



**Al-Khawarizmi Institute of Computer Science
University of Engineering and Technology, Lahore**

**REQUEST FOR PROPOSALS
Re-Tender**

PROCUREMENT OF “AI CENTER”

(FOR Basis)

Estimated Price Rs. 17 Million

TENDER PRICE - Rs. 2000/-

Late date of submission: March 15th, 2021 till 09:30 AM

FOR OFFICE USE ONLY

Serial No. _____

Sold to:- M/S _____

Date of Sale _____ Bank Challan No. _____ Date _____



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TERMS AND CONDITIONS

OVERVIEW

KICS, UET, Lahore intends to purchase the equipment and other required items. The supplier will be responsible for delivery, installation (if required), wherever required in KICS, UET, LAHORE.

1. Proposal instructions (for BOQs in FOR)

- 1.1 Single stage / two envelope bidding procedure shall be applied in response to the RFP (Request for proposal). Each bid envelop shall comprise two envelope containing, separately, financial proposal and technical proposal (if any) plus “legible documents”. The financials of bids found technically non responsive shall be returned unopened to the respective bidders.
- 1.2 Responding organizations shall deliver two sealed copies “one original and one photo copy” of the “FINANCIAL & TECHNICAL PROPOSAL” till March 15th 2021 up till 09:30 am, each copy being physically separate, bound, sealed and labeled. Proposals will not be accepted after the due time & date. Proposal shall be delivered at the address given below before time.

DIRECTOR KICS,
UNIVERSITY OF ENGINEERING AND TECHNOLOGY (UET),
LAHORE. PHONE: (042)-99250247

- 1.3 Proposals received after the submission deadline will not be entertained under any circumstances and will be returned unopened to the submitting vendor. It is the sole responsibility of the participating vendor to ensure that the proposals are delivered before the deadline.

Any queries regarding this proposal should be directed to the designated contact person listed below:

For Details:

Mr. Hammad Ali Butt
Manager Procurement & Admin

Contact Number # 0322 4053424
Contact Number # 042 99250247



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- 1.4 Price should be mentioned on FOR basis.
- 1.5 The prices must be quoted item wise, in the same sequence given in the specification part of the tender document.
- 1.6 The original Request for Proposal documents duly signed and officially sealed by the bidder must be submitted in whole with the proposals. Any conditional, ambiguous, incomplete, supplementary or revised offer after the opening of Bidding shall not be entertained.
- 1.7 Any overwriting/crossing, etc. appearing in the offer may be properly signed by the person signing the Bidding. All pages of the Bidding must be properly signed. Offer with any overwriting and discrepancy shall not be accepted in any circumstances.
- 1.8 Warranty for all equipment's, as approved by the manufacturers/suppliers, should not be less than one year Labor and Service on site.
- 1.9 A call deposit equal to 5% of the estimated bid price (**mentioned in the tender**) should accompany the bidding document as **Earnest Money** drawn in favor of **Treasurer UET, Lahore**. The bidding document shall not be considered without Earnest Money. Bank guarantee will not be accepted. The earnest money will be released after signing the Agreement.
- 1.10 The Successful Bidder's bill will be deducted at a rate of 10% of the contract amount as **Performance Guarantee / Security Deposit**. The **Performance Guarantee / Security Deposit** will be returned after successful completion of Defect Liability/ Warranty Period, after repairing the defects in the equipment/ replacement found during the warranty period for FOR.
- 1.11 The Successful Bidder will deposit a blank stamp paper of value of 0.25% of the total offer/contract amount, purchased in the name of Director KICS (UET), Lahore.
- 1.12 Bidders are **allowed to submit Bids in partial.**
- 1.13 The quantity of an order may vary depending on the quoted prices and the allocated funds.



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- 1.14 The decision of the committee will be a binding on all concerned and can be appealed in the grievance committee.
- 1.15 KICS, UET, Lahore reserves the right to modify the conditions / specifications of the Bidding Document with written intimation to all the participants those who have purchased the Bidding Documents.
- 1.16 Delivery period will be (30) days from the date of issuance of purchase order/supply order.
- 1.17 Delivery, Installation and Training (where mentioned) be completed according to the agreed upon schedule of works.
- 1.18 In case the Bidders fails to execute the contract strictly in accordance with the terms and conditions laid down in the contract, the Security Deposit shall be forfeited and the equipment will be purchased at his own risk and expenses.
- 1.19 The equipment will be inspected at KICS, UET, LAHORE, and may get rejected if not found in accordance to the stated specifications.
- 1.20 KICS, UET, Lahore reserves the right to claim compensation for the losses caused by delay in the delivery of equipment i.e., 1% of contract amount on weekly basis.
- 1.21 It is the sole responsibility of the vendor to comply with local, national and international laws.
- 1.22 Successful bidders may be asked to bring their supplies for demonstration and specification test in the KICS, UET, LAHORE, at their own expenses and risk.
- 1.23 Where reference is made to any specific national or international standards, equal or higher quality will also be acceptable. In case, your offer conforms to standards other than quoted in the Bidding inquiry you are required to submit the followings along with your bid.
 - One copy of those standards in English
 - Evidence that the standards used is recognized and authoritative to ensure equal or higher quality.



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In case the bidder does not submit the required evidence and a copy of each of the standards, its Bid may not be considered.

- 1.24 In case any supplies/material is found not in conformity with the specifications provided in the Bidding, either on account of inferior quality, defective workmanship, faulty design, faulty packing or is short supplied, or wrongly supplied, the supplier will replace the same free of charges or pay the full cost of replacement.
- 1.25 The all proposals submitted will become the property of the University.
- 1.26 Possessing/Providing Dealership Certificate.

2. Evaluation Criteria

All bids shall be evaluated on technical and financial responsiveness.

