)</li><li>HDMI (1x)</li><li>RGB (1x 24 Bit)</li><li>Resistive Touch (4/5-wire)</li></ul> | No | European / North American | 10 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | • Capacitive Touch connector<br>• Camera Parallel Interface (1x)<br>• Camera Serial Interface (1x)<br>• Analog Audio Line in (1x)<br>• Analog Audio Mic in (1x)<br>• Analog Audio Headphone out (1x)<br>• RTC on Board (1x)<br><br>Along with carrier board<br><br>**OR Equivalent** | | | | | | |
| 17. | | Field Programmable Gate array systems for advanced industrial application with development kits and expansion modules Zynq-700 or Equivalent | **Technical Specification (Minimum):**<br>• Onboard configuration circuitry<br>• 16MB Quad SPI Flash<br>• SDIO Card Interface (boot)<br>• PC4 and 20 pin JTAG ports<br>• HDMI Video OUT<br>• 8X LEDs<br>• 12V wall adapter or ATX<br>• Voltage and Current measurement capability of supplies<br>• DDR3 Component Memory 1GB<br>• Support 32 data width<br>• 16MB Quad SPI Flash<br>• IIC - 1 KB EEPROM<br>• 200MHz Fixed PL Oscillator (Differential LVDS)<br>• 156.25MHz (default) I2C Programmable Oscillator (Differential LVDS)<br>• 33.33MHz Fixed PS System Oscillator (Single-Ended CMOS)<br>• Gigabit Ethernet GMII, RGMII and SGMII<br>• USB OTG 1 (PS) - Host USB<br>• IIC Bus Headers/HUB (PS)<br>• 1 CAN with Wake on CAN (PS)<br>• USB UART (PS) | No | European / North American | 10 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | • 3 User Push Buttons<br>• 2 User Switches<br>• 8 User LEDs<br>• XADC header<br>• FMC #1-LPC connector (0 GTX Transceiver, 68 single-ended or 34 differential user defined signals)<br>• FMC #2-LPC connector (0 GTX Transceiver, 68 single-ended or 34 differential user defined signals)<br>• IIC HUB/Expander<br>• Dual Pmod (8 I/O Shared with LED's)<br>• Single Pmod (4 I/O Shared with PJTAG)<br><br>**OR Equivalent** | | | | | | |
| 18. | | Field Programmable Gate array systems for industrial application with development kits and expansion modules PYNQ - Z1 or Equivalent | **Technical Specification (Minimum):**<br>• 650MHz dual-core Cortex-A9 processor<br>• DDR3 memory controller with 8 DMA channels and 4 high performance AXI3 slave ports<br>• High-bandwidth peripheral controllers: 1G Ethernet, USB 2.0, SDIO<br>• Low-bandwidth peripheral controller: SPI, UART, CAN, I2C<br>• Programmable from JTAG, Quad-SPI flash, and micro SD card<br>• Artix-7 family programmable logic<br>• 13,300 logic slices, each with four 6-input LUTs and 8 flip-flops<br>• 630 KB of fast block RAM<br>• 4 clock management tiles, each with a phase-locked loop (PLL) and mixed-mode clock manager (MMCM)<br>• 220 DSP slices<br>• On-chip analog-to-digital converter (XADC)<br>• 512MB DDR3 with 16-bit bus @ 1050Mbps<br>• 16MB Quad-SPI Flash with factory programmed globally unique identifier (48-bit EUI-48/64™ | No | European / North American | 10 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | compatible). | | | | | |
| | | | • MicroSD slot | | | | | |
| | | | • Powered from USB or any 7V-15V source (see recommended products) | | | | | |
| | | | • USB and Ethernet: | | | | | |
| | | | • USB-JTAG Programming circuitry | | | | | |
| | | | • USB-UART bridge | | | | | |
| | | | • USB OTG PHY (supports host only) | | | | | |
| | | | • Gigabit Ethernet PHY | | | | | |
| | | | • Electret microphone with pulse density modulated (PDM) output | | | | | |
| | | | • 3.5mm mono audio output jack, pulse-width modulated (PWM) format | | | | | |
| | | | • HDMI sink port (input) | | | | | |
| | | | • HDMI source port (output) | | | | | |
| | | | • 4 push-buttons | | | | | |
| | | | • 2 slide switches | | | | | |
| | | | • 4 LEDs | | | | | |
| | | | • 2 RGB LEDs | | | | | |
| | | |    • Two standard Pmod ports | | | | | |
| | | |    • 16 Total FPGA I/O | | | | | |
| | | |    • Arduino/chipKIT Shield connector | | | | | |
| | | |    • 49 Total FPGA I/O | | | | | |
| | | |    • 6 Single-ended 0-3.3V Analog inputs to XADC | | | | | |
| | | |    • 4 Differential 0-1.0V Analog inputs to XADC | | | | | |
| | | | **OR Equivalent** | | | | | |
| 19. | | Embedded system for Hobby Electronics<br><br>Raspberry Pi 4 or Equivalent | **Technical Specification (Minimum):**<br>• Broadcom BCM2711, Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz<br>• 8GB LPDDR4-3200 SDRAM (depending on model)<br>• 2.4 GHz and 5.0 GHz IEEE 802.11ac wireless, Bluetooth 5.0, BLE<br>• Gigabit Ethernet<br>• 2 USB 3.0 ports; 2 USB 2.0 ports. | No | Imported | 20 | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | • Standard 40 pin GPIO header (fully backwards compatible with previous boards)<br>• 2 × micro-HDMI ports (up to 4kp60 supported)<br>• 2-lane MIPI DSI display port<br>• 2-lane MIPI CSI camera port<br>• 4-pole stereo audio and composite video port<br>• H.265 (4kp60 decode), H264 (1080p60 decode, 1080p30 encode)<br>• OpenGL ES 3.0 graphics<br>• Micro-SD card slot for loading operating system and data storage<br>• 5V DC via USB-C connector (minimum 3A*)<br>• 5V DC via GPIO header (minimum 3A*)<br>• Power over Ethernet (PoE) enabled (requires separate PoE HAT)<br>• Operating temperature: 0 – 50 degrees C ambient<br><br>**OR Equivalent** | | | | | | |
| 20. | | Touch Screen For embedded systems application Touch Screen 7 inches Toradex Or equivalent | **Technical Specification (Minimum):**<br><br>• Resolution: 800x480px<br>• 18-bit RGB<br>• 7 inches<br>• Touch Interface: I2C<br>• 40 pin and 10 pin FFC cable to connect with a Carrier Board<br>Compatible with serial no 17 board (item)<br><br>**OR Equivalent** | No | European / North American | 5 | | | |
| 21. | | Industrial Grade Monitor | **Technical Specification (Minimum):**<br>• Capacitive, Infrared, Resistive<br>• 19 inches<br>• HDMII VGA DVI<br>• Industrial LCD panel A grade<br>• 300nits, Up to 1000nits | No | Imported | 6 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | • AC 110-240V, 50/60Hz<br>• Response time 5ms<br>• Power consumption<br>• ≤35W<br>• Metal Shell Aluminum alloy enclosure<br>• IP65 seamless front<br>• Waterproof, Dustproof<br>• Finger, Touch pen, Glove hand<br><br>**OR Equivalent** | | | | | | |
| 22. | | Panel PC | **Technical Specification (Minimum):**<br><br>• Touch screen parameters<br>• Touch screen type:  Projected capacitive touch screen<br>• 19 inches<br>• Theory Clicks: More than 50 million times<br>• Operating System Compatibility: Win 7/ Win 8 / Win 10/Win XP / Linux /MAC /Android/CE<br>• LED screen parameters<br>• Resolution:    1280*1024<br>• Brightness:    ≥ 250 cd/m2<br>• Contrast ratio:    ≥ 1000:1<br>• Viewing angle:    89/89/89/89(Typ.) CR≥10) left/right/up/down<br><br>**Power supply parameters**<br><br>• Input Power:    110-240V AC 50/60Hz<br>• Output power:    12V 5A<br>• Overall power consumption:  Less than 60W<br>• Standby power consumption: less than 0.5W<br>• Version: Android 7.1<br>• CPU: RK3288/RK3399 | No | Imported | 3 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | <ul><li>RAM: 2G (4G optional)</li><li>Memory: Flash 8G(16g/32g optional)</li><li>Version: Window7 / Window 8 /Window 10</li><li>CPU: Intel Celeron J1900; Intel Atom x5-Z8350, Intel core I3/I5/I7</li><li>RAM: DDR3 2G/4G/8G/16G (optional)</li><li>Memory: SSD 32G/64G/128G/256G HDD 500G/1T</li></ul> **OR Equivalent** | | | | | | |
| 23. | | MATLAB License | **Academic Use — Individual:** <ul><li>The products can be used by a single named user.</li><li>The products can be activated on up to four different computers, provided that the products are only accessible to and used by that single named user.</li><li>A named user may not use a product on more than two computers simultaneously.</li><li>The license must be restricted to a single country of operation.</li><li>**Subscription: Annual**</li></ul> | No | European / North American | 2 | | | |
| 24. | | QT License | **QT for device creation:** <br>Targeted OS: <br>Embedded Linux, UWP, Integrity, QNX, VxWork Windows, Linux, Mac, Android, IOS <br>**Subscription: Annual** | No | European / North American | 2 | | | |
| 25. | | Solid Works License | **SOLIDWORKS Education Edition Software:** <br>Comprehensive CAD and engineering development teaching tool features 3D software plus a broad curriculum of exercises and interactive courseware for 3D mechanical CAD, design validation and data management. <br>Subscription **Annual** | No | European / North American | 1 | | | |

| 26. | | Tool Kit | **Requirements (Minimum):**<br>408-Piece Mechanics Tool Set with 3-Drawer Heavy Duty Metal Box (Tool Set + Drill Combo Kit)<br>**Include Items:**<br>Contents: (1) utility knife, (20) utility knife blades, screwdriver), magnetic screwdriver, Handled screwdriver bits (6) precision screwdriver, metric hex key set, (11) SAE hex Hey set's, 6" Long nose pliers, 6" Diagonal pliers, (1) 6" combination pliers, (1) 16oz ball-pein hammer, (1) 7.5M (25ft) tape measure, (8) Metric combination wrenches: 8, 10, 11, 12, 13, 14, 15, 17mmm, (8) SAE Combination wrenches: 1/4", 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 3/4", (1) 8" Adjustable wrench, (1) stripper, (55) connector kit, (40) cable ties, (90) hardware kit, (1) 1/4" Dr. Ratchet handle, (1) 3/8" Dr. Ratchet handle, (1) 1/2" Dr. Ratchet handle, (10) 1/4" 6 points SAE dr. Sockets: 5/32", 3/16", 7/32", 1/4", 9/32", 5/16", 11/32", 3/8", 7/16", 1/2", (10)1/4" 6 points metric dr. Sockets: 4, 5, 6, 7, 8, 9, 10, 11, 12, 13mm, (10) 3/8" 6 points SAE dr. Sockets: 1/4", 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 11/16", 3/4", 13/16", (11) 3/8" 6 points metric dr. Sockets: 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 19mm, (8) 3/8" 12 points SAE dr. Sockets: 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 11/16", 3/4", (11) 3/8" 12 points metric: 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 19mm, (6) 1/2" 6 points SAE dr. Sockets: 1/2", 9/16", 5/8", 11/16", 3/4", 7/8", (6) 1/2" 6 points metric dr. Sockets: 14, 15, 17, 18, 19, 21mm (1) 1/2" X 3/8" Adapter, (1) 3/8" X 1/4" Adapter, (1) 1/4"x3" Extension bar, (1) 3/8"X3" Extension bar, (1) 3/8"x6" Extension bar, (1) 1/2"x5" Extension bar, (2) 3/8" Spark sockets: 13/16", 5/8".<br><br>**Cordless Drill Combo Kit, 2-Tool**<br>• Ergonomic Design: Lightweight tools designed to fit the user's needs<br>• Increased Visibility: The DCF885 features a built | No | Imported | 3 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | in Led with 20 second delay after trigger release<br>• Includes: (1) DCD771 drill/driver, (1) DCF885 1/4 inches' impact driver, (2) 20V MAX Lithium Ion 1.3 Ah battery packs, 20-volt MAX charger, and (1) kit bag<br>• 1 Handed Bit Loading: The DCF885 has a 1/4 inches' hex chuck and accepts 1 inches bit tips, Power Tool Type: Cordless<br>High Performance Motor: The DCD771 delivers 300 Unit Watts Out (UWO) of power ability completing a wide range of applications<br><br>**OR Equivalent** | | | | | | |
| 27. | | Benchtop Multimeter | Type: Benchtop<br>0.05% basic accuracy<br>True RMS<br>Auto power off<br>Overload and Short circuit protection<br>DC ranges: 0.1 mV to 1000V<br>Resolution:10 µV to 100 mV<br>AC ranges: 200 mV, 2 V, 20V, 200 V, 750 V<br>Fused and short circuit protected<br><br>**OR Equivalent** | No | European / North American | 3 | | | |
| 28. | | Medical Grade blowers for respiratory apparatus<br><br>Micronel U65HN-024KS-6 or equivalent | **Technical Specification (Minimum):**<br>**Electrical Measuring**<br><br>Supply voltage range [VDC] Unit Minimum = 5<br><br>Typical 24 Maximum = 26.4<br><br>Power consumption (free blowing at nominal<br><br>voltage) Maximum = 110 W<br><br>**Pneumatic (Pressure)**<br><br>Air flow (free blowing at nominal voltage) Typical = | No | European / North American | 4 | | | |

| | | | 440[l/min] | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Minimum air flow at rated speed Minimum 0[l/min] | | | | | | |
| | | | Stat. pressure at rated speed Typical = 100[mbar] | | | | | | |
| | | | Pneumatic (Vacuum) | | | | | | |
| | | | Air flow (free blowing at nominal voltage) Typical = 440 [l/min] | | | | | | |
| | | | Minimum air flow at rated speed Minimum = 0 [l/min] | | | | | | |
| | | | Stat. pressure at rated speed Typical = 90 [mbar] | | | | | | |
| | | | **Thermal** | | | | | | |
| | | | Maximum motor enclosure temperature [°C] | | | | | | |
| | | | Maximum = 70 | | | | | | |
| | | | Ambient operating temperature [°C] Minimum = -20 | | | | | | |
| | | | Typical = 25 Maximum = 50 | | | | | | |
| | | | Ambient storage temperature [°C] Minimum = -20 | | | | | | |
| | | | Typical = 25 Maximum = 50 | | | | | | |
| | | | **Motor** | | | | | | |
| | | | Maximum speed for continuous operation Maximum = 57.000 [rpm] | | | | | | |
| | | | Acceleration (at nominal voltage) Typical = 400 [rpm/ms] | | | | | | |
| | | | Number of pole pairs Typical 1 | | | | | | |
| | | | Terminal resistance Typical = 0.208[Ohm] | | | | | | |
| | | | Terminal inductance Typical = 0.014 [mH] | | | | | | |
| | | | Back EMF-constant Typical = 0.37 [V/Krpm] | | | | | | |
| | | | Torque constant Typical = 3.53[mNm/A] | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Rotor inertia Typical = 1.2 [g/cm2]<br><br>**Ambient**<br><br>Protection class Typical = IP10<br><br>Relative humidity Minimum = 10 Maximum = 95<br><br>[%RH]<br><br>Oxygen resistence Maximum = 100 [%]<br><br>**Life Time**<br><br>L10 Maximum  20'000[h]<br><br>Acoustics<br><br>Acoustic level Maximum =  47 [dB(A)]<br><br>**Mechanical**<br><br>Weight Typical = 240 [gr]<br><br>Balancing class Typical = G < 2.5 [mm/s]<br><br>Impeller Inertia Typical = 5.34 [gcm2]<br><br><br>**OR Equivalent** | | | | | | |
| 29. | | Blower Controller for respiratory apparatus<br><br>Maxon EPOS2 24/5, Digital positioning controller<br>Or equivalent | **Technical Specification (Minimum):**<br><br>Weight :170 g<br>**MOTOR**<br>DC motors up to 120 W<br>EC motors up to 120 W<br>**SENSOR**<br>Without sensor (DC motors) Yes<br>Digital incremental encoder (2-channel, differential) | No | European / North American | 4 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Yes | | | | | |
| | | | Digital incremental encoder (3-channel, differential) | | | | | |
| | | | Yes | | | | | |
| | | | Digital Hall sensors (EC Motors) Yes | | | | | |
| | | | **OPERATING MODES** | | | | | |
| | | | Current controller | | | | | |
| | | | Yes | | | | | |
| | | | Speed controller (closed loop) Yes | | | | | |
| | | | Position controller Yes | | | | | |
| | | | **ELECTRICAL DATA** | | | | | |
| | | | Operating voltage V(min.) 11 V | | | | | |
| | | | Operating voltage V(max.)24 V | | | | | |
| | | | Logic supply voltage V(min.)optional 11 V | | | | | |
| | | | Logic supply voltage V(max.)optional 24 V | | | | | |
| | | | Max. output voltage (factor * V)0.9 | | | | | |
| | | | Max. output current I 10 A | | | | | |
| | | | Max. time of peak output current I 1 s | | | | | |
| | | | Continuous output current I 5 A | | | | | |
| | | | PWM clock frequency of powerstage 50 kHz | | | | | |
| | | | Sampling rate PI current controller 10 kHz | | | | | |
| | | | Sampling rate PI speed controller 1 kHz | | | | | |
| | | | Sampling rate PID positioning controller 1 kHz | | | | | |
| | | | Max. efficiency 92 % | | | | | |
| | | | Max. speed (DC) 100000 rpm | | | | | |
| | | | Max. speed (EC; 1 pole pair) | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | blockcommutation100000 rpm<br><br>Max. speed (EC; 1 pole pair) sinusoidal<br><br>commutation 25000 rpm<br><br>Built-in motor choke per phase 15 µH<br><br>**INPUTS**<br><br>Hall sensor signals H1, H2, H3<br><br>Encoder signals A, A, B, B, I, I\<br><br>Max. encoder input frequency 5 MHz<br><br>Digital inputs 6<br><br>Functionality of digital inputs: limit switch, reference<br><br>switch, general purpose, enable, quickstop,<br><br>step/direction set value, master encoder, position<br><br>marker<br><br>Analog inputs 2<br><br>Resolution, range, circuit 12-bit, 0…+5V<br><br>Functionality of analog inputs set value, general<br><br>purpose<br><br>DIP switch 8<br><br>Functionality of the DIP switch CAN Node-ID, CAN-<br><br>Bus Termination<br><br>**OUTPUTS**<br><br>Digital outputs 4<br><br>Functionality of digital outputs holding brake,<br><br>general purpose, position compare, ready<br><br>**VOLTAGE OUTPUTS** | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Hall sensor supply voltage +5 VDC, max. 30 mA | | | | | |
| | | | Encoder supply voltage +5 VDC, max. 100 mA | | | | | |
| | | | Auxiliary output voltage +VCC , max. 1300 mA | | | | | |
| | | | INTERFACE RS232 Yes | | | | | |
| | | | USB 2.0 (full speed) Yes | | | | | |
| | | | CAN Yes | | | | | |
| | | | CANopen Slave | | | | | |
| | | | CANopen application layer DS-301 | | | | | |
| | | | CANopen frameworks DSP-305 | | | | | |
| | | | CANopen profiles motion control DSP-402 | | | | | |
| | | | Gateway function RS232-to-CAN Yes | | | | | |
| | | | Gateway function USB-to-CAN Yes | | | | | |
| | | | **DISPLAY** | | | | | |
| | | | Status indicator "Ready" green LED | | | | | |
| | | | Status indicator "Error" red LED | | | | | |
| | | | **PROTECTIVE FUNCTIONS** | | | | | |
| | | | Protective functions: current limit, overcurrent, excess temperature, undervoltage, overvoltage, voltagetransients, short-circuits in the motor cable | | | | | |
| | | | **AMBIENT CONDITIONS** | | | | | |
| | | | Temperature – Operation (min.) -10 °C | | | | | |
| | | | Temperature – Operation (max.) 55 °C | | | | | |
| | | | Temperature – Extended Range +55…+83°C, Derating: -0.179 A/°C | | | | | |
| | | | Temperature – Storage (min.) -40 °C | | | | | |

| | | | Temperature – Storage (max.) 85 °C | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Humidity (non-condensing) (min.) 5 % | | | | | | |
| | | | Humidity (non-condensing) (max.) 90 % | | | | | | |
| | | | **MECHANICAL DATA** | | | | | | |
| | | | Weight 170 g | | | | | | |
| | | | Dimension (length) 105 mm | | | | | | |
| | | | Dimension (width) 83 mm | | | | | | |
| | | | Dimension (height) 24 mm | | | | | | |
| | | | Mounting Flange for M3 screws | | | | | | |
| | | | **SOFTWARE** | | | | | | |
| | | | Installation program EPOS Setup | | | | | | |
| | | | Graphical User Interface EPOS Studio | | | | | | |
| | | | Operating system Windows 10, 8, 7, Windows XP SP3 | | | | | | |
| | | | Windows DLL for PC 32-/64-bit | | | | | | |
| | | | PC master IXXAT, Vector, National Instruments, Kvaser, NI-XNET | | | | | | |
| | | | Programming examples MS Visual C#, MS Visual C++, MS Visual Basic, MS Visual Basic.NET, Borland C++, | | | | | | |
| | | | Borland Delphi, NI LabView, NI LabWindows/CVI | | | | | | |
| | | | Linux Shared Object Library X86 32-/64-bit, ARMv7 | | | | | | |
| | | | Programming example C++ (Eclipse Project) | | | | | | |
| | | | IEC 61131-3 library for CAN Master | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Beckhof, Siemens/Helmholz, VIPA | | | | | |
| | | | maxon library for NI SoftMotion National | | | | | |
| | | | Instruments Compact Rio | | | | | |
| | | | **FUNCTIONS** | | | | | |
| | | | CANopen Profile Position Mode Yes | | | | | |
| | | | CANopen Profile Velocity Mode Yes | | | | | |
| | | | CANopen Homing Mode Yes | | | | | |
| | | | Position Mode Yes | | | | | |
| | | | Interpolated Position Mode (PVT) Yes | | | | | |
| | | | Velocity mode Yes | | | | | |
| | | | Current mode Yes | | | | | |
| | | | Master Encoder Mode Yes | | | | | |
| | | | Step/Direction Mode Yes | | | | | |
| | | | Analog set value Yes | | | | | |
| | | | Path generator with | | | | | |
| | | | sinusoidal/trapezoidal profiles | | | | | |
| | | | Yes | | | | | |
| | | | Position Control Feed Forward Yes | | | | | |
| | | | Velocity Control (Feed Forward) Yes | | | | | |
| | | | Position Marker / Touch Probe Yes | | | | | |
| | | | Quickstop Yes | | | | | |
| | | | Enable Yes | | | | | |
| | | | Position Compare Yes | | | | | |
| | | | Control of holding brakes Yes | | | | | |
| | | | Advanced automatic control settings Yes | | | | | |

| | | | **OR Equivalent** | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **30.** | | Respiratory Module for medical grade respiratory systems<br><br>Macawi full respiratory system or equivalent | **Technical Specification (Minimum):**<br>**VENTILATION MODES**<br>Ventilation mode: PC-CMV PC (Pressure Control),VC-CMV VC (Volume Control), PC-SIMV SIMV(PC), VC-SIMV SIMV(VC), PC-SIMV+ Bi-Level Ventilation, PC-BIPAP, PC-ACV ACV(PC), VC-ACV ACV(VC), Spn-CPAP CPAP, CFLOW Continuous Flow at pre-set O2 concentration<br>REAL-TIME SIGNALS<br>Airway Pressure: Patient Flow, Patient Volume,<br>VENTILATION MODE OPTIONS<br>NIV (Non Invasive Ventilation), PS (Pressure Support) on top of PEEP PSV, PCVR (Pressure Controlled Volume Regulation) PRVC, AutoFlow, AVAPS, Volume Guarantee, HPO & LPO High Pressure Oxygen & Low Pressure Oxygen<br>MEASUREMENTS<br>VT Tidal Volume (in- & exp.) [mand. & spont.], MV Mandatory Volume (in- & exp. & tot.) [mand. & pont.], RR Respiratory Rate [mand. & spont.], Ppeak Peak Pressure (PIP), Pplat Plateau Pressure, PEEP Positive End-Expiratory Pressure, MAP Mean Airway Pressure, FiO2 Fractional | No | European / North American | 2 | | | |

| | | | Inspired Oxygen, Vleak Leakage volume per breath | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | VENTILATION SETTINGS RANGE | | | | | |
| | | | VT 2 - 2000 mL , RR 3 - 200 /min, Pinsp, PS Low (Pressure Support) 1 - 90 mbar, Pressure Support 1 - 90 mbar , PEEP 0 - 40 mbar, Insp Flow 5000 - 100000 mL/min for VC with plateau, Ti, Te and Tramp 150 - 30000 ms (Ti & Te ) 60-30000 ms (Tramp) FiO2 21 - 100 Vol.% | | | | | |
| | | | VENTILATION MANEUVERS | | | | | |
| | | | Inspiratory Hold Manual start or generation of prolonged inspiration time | | | | | |
| | | | PERFORMANCE | | | | | |
| | | | Maximum Pressure 100 mbar at sea level (> 80 mbar at 3000m altitude), Maximum Flow > 220 L/min | | | | | |
| | | | ADDITIONAL FUNCTIONALITY | | | | | |
| | | | Distal and Proximal flow and pressure sensor support | | | | | |
| | | | OTHER RELATED FUNCTIONALITY | | | | | |
| | | | Proximal patient flow measurement (including purge system), Proximal airway pressure measurement (including purge system), Triggering functionality in all modes on Flow and or Pressure, Leakage compensation up to > 50 L/min, Nebulizer control output (driver for valve), Compensation of | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | compressible volume For Volume controlled modes, Oxygen sensor interface Galv. Analog sensor or paramagnetic digital sensor, System test and calibration functionality, External Safety Valve<br>ADDITIONAL VENTILATION MODES<br>PC-AMV Assisted Manual Ventilation, Neonatal T-piece resuscitation, PC-APRV Pressure controlled - Airway Pressure Release Ventilation, PC-MMV Pressure controlled - Mandatory Minute Ventilation<br>ADDITIONAL VENTILATION MANEUVERS<br>PS High (Pressure Support) PS on top of inspiratory pressure, Recruitment Generate a fixed number of elevated pressure strokes, PPS Proportional Pressure Support, P0.1 measurement figure for weaning purposes, Tube Compensation Automatic Tube Compensation (inspiratory and/or expiratory),Sigh Generate sigh maneuver at set time interval, Expiratory Hold Manual generation of prolonged expiration time<br>ADDITIONAL MEASUREMENTS<br>Flowpeak_insp ,Inspiratory Peak Flow, Flowpeak_exp Expiratory Peak Flow, Pmin_exp Expiratory Minimum Pressure, P0.1 Negative pressure after 100 ms no inspiratory support, RSBI Rapid Shallow Breathing Index, PTP Pressure Time | | | | | |

Product, Cstat Static Compliance, Rinsp Inspiratory
Resistance, AutoPEEP Intrinsic PEEP, Tracheal
Pressure Derived Tracheal Pressure, Advanced
software

ENVIRONMENTAL OPERATING CONDITIONS
Operating temperature -20 - + 55degrees C,
Relative air humidity 5 - 95% R.H., Air Pressure 500
- 1100 hPa., Module lifetime expectancy > 30.000
hours At moderate Ventilation level, Noise
generation < 40 dB At a pressure of 40 cmH2O, ISO
3744, Pinsp = 20 mbar, PEEP = 5 mbar, Tslope =
200ms, RR = 12 /min at Rp5C20