Technical evaluation process may include, but not limited to the consideration of the following with respect to the functional requirements given ahead:

- 2.1. Technical specifications of proposed equipment's
- 2.2. Best warranty of the equipment

Financial Evaluation process may include, but not limited to the consideration of the following:

- 2.3 Quoted price
- 2.4 CDR (5% of estimated price mentioned in the tender)

3 Required Information

Bidders are required to include the following documents/information in their technical proposals (all documents should be duly signed and stamped)

- i. The Name and Address
- ii. Profile of company (Including Financial Profile)
- iii. List of Previous/Current customer of related equipment's, with contact person and telephone/fax#
- iv. Detailed product information/brochures
- v. Detailed product warranty/guarantee information



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- vi. Attested copy of National Tax Registration Certificate
- vii. Attested copy of Sales Tax Registration Certificate
- viii. Detailed backup support plan
- ix. Bank letter of financial standing
- x. An Affidavit on Rs.100/- Stamp paper that currently they are not black listed or debarred by any Government/Semi Government department to participate in bidding and to supply equipment. Failure to submit such affidavit may lead to disqualification.
- xi. Any additional information the bidder may like to furnish e.g. repair/maintenance workshop owned by supplier and other concerned facility
- xii. Dealership Certificate.

In addition to the above, the proposal must include the following in the order given below:

- i. Detailed equipment specifications, proposed quantities duly filled on the Performa attached with this document
- ii. Detailed project implementation schedule which includes the delivery of equipment
- iii. Terms and Conditions
- iv. Equipment prices (FOR) duly entered.
- v. Validity period of the quoted price, i.e. 60 days
- vi. Educational discounts if available/applied to the quoted price

4 Terms and Conditions (FOR Basis)

- 4.1 All prices should be in PAK rupees exclusive of Taxes. GST and /or other Tax amount where applicable should be mentioned in separate column(s) and the total given in a separate column.



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- 4.2 All prices should be valid for at least 60 days. Withdrawal or any modification of the original offer within the validity period shall entitle KICS, UET, LAHORE to forfeit the earnest money in favor of the KICS, UET, LAHORE and/or putting a ban on the future inquires or taking any other suitable action against the bidder.
- 4.3 Delivery of the items will be free of charge at the KICS, UET, LAHORE during the office hours with a copy of delivery challan.
- 4.4 Items being ordered should be brand new and according to order specification from the current production and covered under normal warranty/guarantee etc. as mentioned in the proposal. Brochures of the product details must be attached.

Name of Vendor.....

Authorized person.....

Authorized Signature.....

Stamp.....

Office address.....

Tel No.....

Fax No.....

(The filled in Bidding Document should be forwarded to KICS, UET, Lahore with covering letter).



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Technical Specifications (Equivalent Or Higher) FOR BASIS

Sr . #	Specification	Amount Rs
1	Procurement for AI Center	Rs. 17 Million

Estimated Price Rs. 17 Million

Technical Specification (Equivalent or Higher)

Sr. No	Description	Amount in Million (PKRs)	Quantity	Technical Specification	Description
1	VOIP Router and Recorder	0.2	3	VOIP Router: 1. Dual Gigabit Ethernet WAN ports for failover and load-balancing 2. Two USB 2.0 ports for connection to Two 3G/4G LTE USB modems, FTP server and network printer 3. Fifty VPN tunnels with comprehensive secure protocols 4. Advanced VPN load-balancing and site-to-site backup functions 5. Integrated IEEE 802.11ac wireless Access Point; dual band; up to 1300Mbps throughput 6. Supports Central Management system for multi-site deployment 7. VoIP (2 x FXS and 1 x FXO Line Port) 8. Object-based Firewall and CSM (Content Security Management) for network security 9. Multiple VLANs provide secure and efficient workgroup management 10. Five Gigabit LAN ports with multiple subnets 11. Embedded Central VPN Management for 8 remote Vigor routers 12. Embedded Central AP Management for Vigor wireless Access Points	For call recording and monitoring and for the voice analysis
2	High Quality Large Display Screens	0.35	10	32" LED TV 1080p	For display of video data and live streams.
3	Tablets for Testing	0.3	1,1	1. Android Tab or equivalent <ul style="list-style-type: none"> ● Android 7.0 ● Processor ● Processor Speed, Type ● Quad Core(2.15 GHz + 1.6 GHz Quad), Qualcomm APQ8096 ● Wi-Fi yes ● Weight: 0.95 lbs ● Product Dimensions (inches) 	For testing of different applications