ELECTRICAL OPERATING CONDITIONS
Power Supply Voltage 24V DC ±10%, Peak current
up to 5A at 24V max. during 200 ms atmaximum
insp. pressure setting, Continuous current up to
2.5A (during insp.) at 24V at maximum inspiratory
pressure setting, Nominal Power consumption 5 -
30 VA at 24V depending on Ventilation settings and
patient

MODULE PROPERTIES
Envelope dimensions 120 x 90 x 185 mm (standard)
Volume < 2L, Module Weight < 850 gram
**Also include the evaluation kit**

| 31. | | Full Set Hexacopter Drone | **Package Must include (minimum):** 1XTarot FY690S Full 6 axle Carbon Aircraft Frame | No | Imported | 4 | | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 6-axle Aircraft Kit 750KV Motor GPS APM 2.8 Flight Control | 3K Folding Hexacopter 680mm FPV TL68C01<br>6X750KV Brushless Disk Motor<br>6XHOBBYWING Platinum-30A-Pro 2-6S 30A Speed Controller ESC<br>3X12x5.5 3K Carbon Fiber Propeller<br>1XAPM2.8 APM 2.8 Multicopter Flight Controller 2.5 2.6 Upgraded Built-in Compass<br>1x6M GPS with Compass L5883 25cm Cable<br>5x10cm Servo Extension Lead Wire Cable MALE TO MALE KK MK MWC flight control Board For RC Quadcopter<br>1XDJI GPS Folding Antenna Mount Holder Metal<br>1X8S-5A 5A U-BEC UBEC Input 9-30V 3-8S Lipo battery 8-24Nimh R7<br>18x3.5mm Bullet Connector ( banana plug )<br>1xHook & Loop Fastening Tape<br>1xT Plug Male Connector Silicone Wire With 11.5CM 14awg<br>1xIMAX RC B3 Pro Compact Balance Charger<br>1x 11.1V 2200MAH 30C 3S1P battery<br>1XRadioLink AT10 2.4GHz 10CH Remote Control System | | | | | | | |
| 32. | | 800*480 FPV Goggles Combo Kit with 32CH RX SpiroNET ANT<br><br>Fatshark Dominator V3 with FSV2442 or equivalent | **Specification (minimum)**<br><br>**Optics**<br>FOV (field of view): 30° diagonal (the same plastic optics as DOMV2)<br>Interpupillary Distance (IPD): 59 to 69 mm (adjustable)<br>Optional Diopter Lens Inserts: -2, -4, -6 dpt<br><br>**Display**<br>800 x 480 WVGA LCD<br>Polarized LED backlight<br>NTCS/PAL auto selecting<br>Side/Side 3D<br>Input HD Port 16:9<br>Video 4:3 horizontally stretched | No | Imported | 2 | | | | |

(Current A/C chip only supports to 720p 50/60 Hz, could be upgraded to 1080p in the future)

**Audio**: Stereo

User Controls
Channel Selection
Volume Control
Mode Selection (Wired/Wireless)
Display Control
DVR Control
HT Control

**Electrical**
Power Supply: 7 - 13 V (2S/3S supply)
Power Consumption: 390mA wireless/ 230mA direct mode (no RX) (@7.4V nominal)
Driver Board: Using the same as HD's, support Side/Side 3D
RF Modules: Infinite channel support on multiple bands
Head Tracker: Modular (sold separately)
Analog DVR: MicroSD support to 32Gb
Record Rate: 6Mbps (MJPG compression, 30 fps, AVI)
File playback (native recording, no codec support)
Upgradeable via SD card
PAL/NTSC continuous scan auto detect/mode change
Auto save if power removed
DVR stay off when not switched on

**Interface**
3.5mm AV in/out port
Power in port
3.5mm 3p earphone port
MiniDIN4 data port (head tracking)
MicroSD insert slot

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | RF module port<br>MiniHD port<br>Mechanical: Ergonomic molded headset w/ adjustable headband<br><br>**Features**<br><br>The Dominator V3 FPV goggle features an immersive 16:9 widescreen display for compatibility with HD content and HD digital video links.<br>It supports side/side 3D content in (both analog and HD Port) and is NTSC/PAL auto switching.<br>Integrated DVR records your analog footage and has playback function that may assist in lost model recovery.<br>If the power is disconnected or the battery runs flat,the DVR will auto-save any recorded video,preventing a corrupted card or loss of data.<br>Warning: Exposing the lens to direct sunlight will result in LCD damage.<br><br>**Package Included:**<br><br>1 x FPV Goggle<br>1 x 32 channel Race Band receiver<br>1 x FSV Battery and its Case<br>1 x Zipper carry case<br>1 x 3m AV Cable<br>1 x Manual | | | | | | |
| 33. | | 5G8 5.8GHz Mini FPV Transmitter with antenna<br><br>Team Blacksheep TBS Unify Pro Or equivalent | **SPECIFICATIONS (minimum):**<br>Operating Voltage: 2S - 6S<br>Supply current: 600mA<br>Operating Temperature: watch for normal airflow<br>Audio carrier Frequency: 6.5 MHz<br>Video Input Impedance: 75 Ohm<br>Weight: 5g (with SMA, without antenna)<br>Antenna Connector: SMA Female Socket with screw mounting holes, U.FL to VTx | No | Imported | 10 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Video Format: NTSC/PAL<br>Output Power: 13dBm (25mW), 23dBm (200mW)<br>Antenna: 5.8G Spironet Antenna | | | | | | |
| **34.** | | FPV Receiver for UVC OTG Smartphone Android Tablet PC Monitor VR Headset<br><br>Skydroid 5.8Ghz 150CH True Diversity or Equivalent | **Specification (minimum):**<br>Frequency : 5645MHz~5945MHz<br>Resolution : 640*480 30fps<br>Working Current : USB 5V 190mA<br>Connector : RP-SMA<br>Working Temp. : -10~65℃<br>Please calibrate it before use<br>Please calibrate it in open area, and keep away from transmitter more than 30m. Long press the menu button and power on receiver, enter into calibration mode. | No | Imported | 10 | | | |
| **35.** | | Mini FPV Camera PAL with MIC Support OSD RunCam Swift 2 600TVL or equivalent | **Specification (minimum):**<br>Image Sensor:1/3" Super HAD II CCD<br>Horizontal Resolution: 600TVL,4:3<br>Lens: 2.5mm 130° / 2.3mm 150°/ 2.1mm 165° (Optional)<br>Signal System: PAL<br>Integrated OSD: YES<br>Integrated MIC: YES<br>S/N Ration>60dB (AGC OFF)<br>Electronic Shutter Speed: PAL:1/50~100,000; NTSC:1/60~100,000<br>AutoGain Control (AGC): YES<br>Back light compensation (BLC): YES<br>Power DC 5 to 36V<br>Net weight    14g<br>Dimensions   28.5mm * 26mm * 26mm | No | Imported | 10 | | | |
| **36.** | | PC for AI Applications<br><br>ThinkStation 920 Workstation or equivalent | Processor<br> Intel® Xeon® Silver 4110 (2.10GHz, 8 cores, 11MB Cache)<br><br>Operating System<br>Windows 10 Pro for Workstations 64<br><br>Memory | No | Imported | 4 | | | |

| | | | 8GB DDR4 2666MHz ECC RDIMM | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Graphics<br>NVIDIA Quadro P620 12GB (Mini DPx4) | | | | | | |
| | | | Hard Drive<br>1TB Hard Drive, 7200RPM, 3.5", SATA3 | | | | | | |
| | | | Optical Drive<br>No 1st Optical Drive Selected | | | | | | |
| | | | Warranty<br>3 Year On-site | | | | | | |
| | | | Network Card<br>2x port Integrated Ethernet | | | | | | |
| | | | Keyboard<br>USB Traditional Keyboard Black English | | | | | | |
| | | | Pointing Device<br>USB Calliope Mouse Black | | | | | | |
| | | | Form Factor<br>Tower 92% Power 1400W | | | | | | |
| | | | M.2 Storage Card<br>Upgradable | | | | | | |
| 37. | | Heavy Robot Chassis<br><br>T'Rex Tank Chassis<br>Or equivalent | **Specification (minimum):**<br>All-Terrain<br>Anodized Aluminum Body<br>Anodized Zinc Tracks, Struts, and Wheels<br>2x 12V DC motors with all metal gearboxes<br>Motor Specifications:<br>Typical Voltage: 12V<br>No Load Current: 1.3A<br>Typical Current: 4A<br>Stall Current: 11A (Measured using a 3S 5000mAh | No | Imported | 5 | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | LiPo battery)<br>70mm (2.75") Clearance with Low Center of Gravity<br>Removable Front and Top Panels with Quick Spring Release<br>355 x 175 x 130mm (14" x 6.8" x 5") | | | | | | |
| 38. | | Hexapod Robot Kit (Hardware Only)<br><br>Lynxmotion T-Hex 3DOF or equivalent | **Inclusion (minimum):**<br>3x 3DoF T-Hex Leg pairs<br>1x T-Hex body<br>6x servo extender cables | No | Imported | 4 | | | |
| 39. | | STM32H7 Development Board | Frequency: 400Mhz<br>Package: LQFP100<br>RAM: 1024KB<br>Flash: H750VB: 128KB H743VI: 2048KB (2M)<br>OLED interface – Plug and Play<br>0.96 inch/ 1.3 inch OLED<br>Data storage: W25Q64 (QPSI driver)<br>High speed crystal: 25 MHz<br>Low frequency crystal: 32.768K<br>Power + Programmable LED Lights<br>2 users and reset button<br>All CPU – IO Leads<br>2.54MM integer double spacing pin | No | Imported | 20 | | | |
| 40. | | Sensors Kit | Kit Listing:<br><br>White LED Module   * 1<br>RGB LED Module *1<br>3W LED Module       * 1<br>Traffic Light Module (Black and Eco-friendly) *1<br>Active Buzzer Module *1<br>Passive Buzzer Module *1<br>Digital Push Button Module *1<br>Collision Sensor        *1<br>Line Tracking Sensor *1<br>Infrared Obstacle Avoidance Sensor *1<br>Photo Interrupter Module    * 1<br>Hall Magnetic Sensor *1 | No | Imported | 5 | | | |

| | | | Knock Sensor Module          *1<br>Digital Tilt Sensor          * 1<br>Capacitive Touch Sensor *1<br>Flame Sensor *1<br>Reed Switch Module *1<br>PIR Motion Sensor      *1<br>Analog Temperature Sensor     *1<br>Analog Rotation Sensor *1<br>Photocell Sensor *1<br>Analog Sound Sensor *1<br>Water Sensor *1<br>Soil Humidity Sensor    *1<br>Analog Gas Sensor *1<br>Analog Alcohol Sensor *1<br>Steam Sensor *1<br>Analog Piezoelectric Ceramic Vibration Sensor *1<br>Voltage Sensor *1<br>Thin-film Pressure Sensor (Black and Eco-friendly) *1<br>TEMT6000 Ambient Light Sensor *1<br>GUVA-S12SD 3528 Ultraviolet Sensor *1<br>Digital IR Receiver Module *1<br>Digital IR Transmitter Module   *1<br>Pulse Rate Monitor Module *1<br>Joystick Module    * 1<br>Rotary Encoder Module *1<br>5V Single Relay Module *1<br>LM35 Linear Temperature Sensor    *1<br>DHT11 Temperature and Humidity Sensor *1<br>Magical Light Cup Module *2<br>APDS-9930 Attitude Sensor Module *1<br>ALS Infrared LED Optical Proximity Detection Module *1<br>MMA8452Q Module Triaxial Digital Acceleration Tilt Sensor   * 1<br>keyestudio 9G Servo Motor    *1<br>HC-SR04 Blue Ultrasonic Sensor    *1 | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Keyestudio 0802 LCD module 5V blue screen（with backlight）*1<br>keyestudio I2C 8x8 LED Dot Matrix *1 | | | | | | |
| 41. | | Google Cloud IoT Development Kit for creating Internet of Things (IoT)<br><br>T4-G-Q-4020 or equivalent | On-board FTDI2232 IC for 4-wire JTAG debugging<br>Various commercial and free IDE options for JTAG debugging and software development<br>Arduino connector to extend kit and add shields<br>Open schematics and layout files<br>Eclipse based IDE for single-step JTAG debugging<br>UART-AT commands to connect T4-G-Q-4020 to MCU/CPU<br>Eight sensors and actuators on-board:<br>Ambient light luminosity<br>3D accelerometer<br>3D gyroscope/rotation<br>3D magnetic field<br>Temperature<br>Humidity<br>Pressure<br>PIR sensor<br>Out-of-box drivers for sensors in demo applications<br>Miscellaneous headers, test-points for power measurement, direct connect to battery, boot-configuration, and other measurements | No | Imported | 4 | | | |
| 42. | | ARM-based IoT Kit for Cloud IoT Core | **Electronic components (Minimum):**<br>1x Photo Cell<br>2x Breadboard Trim Potentiometer<br>5x 10K 5% 1/4W Resistor<br>5x 560 ohm 5% 1/4W Resistor<br>2x Diffused 10mm Blue LED<br>1x Electrolytic Capacitor - 1.0uF<br>1x Ceramic Capacitor - 0.1uF<br>2x Diffused 10mm Red LED<br>2x Diffused 10mm Green LED<br>3x 12mm Tactile Switches | No | Imported | 4 | | | |
| 43. | | Injection Molding Machine | **Technical Specification (minimum):** | No | Imported | 1 | | | |

| Power | 0.5kw |
|---|---|
| Shot weight | 20grams |
| Nozzle hole Diameter | 2mm |
| Motor Accuracy | 0.002mm |
| Cooling Type | Water |
| Power source | AC220V |
| Max Mold size | 200*145mm*145mm |
| Heating Band Power | DC36V |
| Material | PC,PS,PP,ABS,TPU |
| Machine Size | 900mm*210mm*350mm |
| Machine weight | 120kgs |

High accuracy (can make small parts weight<0.01g micro product) (Leading technology)
1): PID temperature control±1℃
2): Mold clamping accuracy 0.001mm
3): Shot weight accuracy 0.001g
4): Shot peak pressure 1kg


High efficiency: 3.5s shaping cycle
Traditional hydraulic press:
Shot speed: 160~200mm/s
Molding cycle :7~10 /s

**Firm Name:** _____

**Signature:** _____

**Name:** _____

**Designation:** _____

## Special Instructions

| | | | | | |
|---|---|---|---|---|---|
| Instl/Assy/Commissioning Req | Yes ✓ | No | Contract with OEM/Supplier | Yes ✓ (against ser no 1-5, 8,11-22,27-43) | No |
| Performance Bond Req | Yes ✓ (against ser no 1-5, 8,11-22,27-43) | No | Offer Req for Package Deal | Yes | No✓ |
| **Note**: (If any) | | | 01-year Warranty req and Duration | Yes ✓ | No |
| Maint Spare Req | Yes | No✓ | Essentially Running spare req | Yes | No ✓ |
| Pub/Lit Req | Yes ✓ | No | Req of Cert for test data results | Yes ✓ (against ser no 1-5, 8,11-22,27-43) | No |
| Training Required | Local ✓ | Foreign | Req of Calibration | Yes | No✓ |

| Description | Bidder | | | Tech Scrutiny to be done by User | | |
|---|---|---|---|---|---|---|
| | Yes | No | Alternate Offer | Accepted | Rejected | Reasons of Rejection |
| **Environment Conditions** <br> (a)  Temperature range:  05ºC to +60ºC <br> (b)  Relative humidity: 0-70% non-condensing | | | | | | |
| **Warranty period**    Two years from the date of commissioning. A warranty sticker is to be pasted on each imported item by the Supplier / OEM highlighting Name of Firm, Contract No and date, Description of Store and Warranty validity | | | | | | |
| **Training Notes**    Supplier will provide a set of handouts for training on operation and maintenance of the equipment | | | | | | |
| **Publications**    Supplier is to provide hard and soft copies (CD) of following manuals. <br> (a)  **Operational / Maintenance manual**: - Qty 01 with Equipment and additional Qty 02 for record purposes and should consist of following sections: - <br> (1)  **Equipment Description /Operation**: - <br> (a)   Specifications | | | | | | |

|  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|
|    (b)   Description<br>   (c)   Operation<br>  (2)  **Servicing**: -<br>   (a)   Maintenance Schedule<br>   (b)   Adjustment / test<br>   (c)   Removal / Installation procedure<br>   (d)   Tools Used<br>  (3)  Trouble shooting guide<br>  (4)  Cleaning requirements<br>  (5)  Shipping and receiving<br>  (6)  Storage requirements<br>(b) **IPB** (Illustrated Parts Breakdown Manual) should have full parts description along with detailed diagrams (exploded view).<br>(c) **Experimental manuals** which must contain the list and procedure of the experiments that equipment can perform.<br>(d) Recorded video lectures of the equipment explaining use/ functions / experiments. |  |  |  |  |  |  |
| **Spares / Technical Support**<br>(a) Supplier to have in-country spares / technical support and ensure spares and technical support / assistance for next 10 years<br>(b) Comprehensive list of spares required for scheduled maintenance of Equipment is to be provided<br>(c) Any software provided must have its license<br>(d) Software upgrade support must be provided free of cost for 10 x years with renewed license at every upgrade<br>(e) Supplier must also provide calibration service for at least 5 x years after commissioning |  |  |  |  |  |  |
| **Additional Spare / Replaceable parts.**<br>(a) Replaceable spare / parts during scheduled inspections are to be identified and provided as per requirement along with equipment sufficient to cater five years consumption.<br>(b) All specialized / standard tools required for inspection / repair / servicing must be supplied along with equipment. |  |  |  |  |  |  |
| **Physical Inspection Criteria:** 100% physical inspection of store will be carried out before commissioning of the equipment |  |  |  |  |  |  |

| for following details:-<br>(a)    For physical damage, scratches and deformity.<br>(b)    Accessories /components as per contractual specifications.<br>(c)    Technical Manuals (Operation manual, user guide, IPBs).<br>(d)    Quality certificate and calibration certificate by the OEM.<br>(e)    OEM certificate and verifiable documents by the supplier that store has been procured from certified source and is factory new and from latest production.<br>(f)    Brand name and country of origin. | | | | | | |
|---|---|---|---|---|---|---|
| **Commissioning**<br>(a)  Commissioning of the equipment will be carried out by OEM rep at his own cost and risk at designated place at NUTECH.<br>(b)  Any special requirement for installation, operation and commissioning must be specified in the offer by the supplier. | | | | | | |
| **Training:** 01 week OEM operational/ maintenance training at NUTECH | | | | | | |
| **Improvement and Safety Measures:** Any improvement and safety measures suggested by NUTECH during commissioning are to be resolved by the supplier / manufacturer at no extra cost. | | | | | | |
| **Liability of Supplier**<br>(a)  OEM certificate of authorized dealership Supplier is to provide original OEM certificate of subject equipment bought directly from the manufacturer and being an authorized dealer.<br>(b)  In case the equipment supplied is not compatible with specifications, the supplier will be obliged to call his representatives at his own cost for consultation and corrective action. | | | | | | |
| **Special Notes**<br>(a) Additional requirements for the maintenance of equipment (if any) must be intimated by the supplier in technical offer.<br>(b) Supplier must provide the list of organizations using same equipment in Pakistan (if any).<br>(c) Equipment must be a standard product of OEM available at | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| web address of OEM.<br>(d) In case of premature failure of the equipment, OEM must replace / rectify the item free of cost. Required transportation charges would be borne by the supplier. | | | | | |

**Firm Name:** _____

**Signature:**_____

**Name:** _____

**Designation:** _____

**Workstation (3 Level Adjustable)**



**Workbench Computer**

## <u>TECHNICAL OFFER</u>
## NUTECH / SCM /Innovation Lab 2021 / TD-211

**<u>Fill in following essential parameters</u>:-**

1. Validity of Offer: _____ Days (Should not be less than **90 days**)

2. Delivery period: _____ Days (After placement of order)

3. Country of Origin: _____

4. Warranty Period: _____

**<u>General</u>**

1. GST Number: _____ (Enclose Copy)

2. NTN / CNIC: _____ (if exempted, provide valid exemption certificate)

**<u>Payment Terms (In continuation of IT Document clause 12)</u>**

| In FOR Cases |
| --- |
| 50% advance payment against BG/CDR/Pay Order/DD/BC through cross cheque or inland LC |
| 50% payment after delivery, installation / commissioning /user satisfaction certificate through cross cheque or inland LC <br> Or <br> 50% payment may be considered on delivery of the store also through cross cheque or inland LC |

**<u>Details of Foreign Principal Information with account details)</u>**

1. Name / Title: _____

2. Address: _____

| OEM Name: | Firm Name: | Signature: |
| --- | --- | --- |
| OEM Focal Person: | Firm Focal Person: | Official Seal: |
| OEM Phone Number: | Firm Phone Number: | Name & CNIC: |
| OEM Email Id: | Firm Email Id: | Designation: |

**FINANCIAL OFFER**

**NUTECH / SCM /Innovation Lab 2021 / TD-211**

| Ser | Part No | Item Name/Size | Specification | A/U | Qty Req | Unit Price PKR (Including Tax) | Total Price PKR (Including Tax) |
|---|---|---|---|---|---|---|---|
| 1. | | 3D Scanner | • Time needed for a single scan: 4 seconds<br>• Time needed for a 360° scan in Auto Scan mode: 1 minute<br>• Plug-and-play. Easy set-up with automated calibration<br>• Uses a safe structured white light, no laser or other light sources that require protection glasses<br>**Technical specifications (Minimum):** | No | 1 | | |

| Scan Mode | Auto scan | Fixed scan |
|---|---|---|
| Scan Speed | 1 min. | 4 s |
| Mode of Alignment | Feature; Manual | Turntable; Manual |
| Single Shot Accuracy | ≤ 0.05 mm | ≤ 0.05 mm |
| Maximum Scan Volume / Minimum Scan Volume | 200 x 200 x 200 mm / 30 x 30 x 30 mm | 1200 x 1200 x 1200 mm / 30 x 30 x 30 mm |
| Range of Single Capture | 200 x 150 mm | 200 x 150 mm |
| Point Distance | 0.17 mm ~ 0.2 mm | 0.17 mm ~ 0.2 mm |
| Texture | Yes | Yes |
| File Format | OBJ, STL, | OBJ, STL, |

|  |  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|---|---|

| | | | ASC, PLY | ASC, PLY | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Camera Resolution | 1.3 Megapixel | 1.3 Megapixel | | | | |
| | | Light Source | White Light | White Light | | | | |
| | | Stand-off Distance | 290 ~ 480 mm | 290 ~ 480 mm | | | | |
| | | Weight unpacked / packed | 4.2 kg / 7.0 kg | 4.2 kg / 7.0 kg | | | | |
| | | Dimension | 570 x 210 x 210 mm | 570 x 210 x 210 mm | | | | |
| | | Power Supply | 50 W | 50 W | | | | |
| | | Input Voltage | DC: 12 V / 3.33 A | DC: 12 V / 3.33 A | | | | |

| 2. | | 3D Printer (SLA) | 3D Printer should be compatible with 3rd party 3D printing resins flexibility to try the different type of resin such as castable resin, tough resin, biocompatible resin<br>3D printer should use the self-developed Full HD 1080p resolution light engine, which can ensure more stable LED intensity and better printing quality<br>Touch screen should be available<br>Advanced architecture main board and self-developed proprietary light engine work together perfectly. Dual-core 800 MHz ARM processor ensures high-performance and better user experience. The mainboard is designed and made in a 10-layer high precision board, safeguarding EMC, the integrity and the stability of the projection signal.<br>**TECHNICAL SPECIFICATIONS (Minimum):** | No | 1 | | |
|---|---|---|---|---|---|---|---|

| 3D Printing Technology | DLP (Digital Light Processing) |
|---|---|
| Printing Size | 120 × 67.5 × 150 mm (L x B xH) |
| Z axis layer height | 25/50 μm (0.025 / 0.05 mm) |
| X-Y axis resolution | 62.5 μm (0.0625 mm) |

| Light source | 405 nm LED; 50,000 hours life span |
|---|---|
| 3D Printing Software | FlashPrint |
| 3D File format | STL |
| Connectivity | USB Cable, USB Stick, Wi-Fi |
| Printer dimensions | 360 x 310 x 565 mm |
| Printer weight | 17.8 kg |
| Power | 100-240v, 50-60Hz, 1A |

**3D PRINTING SPECIFICATIONS (Minimum):**

| Build volume (in liters) | 1.215 |
|---|---|
| Build volume (in millimeters) | 120 × 67.5 × 150 mm |
| Layer resolution | Z: 25 / 50 microns (0.025 / 0.05 mm) \| X-Y: 62.5 microns (0.0625 mm) |
| Print technology | Digital Light Processing (405 nm LED with 50,000 hours life span) |

**CONNECTIVITY:**

| USB | Yes |
|---|---|
| Wi-Fi | Yes |

**SIZE & WEIGHT (Minimum):**

| Product dimensions | 360 x 310 x 565 mm |
|---|---|
| Product weight | 17.8 kg |

**SOFTWARE**

| | | File formats | STL | | | | |
|---|---|---|---|---|---|---|---|
| | | Included software | FlashPrint | | | | |
| | | | | | | | |
| 3. | | Digital Oscilloscope | **Technical Specification (Minimum):**<br>• 10M sample standard and 20M sample interleaved<br>• 30000 to 50000 waveforms/s update rate<br>• 100MHz dual channel<br>• Sensitivity down to 1mV/div(2mV/div)<br>• low noise<br>• Math functions such as +, -, *, /, FFT<br><br>**OR Equivalent** | No | 2 | | |
| 4. | | Function Generator | **Technical Specification (Minimum):**<br>Frequency range: 0.5 Hz...5 MHz (sine); arbitrary 0.5 Hz...5 MHz (or higher)<br>Waveforms: Sine, square/pulse, ramp, white noise, arbitrary (exp. rise/fall, sin(x)/x, staircase etc.; 45 built-in signal and user definable arbitrary waveforms)<br><br>**OR Equivalent** | No | 2 | | |
| 5. | | Handheld Multi Meter | **Technical Specification (Minimum):**<br>• 0.05% basic accuracy<br>• True RMS<br>• Auto power off<br>• Overload protection<br>• DC ranges: 0.1 mV to 1000 V<br>• Resolution:10 μV to 100 mV<br>• AC ranges: 200 mV- 2 V, 20 V- 750 V (or higher)<br>• Fuse for short circuit protection<br><br>**OR Equivalent** | No | 4 | | |
| 6. | | Workstation | • Work Station (Size6'x2'x6')<br>• Wooden with metallic base (pipe size 1.5 inches) | No | 4 | | |

| | | (3 Level Adjustable) | • Power Sockets and additional accessories are not required. Just 3 level workstation is required.<br><br>**Purpose:**<br>This workbench will be used as a computer desk, having space to accommodate computer accessories, development boards, trainers, and accessories for electronic projects. Preferably Workstation should be assembled at premises.<br><br>Picture attached in the Annex "A-2" for reference. | | | | |
|---|---|---|---|---|---|---|---|
| 7. | | Workbench Computer | • Top Material: Manufactured Wood<br>• Base Material: Metal<br>• Assembly Required: Yes<br><br>**Requirements (Minimum):** | No | 4 | | 7. |

| Shape | Rectangular |
|---|---|
| Base Material | Metal |
| Base Wood Construction Details | Powder Coated Metal |
| Top Material | E1 Grade Lamination sheet |
| Top Construction Details | MDF |
| Edges | Covered with Abs (Doolken-Germany) edging |
| Wood Tone | White & Grey |
| Cabinet Included | No |
| Side Rack | Yes |
| Locking Drawers | Yes |
| No of Drawers | 3 |
| Pedestal | Yes |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Included | | | | | |

| | |
|---|---|
| Drawer Glide Mechanism | Ball Bearing Glides |
| Termite Control Treatment | Yes |