				<ul style="list-style-type: none"> ● 9.34" x 6.65" x 0.24" ● Camera resolution (Front): 5MP FF ● Camera resolution (Rear): 13MP AF with Flash ● Digital Optical Zoom X8 (Digital) ● F1.9 (Rear) / F2.2 (Front) ● Battery Type and Size:Li-Ion 6000mAh ● ENERGY STAR® Certified: Yes ● ● Internal Memory: 4GB(RAM) + 32 GB ● External Memory/microSD™ Capacity: microSD up to 400GB ● USB Type-C (3.1) ● Bluetooth v4.2 ● Bluetooth Profiles:A2DP,AVRCP,DI,HFP,HID,HOGP,HSP,MAP,OPP,PAN,PBAP ● Earjack:3.5mm Stereo ● Wi-Fi Direct:Yes ● Display: Main Display Resolution 2048 x 1536 (QXGA) ● Main Display Size: 9.7" ● Main Display Technology: Super AMOLED ● S Pen Support: Yes (Included) ● Audio Streaming, Music Player ● Audio Playing Format: MP3,M4A,3GA,AAC,OGG,OGA,WAV,WMA,AMR,AWB,FLAC,MID,MIDI,XMF,MXMF,IMY,RTTTL,RTX,OTA ● Speaker: Quad Speakers (DSL Type 1709 3.0t) ● Video Streaming, Video Player ● Video Playing Format: MP4, M4V, 3GP, 3G2, WMV, ASF,AVI,FLV,MKV,WEBM ● Sensor Type: Accelerometer,Fingerprint Sensor,Gyro Sensor,Geomagnetic Sensor,Hall Sensor,RGB Light Sensor ● Power Adapter <p>2. Tablet (Apple 8th gen or equivalent)</p> <ul style="list-style-type: none"> ● Technology GSM / CDMA / HSPA / EVDO / LTE ● Dimensions 240 x 169.5 x 7.5 mm (9.45 x 6.67 x 0.30 in) ● Weight 469 g (Wi-Fi) / 478 g (LTE) (1.05 lb) 	
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				<ul style="list-style-type: none"> ● Front glass, aluminum body ● Nano-SIM/ Electronic SIM card (Apple e-SIM) ● - Stylus support ● LED-backlit IPS LCD, capacitive touchscreen, 16M colors ● Size 9.7 inches, 291.4 cm² (~71.6% screen-to-body ratio) ● Resolution 1536 x 2048 pixels, 4:3 ratio (~264 ppi density) ● Multitouch: Yes ● Protection: Scratch-resistant glass, oleophobic coating ● OS: iOS 11.3 ● Chipset: Apple A10 Fusion ● CPU:Quad-core 2.34 GHz (2x Hurricane + 2x Zephyr) ● GPU:PowerVR Series7XT Plus (six-core graphics) ● Internal 32 GB RAM ● CAMERA Primary 8 MP (f/2.4, 31mm, 1.12 μm), autofocus Geo-tagging, touch focus, face/smile detection, HDR (photo/panorama) ● Video 1080p@30fps, 720p@120fps, HDR, stereo sound rec. Secondary 1.2 MP (f/2.2, 31mm), 720p@30fps, face detection, HDR, FaceTime over Wi-Fi or Cellular ● Loudspeaker Yes, with stereo speakers 3.5mm jack - Active noise cancellation with dedicated mic ● WLAN Wi-Fi 802.11 a/b/g/n/ac, dual-band, hotspot Bluetooth 4.2, A2DP, EDR, LE ● GPS Yes, with A-GPS, GLONASS (Wi Fi + Cellular model only) ● USB 2.0, proprietary reversible connector ● Sensors Fingerprint (front-mounted), accelerometer, gyro, compass, barometer ● iMessage, Email, Push Email, IM, Browser ● HTML5 (Safari)- Siri natural language commands and dictation - iCloud cloud service - MP3/WAV/AAX+/AIFF/Apple Lossless player - MP4/H.264 player - Audio/video/photo editor - Document editor ● Non-removable Li-Ion battery (32.4 Wh) ● Talk time Up to 10 h (multimedia) 	
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4	Smartphones for Testing	0.5	2,3	<p>Smartphone (Apple or equivalent)</p> <ul style="list-style-type: none"> a. Technology GSM / HSPA / LTE b. Dimensions 143.6 x 70.9 x 7.7 mm (5.65 x 2.79 x 0.30 in) c. Weight 174 g (6.14 oz) Build d. Front/back glass, stainless steel frame e. SIM Nano-SIM f. - IP67 certified - dust/water resistant (up to 1m for 30 mins) g. Super AMOLED capacitive touchscreen, 16M colors h. Size 5.8 inches, 84.4 cm² (~82.9% screen-to-body ratio) i. Resolution 1125 x 2436 pixels, 19.5:9 ratio (~458 ppi density) j. Multitouch Yes k. Protection Scratch-resistant glass, oleophobic coating l. - Dolby Vision/HDR10 compliant m. - Wide color gamut display n. - 3D Touch display o. - True-tone display p. OS iOS 11.1.1, upgradable to iOS 11.3 q. Chipset Apple A11 Bionic CPU Hexa-core 2.39 GHz (2x Monsoon + 4x Mistral) r. GPU Apple GPU (three-core graphics) s. Internal 64/256 GB, 3 GB RAM t. Primary Dual: 12 MP (f/1.8, 28mm) + 12 MP (f/2.4, 52mm), OIS, phase detection autofocus, 2x optical zoom, quad-LED dual-tone flash, check quality Geo-tagging, simultaneous 4K video and 8MP image recording, touch focus, face/smile detection, HDR (photo/panorama) Video 2160p@24/30/60fps, 1080p@30/60/120/240fps, check quality Secondary 7 MP (f/2.2, 32mm), 1080p@30fps, 720p@240fps, face detection, HDR u. SOUND Alert types v. Vibration, proprietary ringtones w. Loudspeaker Yes, with stereo speakers x. - Active noise cancellation with dedicated mic y. - Lightning to 3.5 mm headphone jack adapter z. WLAN Wi-Fi 802.11 a/b/g/n/ac, dual-band, hotspot Bluetooth 5.0, A2DP, LE aa. GPS Yes, with A-GPS, GLONASS, GALILEO, QZSS 	For Testing of different application
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				<p>bb. NFC Yes</p> <p>cc. USB 2.0, proprietary reversible connector</p> <p>dd. Sensors Face ID, accelerometer, gyro, proximity, compass, barometer</p> <p>ee. iMessage, SMS(threaded view), MMS, Email, Push Email</p> <p>ff. Browser HTML5 (Safari)</p> <p>gg. - Fast battery charging: 50% in 30 min</p> <p>hh. - Qi wireless charging</p> <p>ii. - Siri natural language commands and dictation</p> <p>jj. - iCloud cloud service</p> <p>kk. - MP3/WAV/AAX+/AIFF/Apple Lossless player</p> <p>ll. - MP4/H.265 player</p> <p>mm. - Audio/video/photo editor</p> <p>nn. - Document editor</p> <p>oo. Non-removable Li-Ion 2716 mAh battery (10.35 Wh)</p> <p>pp. Talk time Up to 21 h (3G)</p> <p>qq. Music play Up to 60 h</p> <p>rr. Display Contrast ratio: Infinity (nominal), 5.013 (sunlight)</p> <p>ss. Loudspeaker Voice 68dB / Noise 74dB / Ring 76dB</p> <p>tt. Audio quality Noise -93.7dB / Crosstalk -82.8dB</p> <p>uu. Battery life Endurance rating 74h</p> <p>Smartphone (Android or equivalent)</p> <ul style="list-style-type: none"> ○ Technology GSM / HSPA / LTE ○ Dimensions 162.5 x 74.8 x 8.6 mm (6.40 x 2.94 x 0.34 in) ○ Weight 195 g (6.88 oz) ○ Build Front/back glass (Gorilla Glass 5), aluminum frame ○ SIM Single SIM (Nano-SIM) or Hybrid Dual SIM (Nano-SIM, dual stand-by) ○ - Samsung Pay (Visa, MasterCard certified) ○ - IP68 certified - dust/water proof (up to 1.5m for 30 mins) ○ - Stylus ○ Display Super AMOLED capacitive touchscreen, 16M colors ○ Size 6.3 inches, 101.1 cm² (~83.2% screen-to-body ratio) ○ Resolution 1440 x 2960 pixels, 18.5:9 ratio (~521 ppi density) ○ Multitouch Yes 	
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				<ul style="list-style-type: none"> ○ Protection Corning Gorilla Glass 5 ○ - HDR10 compliant ○ - 3D Touch (home button only) ○ - Always-on display ○ OS Android 7.1.1 (Nougat), upgradable to Android 8.0 (Oreo) ○ Chipset Exynos 8895 Octa - EMEA ○ Qualcomm MSM8998 Snapdragon 835 - USA & China ○ CPU Octa-core (4x2.3 GHz Mongoose M2 & 4x1.7 GHz Cortex-A53) - EMEA or Octa-core (4x2.35 GHz Kryo & 4x1.9 GHz Kryo) - USA & China ○ GPU Mali-G71 MP20 - EMEA or Adreno 540 - USA & China ○ MEMORY Card slot microSD, up to 256 GB (uses SIM 2 slot) - dual SIM model only ○ Internal 64GB, 6 GB RAM ○ CAMERA Primary Dual: 12 MP (f/1.7, 26mm, 1/2.5", 1.4 μm, Dual Pixel PDAF) + 12MP (f/2.4, 52mm, 1/3.6", 1 μm, AF), OIS, phase detection autofocus, 2x optical zoom, LED flash, check quality Geo-tagging, simultaneous 4K video and 9MP image recording, touch focus, face/smile detection, Auto HDR, panorama 2160p@30fps, 1080p@60fps, 720p@240fps, HDR, dual-video rec., check quality Secondary 8 MP (f/1.7, 25mm, 1/3.6", 1.22 μm), autofocus, 1440p@30fps, dual video call, Auto HDR ○ SOUND Alert types Vibration; MP3, WAV ringtones ○ Loudspeaker Yes 3.5mm jack ○ - 32-bit/384kHz audio ○ - Active noise cancellation with dedicated mic ○ Wi-Fi 802.11 a/b/g/n/ac, dual-band, Wi-Fi Direct, hotspot ○ Bluetooth 5.0, A2DP, LE, aptX ○ GPS Yes, with A-GPS, GLONASS, BDS, GALILEO ○ NFC Yes ○ USB 3.1, Type-C 1.0 reversible connector ○ Sensors Iris scanner, fingerprint (rear-mounted), accelerometer, gyro, proximity, compass, barometer, heart rate, SpO2 ○ Messaging SMS(threaded view), MMS, Email, Push Email, IM ○ Browser ○ BATTERY Non-removable Li-Ion 3300 mAh battery 	
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				<ul style="list-style-type: none"> ○ Talk time Up to 22 h (3G) ○ Music play Up to 74 h ○ Display Contrast ratio: Infinite (nominal), 4.148(sunlight) ○ Loudspeaker Voice 67dB / Noise 69dB / Ring 71dB ○ Audio quality Noise -92.5dB / Crosstalk -93.2dB 	
5	Sound Producing equipment High Quality	0.15	1	<p>General Features</p> <p>POWER OUTPUT 1000W</p> <p>BLUETOOTH Yes</p> <ul style="list-style-type: none"> ● 1080P UPSCALER Yes ● SLEEP Yes ● SCREEN SAVER Yes ● AUTO POWER OFF (AUTO STAND-BY)Yes ● Video / Audio / Photo Playback ● DVD Yes ● CD Yes ● USB FILE SYSTEM (FAT32, NTFS) Yes(FAT12/16/32) ● Audio Decoding ● LPCM (2CH / 5.1CH / 7.1CH) LPCM (2ch) ● DOLBY® DIGITAL Yes ● DOLBY® PROLOGIC Yes 	For producing and analysis of voice, call and audio etc