**Dimension in mm (Minimum):**

| | |
|---|---|
| Main Desk | 1500 W x 750 D x 760 H |
| Side Rack | 1050 W x 450 D x 710 H |

Picture attached in the Annex "A" for reference.

| # | | Item | Specification | Unit | Qty | | | |
|---|---|---|---|---|---|---|---|---|
| 8. | | Power Supply | • Variable Output Voltage: 0-32V ±40% (DC)<br>• Variable Output Current: 0-20A ±40% (even at max 32V)<br>• Input Voltage: 100- 240VAC 50/60 Hz<br>• Dual 3-digit LED display<br>• USB interface<br>• Front panel auxiliary output<br>• Overvoltage, over temperature and overload protection<br><br>**OR Equivalent** | No | 4 | | | |
| 9. | | USB Digital Microscope Endoscope Magnifying Glass Camera Zoom for PCB Inspection Phone Repair | • Digital Microscope: Provide high-definition image and video at 1600X1200 resolution,1-200X Zoom and 30fps with 2.0MP CMOS sensor, clearly view details.<br>• Microscope: Can capture live AVI video or take images in BMP format while connecting USB electronic microscope to our computer. And it is a powerful PCB microscope.<br>• Adjustable Light Source: Includes 8 led lights, support dim or brighten light conditions, easy to adjust with sliding regulator | No | 2 | | | |

| | | | | No | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | • Durable and Portable usb digital microscope: Finished with aluminum , durable for daily use. With simple constructions, easy to install, also lightweight and easy to store for home use. Can be connected to device and start the program.<br>• Compatibility: It should work with Windows 7, 8 and 10, and Mac<br><br>**OR Equivalent** | | | | | |
| 10. | | Powered bread board | **Technical Specification (Minimum):**<br>DC output voltages<br>• 0~+15VDC/500mA<br>• 0~-15VDC/500mA<br>• 0~15VAC/500mA<br>• 12,+5VDC/1A<br>  Solderless breadboard<br>• 2420 tie points<br><br>**OR Equivalent** | No | 4 | | | |
| 11. | | Laser Cutter | **Technical Specification (Minimum):**<br>Laser Technology<br>CO2 Laser<br>Working Size<br>1600*1000mm<br>Laser Type<br>Sealed CO2 Glass Laser Tube<br>Laser Power<br>60W/80W/100W/130W/150W/280W/300W<br>Cutting Speed<br>0-40000mm/Min<br>Engraving Speed | No | 1 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 0-60000mm/Min | | | | | |
| | | | Cutting Depth | | | | | |
| | | | Depend | | | | | |
| | | | Control System | | | | | |
| | | | DSP Offline / USB | | | | | |
| | | | Compatible Software | | | | | |
| | | | Autocad/Coreldraw/Photoshop | | | | | |
| | | | Voltage | | | | | |
| | | | 220V/50Hz(110V/60Hz) | | | | | |
| | | | Trademark | | | | | |
| | | | MC | | | | | |
| | | | Transport Package | | | | | |
| | | | Standard Wooden Box | | | | | |
| | | | Specification | | | | | |
| | | | 1600*1000mm | | | | | |
| 12. | | Digital Vibration Meter | **Technical Specification (Minimum):** <br> Velocity Lo-RMS: 0.1 - 199.9 mm/s <br> Velocity Hi-AVE: 0.1 - 199.9 m/s² <br> Displacement, peak to peak Hi-PEAK: 0.001 - 1999 mm <br> Dimension: 185 mm x 68 mm x 30 mm with integrated or with external probe, incl. workshop test certificate <br> compact analyser for predective maintenance of production machinery and for a quick checking of unbalance, misalignment, bearings and gears etc. <br>     LCD display with digit height 18 mm <br>     accuracy ± 5% of display value (± 2 digits) with integrated | No | 1 | | | |

| 13. | | Embedded systems for AI applications<br><br>Nvidia Jetson Nano or Equivalent | accelerometer and with hand strap rugged, polyamid plastic housing, with keypad large LCD display with clear reading, with backlight<br><br>    On-switch, automatic power-Off after approx. 1 min., with battery indicator low frequency mode "Lo-RMS" to test low vibrations high frequency mode "Hi-AVE" to test avarage acceleration displacement peak to peak mode "Hi-Peak"    large frequency range: 10 Hz up to 1 kHz (Lo), 1 kHz up to 15 kHz (Hi)<br><br>    incl. 2 exchangeable probe tips, for different measuring functions:<br><br>    - short probe tip for standard vibration measurements<br><br>    - long, small probe tip for vibration measurements on small or narrow objects, etc.<br><br>    - without probe tip for vibration measurements on smooth object surfaces, etc.<br><br>    operation temperature 0°C ~ +40°C, humidity 30 - 90%RH<br><br>    incl. 1x 9 V battery (type 6LR61, art.-no.: 60 9281), with operation manual<br><br>**Technical Specification (Minimum):**<br>GPU: 128-core Maxwell<br>CPU: Quad-core ARM A57 @ 1.43 GHz<br>Memory: 4 GB 64-bit LPDDR4 25.6 GB/s<br>Storage: microSD (not included)<br>Video Encode: 4K @ 30 \| 4x 1080p @ 30 \| 9x 720p @ 30 (H.264/H.265)<br>Video Decode: 4K @ 60 \| 2x 4K @ 30 \| 8x 1080p @ 30 \| 18x 720p @ 30 (H.264/H.265)<br><br>• Camera: 2x MIPI CSI-2 DPHY lanes<br><br>• Connectivity    Gigabit Ethernet, M.2 Key E<br><br>• Display    HDMI and display port | | No | 10 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | • USB      4x USB 3.0, USB 2.0 Micro-B<br><br>Others GPIO, I2C, I2S, SPI, UART<br>Mechanical    69 mm x 45 mm, 260-pin edge connector<br><br>**OR Equivalent** | | | | |
| 14. | | Embedded systems for advanced AI applications<br><br>Nvidia Jetson Xavier AGX Dev kit or equivalent | **Technical Specification (Minimum):**<br><br>• PCIe X16: x8 PCIe Gen4/x8 SLVS-EC<br>• RJ45: Gigabit Ethernet<br>• USB-C: 2x USB 3.1, DP (Optional), PD (Optional) Close-System Debug and Flashing Support on 1 Port<br>• Camera Connector: (16x) CSI-2 Lanes<br>• M.2 Key M: NVMe<br>• M.2 Key E: PCIe x1 + USB 2.0 + UART (for Wi-Fi/LTE) / I2S / PCM<br>• 40-Pin: Header UART + SPI + CAN + I2C + I2S + DMIC + GPIOs<br>• HD Audio Header: High-Definition Audio<br>• eSATAp + USB3.0 Type A: SATA Through PCIe x1 Bridge (PD + Data for 2.5-inch SATA) + USB 3.0<br>• HDMI Type A: HDMI 2.0<br>• uSD/UFS Card Socket: SD/UFS<br><br>**OR Equivalent** | No | 5 | | |
| 15. | | Embedded systems for professional AI applications<br><br>NVIDIA Jetson TX2 Developer Kit or equivalent | **Technical Specification (Minimum):**<br><br>Module<br>• NVIDIA Pascal™ Architecture GPU<br>2 Denver 64-bit CPUs + Quad-Core A57 Complex<br>• 8 GB L128 bit DDR4 Memory<br>• 32 GB eMMC 5.1 Flash Storage<br>• Connectivity to 802.11ac Wi-Fi and Bluetooth-Enabled Devices<br>• 10/100/1000BASE-T Etherne | No | 10 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | I/O<br>• USB 3.0 Type A<br>• USB 2.0 Micro AB (supports recovery and host mode)<br>• HDMI<br>• M.2 Key E<br>• PCI-E x4<br>• Gigabit Ethernet<br>• Full-Size SD<br>• SATA Data and Power<br>• GPIOs, I2C, I2S, SPI, CAN*<br>• TTL UART with flow control<br>• Display Expansion Header*<br>• Camera Expansion Header<br><br>**OR Equivalent** | | | | | |
| 16. | | Bio Medical Certified Embedded systems for respiratory apparatus applications<br><br>Toradex IMx6 with Ixora Carrier Board or Equivalent | **Technical Specification (Minimum):**<br>• USB 2.0 (1x Host, 1x OTG)<br>• USB 3.0 (2x Host)<br>• PCIe (1x Mini PCIe)<br>• I2C (2x)<br>• SPI (1x)<br>• UART (3x RS232)<br>• PWM (4x)<br>• GPIO (up to 40)<br>• Analog Input (4x)<br>• Ethernet (1x 10/100/1000 Mbit)<br>• SATA (1x mSATA)<br>• SDIO/SD/MMC (1x 4 Bit Micro SD)<br>• CAN (2x)<br>• LVDS (1x Dual Channel)<br>• S/PDIF In/Out (1x)<br>• HDMI (1x)<br>• RGB (1x 24 Bit)<br>• Resistive Touch (4/5-wire)<br>• Capacitive Touch connector<br>• Camera Parallel Interface (1x) | No | 10 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | • Camera Serial Interface (1x)<br>• Analog Audio Line in (1x)<br>• Analog Audio Mic in (1x)<br>• Analog Audio Headphone out (1x)<br>• RTC on Board (1x)<br><br>Along with carrier board<br><br>**OR Equivalent** | | | | |
| 17. | | Field Programmable Gate array systems for advanced industrial application with development kits and expansion modules Zynq-700 or Equivalent | **Technical Specification (Minimum):**<br>• Onboard configuration circuitry<br>• 16MB Quad SPI Flash<br>• SDIO Card Interface (boot)<br>• PC4 and 20 pin JTAG ports<br>• HDMI Video OUT<br>• 8X LEDs<br>• 12V wall adapter or ATX<br>• Voltage and Current measurement capability of supplies<br>• DDR3 Component Memory 1GB<br>• Support 32 data width<br>• 16MB Quad SPI Flash<br>• IIC - 1 KB EEPROM<br>• 200MHz Fixed PL Oscillator (Differential LVDS)<br>• 156.25MHz (default) I2C Programmable Oscillator (Differential LVDS)<br>• 33.33MHz Fixed PS System Oscillator (Single-Ended CMOS)<br>• Gigabit Ethernet GMII, RGMII and SGMII<br>• USB OTG 1 (PS) - Host USB<br>• IIC Bus Headers/HUB (PS)<br>• 1 CAN with Wake on CAN (PS)<br>• USB UART (PS)<br>• 3 User Push Buttons<br>• 2 User Switches<br>• 8 User LEDs<br>• XADC header<br>• FMC #1-LPC connector (0 GTX Transceiver, 68 single-ended or 34 | No | 10 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | differential user defined signals) <br>• FMC #2-LPC connector (0 GTX Transceiver, 68 single-ended or 34 differential user defined signals) <br>• IIC HUB/Expander <br>• Dual Pmod (8 I/O Shared with LED's) <br>• Single Pmod (4 I/O Shared with PJTAG) <br><br>**OR Equivalent** | | | | |
| 18. | | Field Programmable Gate array systems for industrial application with development kits and expansion modules PYNQ - Z1 or Equivalent | **Technical Specification (Minimum):** <br>• 650MHz dual-core Cortex-A9 processor <br>• DDR3 memory controller with 8 DMA channels and 4 high performance AXI3 slave ports <br>• High-bandwidth peripheral controllers: 1G Ethernet, USB 2.0, SDIO <br>• Low-bandwidth peripheral controller: SPI, UART, CAN, I2C <br>• Programmable from JTAG, Quad-SPI flash, and micro SD card <br>• Artix-7 family programmable logic <br>• 13,300 logic slices, each with four 6-input LUTs and 8 flip-flops <br>• 630 KB of fast block RAM <br>• 4 clock management tiles, each with a phase-locked loop (PLL) and mixed-mode clock manager (MMCM) <br>• 220 DSP slices <br>• On-chip analog-to-digital converter (XADC) <br>• 512MB DDR3 with 16-bit bus @ 1050Mbps <br>• 16MB Quad-SPI Flash with factory programmed globally unique identifier (48-bit EUI-48/64™ compatible). <br>• MicroSD slot <br>• Powered from USB or any 7V-15V source (see recommended products) <br>• USB and Ethernet: <br>• USB-JTAG Programming circuitry <br>• USB-UART bridge <br>• USB OTG PHY (supports host only) <br>• Gigabit Ethernet PHY <br>• Electret microphone with pulse density modulated (PDM) output <br>• 3.5mm mono audio output jack, pulse-width modulated (PWM) format <br>• HDMI sink port (input) | No | 10 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | • HDMI source port (output)<br>• 4 push-buttons<br>• 2 slide switches<br>• 4 LEDs<br>• 2 RGB LEDs<br>   ◦ Two standard Pmod ports<br>   ◦ 16 Total FPGA I/O<br>   ◦ Arduino/chipKIT Shield connector<br>   ◦ 49 Total FPGA I/O<br>   ◦ 6 Single-ended 0-3.3V Analog inputs to XADC<br>   ◦ 4 Differential 0-1.0V Analog inputs to XADC<br><br>**OR Equivalent** | | | | |
| 19. | | Embedded system for Hobby Electronics<br><br>Raspberry Pi 4 or Equivalent | **Technical Specification (Minimum):**<br>• Broadcom BCM2711, Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz<br>• 8GB LPDDR4-3200 SDRAM (depending on model)<br>• 2.4 GHz and 5.0 GHz IEEE 802.11ac wireless, Bluetooth 5.0, BLE<br>• Gigabit Ethernet<br>• 2 USB 3.0 ports; 2 USB 2.0 ports.<br>• Standard 40 pin GPIO header (fully backwards compatible with previous boards)<br>• 2 × micro-HDMI ports (up to 4kp60 supported)<br>• 2-lane MIPI DSI display port<br>• 2-lane MIPI CSI camera port<br>• 4-pole stereo audio and composite video port<br>• H.265 (4kp60 decode), H264 (1080p60 decode, 1080p30 encode)<br>• OpenGL ES 3.0 graphics<br>• Micro-SD card slot for loading operating system and data storage<br>• 5V DC via USB-C connector (minimum 3A*)<br>• 5V DC via GPIO header (minimum 3A*)<br>• Power over Ethernet (PoE) enabled (requires separate PoE HAT)<br>• Operating temperature: 0 – 50 degrees C ambient<br><br>**OR Equivalent** | No | 20 | | |

| 20. | | Touch Screen For embedded systems application Touch Screen 7 inches Toradex Or equivalent | **Technical Specification (Minimum):**<br><br>• Resolution: 800x480px<br>• 18-bit RGB<br>• 7 inches<br>• Touch Interface: I2C<br>• 40 pin and 10 pin FFC cable to connect with a Carrier Board<br>Compatible with serial no 17 board (item)<br><br>**OR Equivalent** | No | 5 | | |
| 21. | | Industrial Grade Monitor | **Technical Specification (Minimum):**<br>• Capacitive, Infrared, Resistive<br>• 19 inches<br>• HDMII VGA DVI<br>• Industrial LCD panel A grade<br>• 300nits, Up to 1000nits<br>• AC 110-240V, 50/60Hz<br>• Response time 5ms<br>• Power consumption<br>• ≤35W<br>• Metal Shell Aluminum alloy enclosure<br>• IP65 seamless front<br>• Waterproof, Dustproof<br>• Finger, Touch pen, Glove hand<br><br>**OR Equivalent** | No | 6 | | |
| 22. | | Panel PC | **Technical Specification (Minimum):**<br><br>• Touch screen parameters<br>• Touch screen type:  Projected capacitive touch screen<br>• 19 inches<br>• Theory Clicks: More than 50 million times<br>• Operating System Compatibility: Win 7/ Win 8 / Win 10/Win XP / Linux /MAC /Android/CE<br>• LED screen parameters<br>• Resolution:    1280*1024 | No | 3 | | |

|  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
|  |  |  | • Brightness:  ≥ 250 cd/m2<br>• Contrast ratio:  ≥ 1000:1<br>• Viewing angle:  89/89/89/89(Typ.) CR≥10) left/right/up/down<br><br>**Power supply parameters**<br><br>• Input Power:  110-240V AC 50/60Hz<br>• Output power:  12V 5A<br>• Overall power consumption:  Less than 60W<br>• Standby power consumption: less than    0.5W<br>• Version: Android 7.1<br>• CPU: RK3288/RK3399<br>• RAM: 2G (4G optional)<br>• Memory: Flash 8G(16g/32g optional)<br>• Version: Window7 / Window 8 /Window 10<br>• CPU: Intel Celeron J1900; Intel Atom x5-Z8350, Intel core I3/I5/I7<br>• RAM:  DDR3 2G/4G/8G/16G (optional)<br>• Memory:  SSD 32G/64G/128G/256G HDD 500G/1T<br><br>**OR Equivalent** |  |  |  |  |
| 23. |  | MATLAB License | **Academic Use — Individual:**<br>• The products can be used by a single named user.<br>• The products can be activated on up to four different computers, provided that the products are only accessible to and used by that single named user.<br>• A named user may not use a product on more than two computers simultaneously.<br>• The license must be restricted to a single country of operation.<br>• **Subscription: Annual** | No | 2 |  |  |
| 24. |  | QT License | **QT for device creation:**<br>Targeted OS:<br>Embedded Linux, UWP, Integrity, QNX, VxWork<br>Windows, Linux, Mac, Android, IOS<br>**Subscription: Annual** | No | 2 |  |  |
| 25. |  | Solid Works | **SOLIDWORKS Education Edition Software:** | No | 1 |  |  |

| | | License | Comprehensive CAD and engineering development teaching tool features 3D software plus a broad curriculum of exercises and interactive courseware for 3D mechanical CAD, design validation and data management.<br>Subscription **Annual** | | | | |
|---|---|---|---|---|---|---|---|
| **26.** | | Tool Kit | **Requirements (Minimum):**<br>408-Piece Mechanics Tool Set with 3-Drawer Heavy Duty Metal Box (Tool Set + Drill Combo Kit)<br>**Include Items:**<br>Contents: (1) utility knife, (20) utility knife blades, screwdriver), magnetic screwdriver, Handled screwdriver bits (6) precision screwdriver, metric hex key set, (11) SAE hex Hey set's, 6" Long nose pliers, 6" Diagonal pliers, (1) 6" combination pliers, (1) 16oz ball-pein hammer, (1) 7.5M (25ft) tape measure, (8) Metric combination wrenches: 8, 10, 11, 12, 13, 14, 15, 17mm, (8) SAE Combination wrenches: 1/4", 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 3/4", (1) 8" Adjustable wrench, (1) stripper, (55) connector kit, (40) cable ties, (90) hardware kit, (1) 1/4" Dr. Ratchet handle, (1) 3/8" Dr. Ratchet handle, (1) 1/2" Dr. Ratchet handle, (10) 1/4" 6 points SAE dr. Sockets: 5/32", 3/16", 7/32", 1/4", 9/32", 5/16", 11/32", 3/8", 7/16", 1/2", (10)1/4" 6 points metric dr. Sockets: 4, 5, 6, 7, 8, 9, 10, 11, 12, 13mm, (10) 3/8" 6 points SAE dr. Sockets: 1/4", 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 11/16", 3/4", 13/16", (11) 3/8" 6 points metric dr. Sockets: 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 19mm, (8) 3/8" 12 points SAE dr. Sockets: 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 11/16", 3/4", (11) 3/8" 12 points metric: 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 19mm, (6) 1/2" 6 points SAE dr. Sockets: 1/2", 9/16", 5/8", 11/16", 3/4", 7/8", (6) 1/2" 6 points metric dr. Sockets: 14, 15, 17, 18, 19, 21mm (1) 1/2" X 3/8" Adapter, (1) 3/8" X 1/4" Adapter, (1) 1/4"x3" Extension bar, (1) 3/8"X3" Extension bar, (1) 3/8"x6" Extension bar, (1) 1/2"x5" Extension bar, (2) 3/8" Spark sockets: 13/16", 5/8".<br><br>**Cordless Drill Combo Kit, 2-Tool**<br>• Ergonomic Design: Lightweight tools designed to fit the user's needs<br>• Increased Visibility: The DCF885 features a built in Led with 20 second delay after trigger release<br>• Includes: (1) DCD771 drill/driver, (1) DCF885 1/4 inches' impact driver, (2) 20V MAX Lithium Ion 1.3 Ah battery packs, 20-volt MAX | No | 3 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | charger, and (1) kit bag<br>• 1 Handed Bit Loading: The DCF885 has a 1/4 inches' hex chuck and accepts 1 inches bit tips, Power Tool Type: Cordless<br>High Performance Motor: The DCD771 delivers 300 Unit Watts Out (UWO) of power ability completing a wide range of applications<br><br>**OR Equivalent** | | | | |
| 27. | | Benchtop Multimeter | Type: Benchtop<br>0.05% basic accuracy<br>True RMS<br>Auto power off<br>Overload and Short circuit protection<br>DC ranges: 0.1 mV to 1000V<br>Resolution:10 µV to 100 mV<br>AC ranges: 200 mV, 2 V, 20V, 200 V, 750 V<br>Fused and short circuit protected<br><br>**OR Equivalent** | No | 3 | | |
| 28. | | Medical Grade blowers for respiratory apparatus<br><br>Micronel U65HN-024KS-6 or equivalent | **Technical Specification (Minimum):**<br>**Electrical Measuring**<br><br>Supply voltage range [VDC] Unit Minimum = 5 Typical 24 Maximum = 26.4<br><br>Power consumption (free blowing at nominal voltage) Maximum = 110 W<br><br>**Pneumatic (Pressure)**<br><br>Air flow (free blowing at nominal voltage) Typical = 440[l/min]<br><br>Minimum air flow at rated speed Minimum 0[l/min]<br><br>Stat. pressure at rated speed Typical = 100[mbar]<br><br>Pneumatic (Vacuum)<br><br>Air flow (free blowing at nominal voltage) Typical = 440 [l/min]<br><br>Minimum air flow at rated speed Minimum = 0 [l/min] | No | 4 | | |

Stat. pressure at rated speed Typical = 90 [mbar]

**Thermal**

Maximum motor enclosure temperature [°C] Maximum = 70

Ambient operating temperature [°C] Minimum = -20 Typical = 25

Maximum = 50

Ambient storage temperature [°C] Minimum = -20 Typical = 25 Maximum

= 50

**Motor**

Maximum speed for continuous operation Maximum = 57.000 [rpm]

Acceleration (at nominal voltage) Typical = 400 [rpm/ms]

Number of pole pairs Typical 1

Terminal resistance Typical = 0.208[Ohm]

Terminal inductance Typical = 0.014 [mH]

Back EMF-constant Typical = 0.37 [V/Krpm]

Torque constant Typical = 3.53[mNm/A]

Rotor inertia Typical = 1.2 [g/cm2]

**Ambient**

Protection class Typical = IP10

Relative humidity Minimum = 10 Maximum = 95    [%RH]

Oxygen resistence Maximum = 100 [%]

**Life Time**

L10 Maximum  20'000[h]

Acoustics

Acoustic level Maximum =  47 [dB(A)]

**Mechanical**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Weight Typical = 240 [gr] | | | | | |
| | | | Balancing class Typical = G < 2.5 [mm/s] | | | | | |
| | | | Impeller Inertia Typical = 5.34 [gcm2] | | | | | |
| | | | **OR Equivalent** | | | | | |
| 29. | | Blower Controller for respiratory apparatus<br><br>Maxon EPOS2 24/5, Digital positioning controller Or equivalent | **Technical Specification (Minimum):**<br><br>Weight :170 g<br>**MOTOR**<br>DC motors up to 120 W<br>EC motors up to 120 W<br>**SENSOR**<br>Without sensor (DC motors) Yes<br>Digital incremental encoder (2-channel, differential) Yes<br>Digital incremental encoder (3-channel, differential) Yes<br>Digital Hall sensors (EC Motors) Yes<br>**OPERATING MODES**<br>Current controller<br>Yes<br>Speed controller (closed loop) Yes<br>Position controller Yes<br>**ELECTRICAL DATA**<br>Operating voltage V(min.) 11 V<br>Operating voltage V(max.)24 V<br>Logic supply voltage V(min.)optional 11 V | No | 4 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | Logic supply voltage V(max.)optional 24 V | | | | |
| | | | Max. output voltage (factor * V)0.9 | | | | |
| | | | Max. output current I 10 A | | | | |
| | | | Max. time of peak output current I 1 s | | | | |
| | | | Continuous output current I 5 A | | | | |
| | | | PWM clock frequency of powerstage 50 kHz | | | | |
| | | | Sampling rate PI current controller 10 kHz | | | | |
| | | | Sampling rate PI speed controller 1 kHz | | | | |
| | | | Sampling rate PID positioning controller 1 kHz | | | | |
| | | | Max. efficiency 92 % | | | | |
| | | | Max. speed (DC) 100000 rpm | | | | |
| | | | Max. speed (EC; 1 pole pair) blockcommutation100000 rpm | | | | |
| | | | Max. speed (EC; 1 pole pair) sinusoidal commutation 25000 rpm | | | | |
| | | | Built-in motor choke per phase 15 µH | | | | |
| | | | **INPUTS** | | | | |
| | | | Hall sensor signals H1, H2, H3 | | | | |
| | | | Encoder signals A, A, B, B, I, I\ | | | | |
| | | | Max. encoder input frequency 5 MHz | | | | |
| | | | Digital inputs 6 | | | | |
| | | | Functionality of digital inputs: limit switch, reference switch, general purpose, enable, quickstop, step/direction set value, master encoder, position marker | | | | |
| | | | Analog inputs 2 | | | | |
| | | | Resolution, range, circuit 12-bit, 0…+5V | | | | |
| | | | Functionality of analog inputs set value, general purpose | | | | |

DIP switch 8

Functionality of the DIP switch CAN Node-ID, CAN-Bus Termination

**OUTPUTS**

Digital outputs 4

Functionality of digital outputs holding brake, general purpose, position

compare, ready

**VOLTAGE OUTPUTS**

Hall sensor supply voltage +5 VDC, max. 30 mA

Encoder supply voltage +5 VDC, max. 100 mA

Auxiliary output voltage +VCC , max. 1300 mA

INTERFACE RS232 Yes

USB 2.0 (full speed) Yes

CAN Yes

CANopen Slave

CANopen application layer DS-301

CANopen frameworks DSP-305

CANopen profiles motion control DSP-402

Gateway function RS232-to-CAN Yes

Gateway function USB-to-CAN Yes

**DISPLAY**

Status indicator "Ready" green LED

Status indicator "Error" red LED

**PROTECTIVE FUNCTIONS**

Protective functions: current limit, overcurrent, excess temperature,

undervoltage, overvoltage, voltagetransients, short-circuits in the motor

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | cable | | | | |

**AMBIENT CONDITIONS**

Temperature – Operation (min.) -10 °C

Temperature – Operation (max.) 55 °C

Temperature – Extended Range +55…+83°C, Derating: -0.179 A/°C

Temperature – Storage (min.) -40 °C

Temperature – Storage (max.) 85 °C

Humidity (non-condensing) (min.) 5 %

Humidity (non-condensing) (max.) 90 %

**MECHANICAL DATA**

Weight 170 g

Dimension (length) 105 mm

Dimension (width) 83 mm

Dimension (height) 24 mm

Mounting Flange for M3 screws

**SOFTWARE**

Installation program EPOS Setup

Graphical User Interface EPOS Studio

Operating system Windows 10, 8, 7, Windows XP SP3

Windows DLL for PC 32-/64-bit

PC master IXXAT, Vector, National Instruments, Kvaser, NI-XNET

Programming examples MS Visual C#, MS Visual C++, MS Visual Basic,

MS Visual Basic.NET, Borland C++,

Borland Delphi, NI LabView, NI LabWindows/CVI

Linux Shared Object Library X86 32-/64-bit, ARMv7

| | | | Programming example C++ (Eclipse Project) | | | | |
|---|---|---|---|---|---|---|---|
| | | | IEC 61131-3 library for CAN | | | | |
| | | | Master | | | | |
| | | | Beckhof, Siemens/Helmholz, VIPA | | | | |
| | | | maxon library for NI SoftMotion National Instruments Compact Rio | | | | |
| | | | **FUNCTIONS** | | | | |
| | | | CANopen Profile Position Mode Yes | | | | |
| | | | CANopen Profile Velocity Mode Yes | | | | |
| | | | CANopen Homing Mode Yes | | | | |
| | | | Position Mode Yes | | | | |
| | | | Interpolated Position Mode (PVT) Yes | | | | |
| | | | Velocity mode Yes | | | | |
| | | | Current mode Yes | | | | |
| | | | Master Encoder Mode Yes | | | | |
| | | | Step/Direction Mode Yes | | | | |
| | | | Analog set value Yes | | | | |
| | | | Path generator with | | | | |
| | | | sinusoidal/trapezoidal profiles | | | | |
| | | | Yes | | | | |
| | | | Position Control Feed Forward Yes | | | | |
| | | | Velocity Control (Feed Forward) Yes | | | | |
| | | | Position Marker / Touch Probe Yes | | | | |
| | | | Quickstop Yes | | | | |
| | | | Enable Yes | | | | |
| | | | Position Compare Yes | | | | |