6	Pen Tablets	0.5	1, 1, 2	<p>Pen Tablet (Apple or equivalent)</p> <ul style="list-style-type: none"> ● 2.8GHz quad-core 7th-generation Intel Core i7 processor ● Turbo Boost up to 3.8GHz ● 16GB 2133MHz LPDDR3 memory ● 256GB SSD storage1 ● Radeon Pro 555 with 2GB memory ● Four Thunderbolt 3 ports ● Touch Bar and Touch ID ● Battery and Power: Up to 10 hours wireless web ● Up to 10 hours iTunes movie playback ● Up to 30 days of standby time ● Built-in 76.0-watt-hour lithium-polymer battery ● 87W USB-C Power Adapter <p>Pen Tablet (Android or equivalent)</p> <ul style="list-style-type: none"> ● Up to 8th Generation Intel® Core™ i7-8550U Processor (1.80GHz 8MB) ● 7th Generation Intel® Core™ i7-7500U Processor (2.70GHz 4MB) ● Operating System Windows 10 Home ● Display ? 15.6" FHD (1920 x 1080) IPS Anti-Glare Multitouch with integrated camera ● Graphics ● Intel® UHD Graphics 620 ● Intel® HD Graphics 620 ● Camera HD 720p ● Memory ? Up to 16GB DDR4 2133 MHz ● Storage ? ● Up to 1TB 5400 RPM ● Up to 512GB PCIe SSD ● Battery FHD Models: Up to 10.5 hours ● Active Pen No Active Pen ● Audio ● Harman speaker ● Dolby® Audio Premium ● Security Fingerprint reader with Windows Hello ● Ports 	For Software development and testing purpose
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				<ul style="list-style-type: none"> ● 2 x USB 3.0 (1 x charger) ● USB Type-C ● Card reader ● HDMI ● Audio jack ● WiFi ? 802.11 AC (2 x 2) WiFi + Bluetooth® 4.1 ● Dimensions 14.3" x 9.8" x 0.8" / 365 x 250 x 20.8 (mm) ● Weight Starting at 4.4 lbs (2 kg) ● Colors Black <p>Pen Tablet (Wacom Cintiq Pro or Equivalent)</p> <ul style="list-style-type: none"> ● Screen size: 13.3 in (33.8 cm) (diagonal) ● Size: 360 x 235 x 13.9mm (14.2 x 9.3 x .55 in) ● Color performance: 16.7 million colors; 87% Adobe RGB ● Resolution: Full HD (1920 x 1080) ● Pen pressure levels: 8192 ● Pen tilt ● ExpressKeys™: 17 on optional ExpressKey Remote ● Multi-touch: yes ● Pen stand ● Integrated pop-out legs for 20 degree angle ● 3 position optional adjustable stand ● Compact slim design 	
7	Multimedia Projectors 3D	0.2	1	<ul style="list-style-type: none"> ● Full HD 3D Projector 2500 Lumens 	Required for Presentations and applications demonstration
8	Xbox and Kinect for testing	0.1	1	<p>Xbox One-X or equivalent</p> <ul style="list-style-type: none"> ● 2.3GHz 8 Core CPU ● 12GB DDR5 RAM @ 326 GB/s ● 1TB HDD ● 4k UHD Blu-ray Display ● 2160p @ 60Hz HDMI resolution ● Kinect 2.0 or equivalent 	Required for motion sensing and depth processing