| 30. | | Respiratory Module for medical grade respiratory systems<br><br>Macawi full respiratory system or equivalent | **Technical Specification (Minimum):**<br>**VENTILATION MODES**<br>Ventilation mode: PC-CMV PC (Pressure Control),VC-CMV VC (Volume Control), PC-SIMV SIMV(PC), VC-SIMV SIMV(VC), PC-SIMV+ Bi-Level Ventilation, PC-BIPAP, PC-ACV ACV(PC), VC-ACV ACV(VC), Spn-CPAP CPAP, CFLOW Continuous Flow at pre-set O2 concentration<br>REAL-TIME SIGNALS<br>Airway Pressure: Patient Flow, Patient Volume,<br>VENTILATION MODE OPTIONS<br>NIV (Non Invasive Ventilation), PS (Pressure Support) on top of PEEP PSV, PCVR (Pressure Controlled Volume Regulation) PRVC, AutoFlow, AVAPS, Volume Guarantee, HPO & LPO High Pressure Oxygen & Low Pressure Oxygen<br>MEASUREMENTS<br>VT Tidal Volume (in- & exp.) [mand. & spont.], MV Mandatory Volume (in- & exp. & tot.) [mand. & pont.], RR Respiratory Rate [mand. & spont.], Ppeak Peak Pressure (PIP), Pplat Plateau Pressure, PEEP Positive End-Expiratory Pressure, MAP Mean Airway Pressure, FiO2 Fractional Inspired Oxygen, Vleak Leakage volume per breath<br>VENTILATION SETTINGS RANGE<br>VT 2 - 2000 mL , RR 3 - 200 /min, Pinsp, PS Low (Pressure Support) 1 - | No | 2 | | |

Above row 30, continued content:

| | | | Control of holding brakes Yes<br>Advanced automatic control settings Yes<br><br>**OR Equivalent** | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | 90 mbar, Pressure Support 1 - 90 mbar , PEEP 0 - 40 mbar, Insp Flow 5000 - 100000 mL/min for VC with plateau, Ti, Te and Tramp 150 - 30000 ms (Ti & Te ) 60-30000 ms (Tramp) FiO2 21 - 100 Vol.% <br> VENTILATION MANEUVERS <br> Inspiratory Hold Manual start or generation of prolonged inspiration time <br> PERFORMANCE <br> Maximum Pressure 100 mbar at sea level (> 80 mbar at 3000m altitude), Maximum Flow > 220 L/min <br> ADDITIONAL FUNCTIONALITY <br> Distal and Proximal flow and pressure sensor support <br> OTHER RELATED FUNCTIONALITY <br> Proximal patient flow measurement (including purge system), Proximal airway pressure measurement (including purge system), Triggering functionality in all modes on Flow and or Pressure, Leakage compensation up to > 50 L/min, Nebulizer control output (driver for valve), Compensation of compressible volume For Volume controlled modes, Oxygen sensor interface Galv. Analog sensor or paramagnetic digital sensor, System test and calibration functionality, External Safety Valve <br> ADDITIONAL VENTILATION MODES <br> PC-AMV Assisted Manual Ventilation, Neonatal T-piece resuscitation, PC-APRV Pressure controlled - Airway Pressure Release Ventilation, PC-MMV Pressure controlled - Mandatory Minute Ventilation <br> ADDITIONAL VENTILATION MANEUVERS | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | PS High (Pressure Support) PS on top of inspiratory pressure, Recruitment Generate a fixed number of elevated pressure strokes, PPS Proportional Pressure Support, P0.1 measurement figure for weaning purposes, Tube Compensation Automatic Tube Compensation (inspiratory and/or expiratory),Sigh Generate sigh maneuver at set time interval, Expiratory Hold Manual generation of prolonged expiration time ADDITIONAL MEASUREMENTS Flowpeak_insp ,Inspiratory Peak Flow, Flowpeak_exp Expiratory Peak Flow, Pmin_exp Expiratory Minimum Pressure, P0.1 Negative pressure after 100 ms no inspiratory support, RSBI Rapid Shallow Breathing Index, PTP Pressure Time Product, Cstat Static Compliance, Rinsp Inspiratory Resistance, AutoPEEP Intrinsic PEEP, Tracheal Pressure Derived Tracheal Pressure, Advanced software ENVIRONMENTAL OPERATING CONDITIONS Operating temperature -20 - + 55degrees C, Relative air humidity 5 - 95% R.H., Air Pressure 500 - 1100 hPa., Module lifetime expectancy > 30.000 hours At moderate Ventilation level, Noise generation < 40 dB At a pressure of 40 cmH2O, ISO 3744, Pinsp = 20 mbar, PEEP = 5 mbar, Tslope = 200ms, RR = 12 /min at Rp5C20 ELECTRICAL OPERATING CONDITIONS Power Supply Voltage 24V DC ±10%, Peak current up to 5A at 24V max. during 200 ms atmaximum insp. pressure setting, Continuous current up to 2.5A (during insp.) at 24V at maximum inspiratory pressure setting, Nominal Power consumption 5 - 30 VA at 24V depending on Ventilation settings and patient | | | | |

| | | | MODULE PROPERTIES | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Envelope dimensions 120 x 90 x 185 mm (standard) | | | | | |
| | | | Volume < 2L, Module Weight < 850 gram | | | | | |
| | | | **Also include the evaluation kit** | | | | | |
| 31. | | Full Set Hexacopter Drone 6-axle Aircraft Kit 750KV Motor GPS APM 2.8 Flight Control | **Package Must include (minimum):** <br>1XTarot FY690S Full 6 axle Carbon Aircraft Frame 3K Folding Hexacopter 680mm FPV TL68C01 <br>6X750KV Brushless Disk Motor <br>6XHOBBYWING Platinum-30A-Pro 2-6S 30A Speed Controller ESC <br>3X12x5.5 3K Carbon Fiber Propeller <br>1XAPM2.8 APM 2.8 Multicopter Flight Controller 2.5 2.6 Upgraded Built-in Compass <br>1x6M GPS with Compass L5883 25cm Cable <br>5x10cm Servo Extension Lead Wire Cable MALE TO MALE KK MK MWC flight control Board For RC Quadcopter <br>1XDJI GPS Folding Antenna Mount Holder Metal <br>1X8S-5A 5A U-BEC UBEC Input 9-30V 3-8S Lipo battery 8-24Nimh R7 <br>18x3.5mm Bullet Connector ( banana plug ) <br>1xHook & Loop Fastening Tape <br>1xT Plug Male Connector Silicone Wire With 11.5CM 14awg <br>1xIMAX RC B3 Pro Compact Balance Charger <br>1x 11.1V 2200MAH 30C 3S1P battery <br>1XRadioLink AT10 2.4GHz 10CH Remote Control System | No | 4 | | | |
| 32. | | 800*480 FPV Goggles Combo Kit with 32CH RX SpiroNET ANT <br><br>Fatshark Dominator V3 with FSV2442 or equivalent | **Specification (minimum)** <br><br>**Optics** <br>FOV (field of view): 30° diagonal (the same plastic optics as DOMV2) <br>Interpupillary Distance (IPD): 59 to 69 mm (adjustable) <br>Optional Diopter Lens Inserts: -2, -4, -6 dpt <br><br>**Display** <br>800 x 480 WVGA LCD <br>Polarized LED backlight <br>NTCS/PAL auto selecting <br>Side/Side 3D <br>Input HD Port 16:9 | No | 2 | | | |

Video 4:3 horizontally stretched
(Current A/C chip only supports to 720p 50/60 Hz, could be upgraded to 1080p in the future)

**Audio**: Stereo

User Controls
Channel Selection
Volume Control
Mode Selection (Wired/Wireless)
Display Control
DVR Control
HT Control

**Electrical**
Power Supply: 7 - 13 V (2S/3S supply)
Power Consumption: 390mA wireless/ 230mA direct mode (no RX)
(@7.4V nominal)
Driver Board: Using the same as HD's, support Side/Side 3D
RF Modules: Infinite channel support on multiple bands
Head Tracker: Modular (sold separately)
Analog DVR: MicroSD support to 32Gb
Record Rate: 6Mbps (MJPG compression, 30 fps, AVI)
File playback (native recording, no codec support)
Upgradeable via SD card
PAL/NTSC continuous scan auto detect/mode change
Auto save if power removed
DVR stay off when not switched on

**Interface**
3.5mm AV in/out port
Power in port
3.5mm 3p earphone port
MiniDIN4 data port (head tracking)
MicroSD insert slot
RF module port
MiniHD port
Mechanical: Ergonomic molded headset w/ adjustable headband

| | | | Features | | | | |
|---|---|---|---|---|---|---|---|
| | | | The Dominator V3 FPV goggle features an immersive 16:9 widescreen display for compatibility with HD content and HD digital video links. It supports side/side 3D content in (both analog and HD Port) and is NTSC/PAL auto switching. Integrated DVR records your analog footage and has playback function that may assist in lost model recovery. If the power is disconnected or the battery runs flat,the DVR will auto-save any recorded video,preventing a corrupted card or loss of data. Warning: Exposing the lens to direct sunlight will result in LCD damage.<br><br>**Package Included:**<br><br>1 x FPV Goggle<br>1 x 32 channel Race Band receiver<br>1 x FSV Battery and its Case<br>1 x Zipper carry case<br>1 x 3m AV Cable<br>1 x Manual | | | | |
| 33. | | 5G8 5.8GHz Mini FPV Transmitter with antenna<br><br>Team Blacksheep TBS Unify Pro Or equivalent | **SPECIFICATIONS (minimum):**<br>Operating Voltage: 2S - 6S<br>Supply current: 600mA<br>Operating Temperature: watch for normal airflow<br>Audio carrier Frequency: 6.5 MHz<br>Video Input Impedance: 75 Ohm<br>Weight: 5g (with SMA, without antenna)<br>Antenna Connector: SMA Female Socket with screw mounting holes, U.FL to VTx<br>Video Format: NTSC/PAL<br>Output Power: 13dBm (25mW), 23dBm (200mW)<br>Antenna: 5.8G Spironet Antenna | No | 10 | | |
| 34. | | FPV Receiver for UVC OTG Smartphone Android Tablet PC Monitor VR | **Specification (minimum):**<br>Frequency : 5645MHz~5945MHz<br>Resolution : 640*480 30fps<br>Working Current : USB 5V 190mA<br>Connector : RP-SMA | No | 10 | | |

| | | Headset<br><br>Skydroid 5.8Ghz 150CH True Diversity or Equivalent | Working Temp. : -10~65℃<br>Please calibrate it before use<br>Please calibrate it in open area, and keep away from transmitter more than 30m. Long press the menu button and power on receiver, enter into calibration mode. | | | | |
|---|---|---|---|---|---|---|---|
| **35.** | | Mini FPV Camera PAL with MIC Support OSD RunCam Swift 2 600TVL or equivalent | **Specification (minimum):**<br>Image Sensor:1/3" Super HAD II CCD<br>Horizontal Resolution: 600TVL,4:3<br>Lens: 2.5mm 130° / 2.3mm 150°/ 2.1mm 165° (Optional)<br>Signal System: PAL<br>Integrated OSD: YES<br>Integrated MIC: YES<br>S/N Ration>60dB (AGC OFF)<br>Electronic Shutter Speed: PAL:1/50~100,000; NTSC:1/60~100,000<br>AutoGain Control (AGC): YES<br>Back light compensation (BLC): YES<br>Power DC 5 to 36V<br>Net weight    14g<br>Dimensions   28.5mm * 26mm * 26mm | No | 10 | | |
| **36.** | | PC for AI Applications<br><br>ThinkStation 920 Workstation or equivalent | Processor<br> Intel® Xeon® Silver 4110 (2.10GHz, 8 cores, 11MB Cache)<br><br>Operating System<br>Windows 10 Pro for Workstations 64<br><br>Memory<br>8GB DDR4 2666MHz ECC RDIMM<br><br>Graphics<br>NVIDIA Quadro P620 12GB (Mini DPx4)<br><br>Hard Drive<br>1TB Hard Drive, 7200RPM, 3.5", SATA3<br><br>Optical Drive<br>No 1st Optical Drive Selected | No | 4 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | Warranty<br>3 Year On-site<br><br>Network Card<br>2x port Integrated Ethernet<br><br>Keyboard<br>USB Traditional Keyboard Black English<br><br>Pointing Device<br>USB Calliope Mouse Black<br><br>Form Factor<br>Tower 92% Power 1400W<br><br>M.2 Storage Card<br>Upgradable | | | | |
| **37.** | | Heavy Robot Chassis<br><br>T'Rex Tank Chassis<br>Or equivalent | **Specification (minimum):**<br>All-Terrain<br>Anodized Aluminum Body<br>Anodized Zinc Tracks, Struts, and Wheels<br>2x 12V DC motors with all metal gearboxes<br>Motor Specifications:<br>Typical Voltage: 12V<br>No Load Current: 1.3A<br>Typical Current: 4A<br>Stall Current: 11A (Measured using a 3S 5000mAh LiPo battery)<br>70mm (2.75") Clearance with Low Center of Gravity<br>Removable Front and Top Panels with Quick Spring Release<br>355 x 175 x 130mm (14" x 6.8" x 5") | No | 5 | | |
| **38.** | | Hexapod Robot Kit (Hardware Only)<br><br>Lynxmotion T-Hex 3DOF  or equivalent | **Inclusion (minimum):**<br>3x 3DoF T-Hex Leg pairs<br>1x T-Hex body<br>6x servo extender cables | No | 4 | | |