9	Laptops/Desktops for development	1.5	12, 1	<ul style="list-style-type: none"> • Processor: Intel® Core™ i7-7700K with intel HD Graphics 630 (4.2 GHZ, 8 MB Cache, 4 Cores) • Chipset: Intel® B250 • Memory: 16GB DDR4-2400 SDRAM • Graphics: Integrated Intel HD Graphics • Internal Storage: 1TB SATA 7200RPM (System should be capable of RAID Configuration) • Audio: Integrated with combo microphone / headphone jack, line in and line out rear port (3.5mm), Internal speaker • Port and connectors: as per manufacturer default • Communication: 1 x 10/100/1000 Gigabit Ethernet • Wireless LAN: Intel ® 802. 11ac wireless with bluetooth® M.2 Combo Card • Power Supply: Manufacturer standard Power Supply • Mouse and Keyboard: Manufacturer Standard USB Keyboard and USB Optical Mouse • Form Factor: Tower • Operating System: DOS /Open Source Supportive <p>Laptop (Apple or Equivalent)</p> <ul style="list-style-type: none"> • Operating System MAC OS X • Screen Size 13.3” • Touchscreen No • Screen Resolution 1440 x 900 • Processor Type Intel Core i5 6th Gen • Processor Speed 1.8 GHz • Processor Turbo upto 2.9 GHz • Processor Cache 3MB • Processor Model Info n/a • RAM 8GB • RAM Type LPDDR3 • Hard Disk Capacity 128GBSSD • HDD Interface SSD • HDD RPM Info n/a • Graphic Intel Integrated Graphics • Graphics Detail intel HD Graphics 6000 	For resources who will work for development
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				<ul style="list-style-type: none"> • Video Memory Shared • Optical Drive No Optical Drive • USB Ports: 2 ports • Bluetooth: Yes • Backlit Keyboard: Yes • WebCam: Yes • HDMI: No • WIFI: Yes • Numeric Pad: No • Fingerprint Reader: NO • Battery Capcaity: Info n/a • Warranty 1 Year local + International watt 	
10	Cameras for surveillance	0.2	6	<ul style="list-style-type: none"> • Weatherproof • built-in speaker and microphone • Compatible with Amazon Alexa. • records in crisp 1080p HD • 130° wide-angle view • Phone and email alerts with snapshots when Nest Cam Outdoor detects activity • Weatherproof camera, cable and adapter • Talk and listen with the built-in speaker and microphone 	For recording videos and making our own datasets
11	Thermal Imaging Cameras	0.25	1	<ul style="list-style-type: none"> • Provides high-quality thermography in tough working conditions. • Thermal imager can be conveniently transported • IR resolution of 160 x 120 pixels, via integrated testo • SuperResolution Technology 320 x 240 pixels • Visualizing temperature differences from 0.12°C 	For recording videos and making our own datasets
12	Spying Cameras and recorders	0.1	3	<ul style="list-style-type: none"> • 1 Spy Pen, and 2 watch camera • Video Recording • Take Photos • Motion Detection • Loop Recording • Clear And Sharp Still in Low illumination 	For recording videos and making our own datasets