| 39. | | STM32H7 Development Board | Frequency: 400Mhz<br>Package: LQFP100<br>RAM: 1024KB<br>Flash: H750VB: 128KB H743VI: 2048KB (2M)<br>OLED interface – Plug and Play<br>0.96 inch/ 1.3 inch OLED<br>Data storage:  W25Q64 (QPSI driver)<br>High speed crystal: 25 MHz<br>Low frequency crystal: 32.768K<br>Power + Programmable LED Lights<br>2 users and reset button<br>All CPU – IO Leads<br>2.54MM integer double spacing pin | No | 20 | | | |
| 40. | | Sensors Kit | Kit Listing:<br><br>White LED Module   * 1<br>RGB LED Module *1<br>3W LED Module        * 1<br>Traffic Light Module (Black and Eco-friendly) *1<br>Active Buzzer Module *1<br>Passive Buzzer Module *1<br>Digital Push Button Module *1<br>Collision Sensor        *1<br>Line Tracking Sensor *1<br>Infrared Obstacle Avoidance Sensor *1<br>Photo Interrupter Module    * 1<br>Hall Magnetic Sensor *1<br>Knock Sensor Module          *1<br>Digital Tilt Sensor            * 1<br>Capacitive Touch Sensor *1<br>Flame Sensor *1<br>Reed Switch Module *1<br>PIR Motion Sensor      *1<br>Analog Temperature Sensor     *1<br>Analog Rotation Sensor *1<br>Photocell Sensor *1<br>Analog Sound Sensor *1<br>Water Sensor *1 | No | 5 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | Soil Humidity Sensor　*1<br>Analog Gas Sensor *1<br>Analog Alcohol Sensor *1<br>Steam Sensor *1<br>Analog Piezoelectric Ceramic Vibration Sensor　*1<br>Voltage Sensor *1<br>Thin-film Pressure Sensor (Black and Eco-friendly)　*1<br>TEMT6000 Ambient Light Sensor *1<br>GUVA-S12SD 3528 Ultraviolet Sensor *1<br>Digital IR Receiver Module *1<br>Digital IR Transmitter Module　*1<br>Pulse Rate Monitor Module *1<br>Joystick Module　* 1<br>Rotary Encoder Module *1<br>5V Single Relay Module *1<br>LM35 Linear Temperature Sensor　*1<br>DHT11 Temperature and Humidity Sensor *1<br>Magical Light Cup Module *2<br>APDS-9930 Attitude Sensor Module *1<br>ALS Infrared LED Optical Proximity Detection Module *1<br>MMA8452Q Module Triaxial Digital Acceleration Tilt Sensor　* 1<br>keyestudio 9G Servo Motor　*1<br>HC-SR04 Blue Ultrasonic Sensor　*1<br><br>Keyestudio 0802 LCD module 5V blue screen（with backlight）*1<br>keyestudio I2C 8x8 LED Dot Matrix *1 | | | | | |
| 41. | | Google Cloud IoT Development Kit for creating Internet of Things (IoT)<br><br>T4-G-Q-4020 or equivalent | On-board FTDI2232 IC for 4-wire JTAG debugging<br>Various commercial and free IDE options for JTAG debugging and software development<br>Arduino connector to extend kit and add shields<br>Open schematics and layout files<br>Eclipse based IDE for single-step JTAG debugging<br>UART-AT commands to connect T4-G-Q-4020 to MCU/CPU<br>Eight sensors and actuators on-board:<br>Ambient light luminosity<br>3D accelerometer<br>3D gyroscope/rotation<br>3D magnetic field | No | 4 | | |

| | | | | No | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Temperature<br>Humidity<br>Pressure<br>PIR sensor<br>Out-of-box drivers for sensors in demo applications<br>Miscellaneous headers, test-points for power measurement, direct connect to battery, boot-configuration, and other measurements | | | | | |
| 42. | | ARM-based IoT Kit for Cloud IoT Core | **Electronic components (Minimum):**<br>1x Photo Cell<br>2x Breadboard Trim Potentiometer<br>5x 10K 5% 1/4W Resistor<br>5x 560 ohm 5% 1/4W Resistor<br>2x Diffused 10mm Blue LED<br>1x Electrolytic Capacitor - 1.0uF<br>1x Ceramic Capacitor - 0.1uF<br>2x Diffused 10mm Red LED<br>2x Diffused 10mm Green LED<br>3x 12mm Tactile Switches | No | 4 | | | |
| 43. | | Injection Molding Machine | **Technical Specification (minimum):** | No | 1 | | | |

Table within item 43:

| | |
|---|---|
| Power | 0.5kw |
| Shot weight | 20grams |
| Nozzle hole Diameter | 2mm |
| Motor Accuracy | 0.002mm |
| Cooling Type | Water |
| Power source | AC220V |
| Max Mold size | 200*145mm*145mm |
| Heating Band Power | DC36V |
| Material | PC,PS,PP,ABS,TPU |
| Machine Size | 900mm*210mm*350mm |
| Machine weight | 120kgs |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | High accuracy (can make small parts weight<0.01g micro product) (Leading technology) 1): PID temperature control±1℃ 2): Mold clamping accuracy 0.001mm 3): Shot weight accuracy 0.001g 4): Shot peak pressure 1kg High efficiency: 3.5s shaping cycle Traditional hydraulic press: Shot speed: 160~200mm/s Molding cycle :7~10 /s | | | | |
| | | | **Total** | | | | |

**Firm Name:** ＿＿＿＿＿＿＿＿

**Signature:** ＿＿＿＿＿＿＿＿

**Name:** ＿＿＿＿＿＿＿＿

**Designation:** ＿＿＿＿＿＿＿＿

Tender No_____
Name of the Firm _____
Firm Address_____
Date_____
Telephone No_____
E-Mail_____

To,
DD SCM Office
NUTECH University
I-12,  Main IJP Road,
Islamabad.

Dear Sir

1.  I / We hereby offer to supply to the NUTECH University the stores detailed in schedule to the tender inquiry or such portion thereof as you may specify in the acceptance of tender at the price offered against the said schedule and further agree that this offer will remain valid up to 90 days after opening of Financial offer and will not be withdrawn or altered in terms of rates quoted and the conditions already stated therein or on before this date. I / we shall be bound by a communication of acceptance to be dispatched within he prescribed time.

2.  I / we have understood the instructions to Tenders and General Conditions Governing Contract available at NUTECH website and have thoroughly examined the specifications / drawing and / or patterns quoted in the schedule here to and am/are fully aware of the nature of the stores required and my/ our offer is to supply stores strictly in accordance with the requirements.

Yours Faithfully.

(Signature of Tenderer)

Designation

Date:

Individual signing tender and / or other documents connected with a contract must be signed by principal authorized rep/ OEM rep/ Authorized partner firm rep.

## <u>SPECIMEN FOR "ADVANCE PAYMENT BANK GUARANTEE"</u>

Guarantee No: _____Date_____    Amount:_____    Valid upto:_____

In Favour of:

National University of Technology (NUTECH), IJP Road, I-12, Islamabad

 Subject: **Advance Payment Bank Guarantee**

Contract No: _____DATED._____

Dear Sir,

1.    We [Name of Guarantor] understand that you have entered into contract with M/S [Name of Firm] (hereinafter called Our Client), for provision of [Name of Stores]. And as per the above mentioned Contract, you are liable to pay to Our Client an amount of [Amount of Guarantee] in advance, which shall be released against a Bank Guarantee. 2.    Bank & seller firm shall inform your office regarding termination of the validity of this bank Guarantee one clear month before the actual expiry date of this Bank Guarantee.

3.    Now, we hereby irrevocably undertake to immediately make payment on to your orders, merely upon receipt of your first written notice, an amount not exceeding [Amount of Guarantee] that may be claimed by you at your own discretion without it being necessary for you to prove or even assert to the Bank any default whatsoever of Our Client under the Contract.

4.    Claims against this Guarantee shall be lodged on us through written request/s on your proper Letter Head. Unless claims are not presented on or before the Validity Date, all rights and benefits under this guarantee shall be forfeited and we shall be released from all claims, demands or liabilities of any kind whatsoever.

5.    This Guarantee shall remain in force up to the above mentioned Validity Date which can however, be extended upon request of Our Client.

<div align="center">Yours faithfully,</div>

Signature:_____

Name:_____

Designation:_____

Bank Stamp:

**"SPECIMEN FOR BANK GUARANTEE AGAINST PERFORMANCE/WARRANTY GUARANTEE"**

Guarantee No: _____Date_____  Amount:_____  Valid upto:_____

In Favour of:  National University of Technology (NUTECH), IJP Road, I-12, Islamabad

Subject: **In compliance with terms of Performance/Warranty Guarantee Bank Guarantee**

Contract No: _____ dated_____

Dear Sir,

1. Whereas your good-self have entered into Contract No__ dated_with   M/s   [Firm Name] Located at [Firm Address], Herein after referred to as our customer and that one of the conditions of the Contract is submission of Bank Guarantee by our customer to your good-self for a sum of [Amount].

2. Incompliance with this stipulation of subj contract, we hereby agree and undertake as under:-

   a. To pay to you unconditionally on demand and / or without any reference to our Customer an amount not exceeding the sum of [Amount] as would be mentioned in your written Demand Notice.

   b. To keep this Guarantee in force till [Validity Date].

   c. That the validity of this Bank guarantee shall be kept two clear year ahead of the original / extended delivery period or the warrantee of the stores which so ever is later in duration on receipt of information from your office. Our liability under this Bank Guarantee shall cease on the closing of banking hours on the last date of validity of this Bank Guarantee. Claim received there after shall not been entertained by us whether you suffer a loss or not. On receipt of payment under this Guarantee, this documents i.e., Bank Guarantee must be clearly cancelled, discharged and returned to us.

   d. That we shall inform your office regarding termination of the validity of this bank Guarantee on clear month before the actual expiry date of this Bank Guarantee.

   e. That with the consent of our customer you may amend / alter any term / cause of the contractor add / delete any term / clause to / from this contract without making any reference to us. We do not reserve any right to receive any such amendment / alternation or addition / deletion provided such like actions do not increase our monetary liability under this Bank Guarantee which shall be limited only [Amount ................................... ].

   f. That the bank guarantee herein before given shall not be affected by any change in the constitution of the Bank or Customer / Supplier or Vendor.

g. That this is an unconditional Bank guarantee, which shall been cashed on sight on presentation without any reference to our Customer / Supplier or Vendor.

Signature_____

Name_____

Desig_____

Bank Stamp_____

Note: No changes in the above given BG format shall be accepted.

## "SELLER'S WARRANTY CERTIFICATE"
### (To be provided on stamp paper)

Contract No: _____          Dated:

Validity ____ years from the date of final acceptance of the Stores.
We hereby guarantee that we are the genuine and original Source of provisioning the Stores to our Buyer. We also undertake that nothing in the manufacturing of these Stores has been obtained through unauthorized means.

1.    We hereby warrant and undertake that the Stores and all the associated spares/ accessories supplied under the terms and conditions of the above Contract, are:

    a.    brand new, complete in all respects, possessing good quality and standard workmanship; and

    b.    liable for replacement/rectification free of charge, if during the Warranty period the same are found defective before or under normal use or these do not remain within the limits and tolerances stated under the specifications or in any way not in accordance with the terms of this Contract. All expenses incurred in removal, re-provisioning and reinstallation of such defective Stores or their parts shall also be borne by us.

2.    The Warranty shall remain valid for a period of ____ years from the date of final acceptance of the Stores.

Signature & Stamp  _____

_____

Name & CNIC  _____

_____

Designation:  _____
Date:  _____

    **Sellers warranty must be provided by the Seller (firm) on Rs 100 stamp paper along with bank guarantee/CDR/Pay Order without changing a word. BG with additional clauses will be rejected.

**CHECK LIST**

**(This checked list must be attached with your technical offer, duly filled and**

**Signed by authorized signatory)**

**Tender No_____**                                     **Date_____**

| 1 | Tender Processing Fee | a. Tender processing fee ref no_____<br>b. Bank_____<br>c. Amount_____ | | |
|---|---|---|---|---|
| 2 | EM/ Bid Bond | a. EM/ Bid Bond ref no_____<br>b. Bank _____ | | |
| 3 | Form Annex A, A-1, B and C signed by Authorized Signatory | **Yes** | | **No** |
| 4 | Offering specification of items as per IT | **Yes** | | **No** |
| 5 | Quoted Currency as per IT | **Yes** | | **No** |
| 6 | Accounting unit/Qty as per IT | **Yes** | | **No** |
| 7 | Delivery Schedule as per IT | **Yes** | | **No** |
| 8 | Country of origin of store_____ | | | |
| 9 | Name of OEM:-_____ | | | |
| 10 | Original Performa invoice (Mandatory) | **Yes** | | **No** |
| 11 | Certified that there is no Deviation from IT conditions/ there is deviation from IT condition as per fol details | **Yes** | | **No** |
| 12 | Blacklisting certificate. | **Yes** | | **No** |
| 13 | Verifiable OEM Certificate | **Yes** | | **No** |
| 14 | Warranty Period as per IT | **Yes** | | **No** |
| 15 | ATPs provided | **Yes** | | **No** |

Note: Fill and/or mark Yes/No where required

_____

Signature of Firm Auth Signatory