				<ul style="list-style-type: none"> ● Choose The Night View ● 2K HD Video In Dim Background ● Working Well In illumination Of Over 0.1 	
13	Night vision cameras	0.2	1	<ul style="list-style-type: none"> ● Starlight technology ● 1080P @ 30 FPS; 1920 × 1080 ● Detect: up to 125 ft ● Recognize: up to 75 ft ● Identify: up to 50 ft ● Alarm Input and Output ● Audio Input and Output ● Micro-SD Card Slot ● Temperature rated from -40°F to 140 °F ● Humidity rated between 10 and 95% 	For recording videos and making our own datasets
14	IRIS Scanning equipment	0.4	<ol style="list-style-type: none"> 1 2 2 1 	<ol style="list-style-type: none"> 1) CMITech BMT-20 or equivalent <ul style="list-style-type: none"> ● Dimensions:210 x 161 x 58 mm (8.6 x 6.3 x 2.3 inches) ● Image output: Meets or exceeds ISO 19794-6 ● MTF/spatial resolution: Exceeds 4.0 Ip/mm @ > 60% contrast ● Iris image pixel resolution: 640 x 480 pixels, 8 bits. Supports multiple formats ● Operational path distance: 350 to 380 mm ● Depth of field: 30 mm (1.2 inches) ● Inter-pupillary distance covered: 40 to 90 mm (1.6 to 3.5 inches) ● Time of capture: About 1.0 second, from time of head placement ● IR illumination for iris imaging Dual LED: wavelengths of 850 nm nominal (about 50%); and 750 nm nominal (about 50%) ● Internal LED for pupil contraction: Broadband visible (white) 2) IriShield-USB MO 2121 or equivalent <ul style="list-style-type: none"> ● Mode= Auto capture ● Capture Distance= 14 cm - 15 cm (5.5 inches -5.9 inches) from the front of camera Lens ● (Optimal distance = 14.5 cm (5.7 inches), Focal depth = 1.0 cm (0.4 inch), ● Field of View = 3.3 cm x 2.4 cm at 15 cm (1.3 inches x 0.9 inch at 5.9 inches) ● Image Format: ISO Standard 19794-6 (2005 & 2011), (640 x 480 Pixels, 8 bit Grayscale), full support of K1, K2, K3, K7 ● Sensor Resolution: VGA ● Illumination: Infrared LED ● Usage: Indoor; Outdoor (avoid direct sunlight and bright reflections) 	For Unique Impression recording and processing and making our own datasets

				<ul style="list-style-type: none"> ● Compliance & Certificates :Eye safety standard (IEC 62471:2006-07), RoHS ● FCC-Class A* , IP54* ● Resolution: Spatial $\geq 60\%$ @ 4.0 Lp/mm, Pixel : ≥ 16 Pixels/mm ● Connectivity: USB 2.0 ● Product package: Chip & Camera set, Module, Encased ● Security: PKI (2048-bit) and AES (256-bit); X509 Certificate, PFX/PKCS#12 Certificate , RSA key pair generated on-board ● Ancillary SW: Demo Application, Drivers, SDK (C/C++, .NET C#/VB, Java) with Sample codes ● Host OS: Windows Family, Linux Family, WinCE, Embedded Linux, and Android <p>3) IriShield-USB MK 2120U Iris Scanner or equivalent</p> <ul style="list-style-type: none"> ● Mode= Auto capture ● Capture Distance= 4.7 cm - 5.3 cm (1.8 inches -2.1 inches) from the image sensor ● Image Format: ISO Standard 19794-6 (2005 & 2011), (640 x 480 Pixels, 8 bit Grayscale), full support of K1, K2, K3, K7 ● Sensor Resolution: VGA ● Illumination: Infrared LED ● Usage: Indoor; Outdoor (avoid direct sunlight and bright reflections) ● Compliance & Certificates: Eye safety standard (IEC 62471:2006-07), RoHS ● FCC-Class A* , IP54* ● Resolution: Spatial $\geq 60\%$ @ 4.0 Lp/mm, Pixel : ≥ 16 Pixels/mm ● Connectivity: USB 2.0 ● Product package: Chip & Camera set, Module, Encased ● Security: PKI (2048-bit) and AES (256-bit); X509 Certificate, PFX/PKCS#12 Certificate , RSA key pair generated on-board ● Ancillary SW: Demo Application, Drivers, SDK (C/C++, .NET C#/VB, Java) with Sample codes ● Host OS: Windows Family, Linux Family, WinCE, Embedded Linux, and Android <p>4) EyeLock MyRis or equivalent</p> <ul style="list-style-type: none"> ● Unit Dimensions (Diameter x Depth): 3.0” (7.8 cm) x 1.18” (3 cm) ● Weight: 3.2oz (90.71 g) ● Power Input / Consumption: USB 2.0 (5VDC - 2.5W max) ● Standoff Distance: 8.5” (21.59 cm) ● Vertical Capture Range: 6.5” (16.25 cm) ● Horizontal Capture Range: 4.9” (12.44 cm) 	
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				<ul style="list-style-type: none"> • Operating Temperature: 32°F-104°F (0°C-40°C) • Humidity: Up to 85% non-condensing • Communications: USB 	
15	Palm Scanning equipment	0.3	4	Palm Scanner with Shell <ul style="list-style-type: none"> • Advanced biometric authentication algorithm delivers ultra-low FAR (false accept rate) and FRR (false reject rate) • Contactless palm vein authentication is hygienic and noninvasive - No Residual Trace Technology • Encrypted repository for template storage & enterprise level event logging capability • PalmSecure Authentication recognized by leading International Security Bodies, including International Common Criteria and CNIL • Fast and easy registration with virtually no enrollment error. 	For dataset generation
16	Development boards	0.2	5	Jetson Nano <ol style="list-style-type: none"> 1. 4GB Ram 	Embedded System Development
17	FPGA Development Kit	0.3	<ol style="list-style-type: none"> 1) 2 2) 3 3) 5 4) 3 5) 5 	FPGA Dev Kits <ol style="list-style-type: none"> 1) Intel Cyclone 10 LP Chip 2) Intel Cyclone 10 LP Evaluation Board 3) Xilinx FPGA CORE3S250E board 4) Artix-7 35T (XC7A35T-L1CSG324I FPGA) Evaluation Kit 5) Spartan 6 Xula2-LX9 FPGA board 	Artificial intelligence has seen rapid growth in the past decade. One consequence of this rapid growth is that now artificial intelligence algorithms are crunching very large data sets. Such large data sets pose a serious problem in applications

					where speed of the algorithm execution matters. Field-Programmable Gate Arrays (FPGA) provide an alternative way to implement these algorithms as with large data sets the implementation of these algorithms on CPUs, GPUs and microcontrollers become infeasible.
18	Intel RealSense 3D imaging Cameras	0.3	1) 4	<p>1) Depth Camera Realsense D435 or equivalent</p> <ul style="list-style-type: none"> ● 1280 x 720 depth resolution ● 0.11 – 10m depth range ● 85.2 x 58 Field of View ● 90mm x 25mm x 25mm Dimensions 	For working with depth imaging
19	IMU Sensors	0.05	2	<p>Inertial measurement Sensor</p> <ul style="list-style-type: none"> ● Mode <ul style="list-style-type: none"> – Logging (data is saved in local memory) sensor – Streaming (data is sent live to your device) sensor ● Connectivity <ul style="list-style-type: none"> – Bluetooth LE 4.2 – 2.4Ghz – Up to 100ft of range – typical 10m – Stream sensor Data from 1 Hz to 100 Hz – Log sensor Data from 1 Hz to 400 Hz 	Required for recording a range of biomedical signals in the lab wirelessly. Body sensor networks have many applications in human activity

				<ul style="list-style-type: none"> ● Core <ul style="list-style-type: none"> – Nordic nRF52 32-bit ARM® Cortex™ M4F CPU – 512kB flash + 64kB RAM – RGB LED – Micro push-button – I2C + 4 GPIOs ● Logging / Memory <ul style="list-style-type: none"> – Streaming AND Logging Sensor – 8MB NOR FLASH – Off board – 100K – 500K sensor data entries with timestamps ● Battery <ul style="list-style-type: none"> – 200 – 220mAH CR2032 Coin cell battery – not rechargeable (included) ● Accelerometer <ul style="list-style-type: none"> – Accelerometer (A): 16 bit – ±2g: 16384LSB/g – ±4g: 8192LSB/g – ±8g: 4096LSB/g – ±16g: 2048LSB/g – Noise density (typ.): 180 µg/√Hz ● Gyroscope <ul style="list-style-type: none"> – Gyroscope (G): 16bit – ±125°/s: 262.4 LSB/°/s – ±250°/s: 131.2 LSB/°/s – ±500°/s: 65.6 LSB/°/s – ±1000°/s: 32.8 LSB/°/s – ±2000°/s: 16.4 LSB/°/s – Noise density (typ.): 0.008 °/s/√Hz ● Magnetometer <ul style="list-style-type: none"> – Magnetometer(T): 16bit – ±1300µT (x,y-axis) range – ±2500µT (z-axis) range – Resolution: 0.3µT ● Pressure <ul style="list-style-type: none"> – Barometer(Pa): 16bit 	<p>recognitions, assistive technologies, and healthcare</p>
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				<ul style="list-style-type: none"> - 300...1100 hPa - Resolution: 0.01 hPa (< 10 cm if calibrated) ● Sensor Fusion <ul style="list-style-type: none"> - Advanced 9-axis sensor fusion algorithms - Fast in-use background calibration of all sensors and calibration monitor - Enhanced magnetic distortion detection and suppression - Real-time motion tracking due to built-in group delay compensation - Gyroscope drift cancellation ● - Supports various power modes for switching on/off sensors and algorithm modules 	
20	EMG sensors wearable	0.05	1	1. HTC Hyperkin Hyper Blaster Set with VIVE Tracker	Required for recording a range of biomedical signals in the lab wirelessly. Body sensor networks have many applications in human activity recognitions, assistive technologies, and healthcare.
21	EEG sensors wearable	0.2	1	1. leap motion controller 2. HTC vive motion tracker	Required for testing and recording brain signals for BCI based applications and reading human minds and criminal mental health and activity while

					interrogation
22	Virtual Reality Headsets	0.5	1,1	1. Oculus quest 2 All-In-One VR Headset 2. VIVE Pro Full Kit	For generating VR environment for crime investigation
23	Ground surveillance robots	0.8	1) 2 2) 2 3) 1	2) Programmable Mecanum Wheel Vectoring Robot (4 Mecanum wheels with frame and batteries, Programmable) 3) LEGO Mindstorm Robotic Kit. (Complete Kit with adapter and accessories) or equivalent 4) 4WD All Terrain Heavy Duty Enclosed Robot Platform (With Remote, Charger, rigid casing and cover) <ul style="list-style-type: none"> a. 990 x 670 x 390 mm dimensions b. 50 Kg weight c. 75 Kg Payload capacity d. 1m/s max speed e. 3 hours battery run time f. ROS, C++, Mathworks programmable 	For providing evidence in human absence
24	Air surveillance robots (Drones)	0.5	2	AIRCRAFT Weight (Battery & Propellers Included) 1388 g Diagonal Size (Propellers Excluded) 350 mm Max Ascent Speed S-mode: 6 m/s P-mode: 5 m/s Max Descent Speed S-mode: 4 m/s P-mode: 3 m/s Max Speed S-mode: 45 mph (72 kph) A-mode: 36 mph (58 kph) P-mode: 31 mph (50 kph) Max Tilt Angle S-mode: 42° A-mode: 35° P-mode: 25° Max Angular Speed S-mode: 250°/s A-mode: 150°/s Max Service Ceiling Above Sea Level 19685 feet (6000 m) Max Wind Speed Resistance 10 m/s	For remote spying purpose and recording the crime scene arial view.

				<p> Max Flight Time Approx. 30 minutes Operating Temperature Range 32° to 104°F (0° to 40°C) Satellite Positioning Systems GPS/GLONASS Hover Accuracy Range Vertical: ±0.1 m (with Vision Positioning) ±0.5 m (with GPS Positioning) Horizontal: ±0.3 m (with Vision Positioning) ±1.5 m (with GPS Positioning) </p> <p> VISION SYSTEM Vision System Forward Vision System Backward Vision System Downward Vision System Velocity Range ≤31 mph (50 kph) at 6.6 ft (2 m) above ground Altitude Range 0 - 33 feet (0 - 10 m) Operating Range 0 - 33 feet (0 - 10 m) Obstacle Sensory Range 2 - 98 feet (0.7 - 30 m) FOV Forward: 60°(Horizontal), ±27°(Vertical) Backward: 60°(Horizontal), ±27°(Vertical) Downward: 70°(Front and Rear), 50°(Left and Right) Measuring Frequency Forward: 10 Hz Backward: 10 Hz Downward: 20 Hz Operating Environment Surface with clear pattern and adequate lighting (lux>15) </p> <p> CAMERA Sensor 1" CMOS Effective pixels: 20M Lens FOV 84° 8.8 mm/24 mm (35 mm format equivalent) f/2.8 - f/11 auto focus at 1 m - ∞ ISO Range Video: 100 - 3200 (Auto) 100 - 6400 (Manual) Photo: 100 - 3200 (Auto) </p>	
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				<p>100- 12800 (Manual)</p> <p>Image Size 3:2 Aspect Ratio: 5472 × 3648 4:3 Aspect Ratio: 4864 × 3648 16:9 Aspect Ratio: 5472 × 3078</p> <p>PIV Image Size 4096×2160(4096×2160 24/25/30/48/50p)</p> <p>Still Photography Modes Single Shot</p> <p>Burst Shooting: 3/5/7/10/14 frames</p> <p>Auto Exposure Bracketing (AEB): 3/5 bracketed frames at 0.7 EV</p> <p>Bias</p> <p>Interval: 2/3/5/7/10/15/20/30/60 s</p> <p>Video Recording Modes</p> <p>Supported File Systems FAT32 (≤32 GB); exFAT (>32 GB)</p> <p>Photo JPEG, DNG (RAW), JPEG + DNG</p> <p>Video MP4/MOV (AVC/H.264; HEVC/H.265)</p> <p>Supported SD Cards Micro SD</p> <p>Max Capacity: 128GB</p> <p>Write speed ≥15MB/s, Class 10 or UHS-1 rating required</p> <p>Operating Temperature Range 32° to 104°F (0° to 40°C)</p> <p>CHARGER</p> <p>Voltage 17.4 V</p> <p>Rated Power 100 W</p> <p>APP / LIVE VIEW</p> <p>Mobile App DJI GO 4</p> <p>Live View Working Frequency 2.4 GHz ISM, 5.8 GHz ISM</p> <p>Live View Quality 720P @ 30fps</p> <p>Latency Phantom 4 Pro: 220 ms (depending on conditions and mobile device)</p> <p>Phantom 4 Pro + : 160 - 180 ms</p> <p>Required Operating Systems iOS 9.0 or later Android 4.4.0 or later</p> <p>GIMBAL</p> <p>Stabilization 3-axis (pitch, roll, yaw)</p> <p>Controllable Range Pitch: -90° to +30°</p> <p>Max Controllable Angular Speed Pitch: 90°/s</p> <p>Angular Vibration Range ±0.02°</p>	
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				<p>INFRARED SENSING SYSTEM Obstacle Sensory Range 0.6 - 23 feet (0.2 - 7 m) FOV 70° (Horizontal), ±10° (Vertical) Measuring Frequency 10 Hz Operating Environment Surface with diffuse reflection material, and reflectivity > 8% (such as wall, trees, humans, etc.)</p> <p>REMOTE CONTROLLER Operating Frequency 2.400 - 2.483 GHz and 5.725 - 5.825 GHz Max Transmission Distance 2.400 - 2.483 GHz (Unobstructed, free of interference) FCC: 4.3 mi (7 km) Operating Temperature Range 32° to 104°F (0° to 40°C) Battery 6000 mAh LiPo 2S Transmitter Power (EIRP) 2.400 - 2.483 GHz FCC: 26 dBm MIC: - Operating Current/Voltage 1.2 A@7.4 V Video Output Port GL300E: HDMI GL300F: USB Mobile Device Holder GL300E: Built-in display device (5.5 inch screen, 1920×1080, 1000 cd/m2, Android system, 4 GB RAM+16 GB ROM) GL300F: Tablets and smart phones</p> <p>INTELLIGENT FLIGHT BATTERY Capacity 5870 mAh Voltage 15.2 V Battery Type LiPo 4S Energy 89.2 Wh Net Weight 468 g Charging Temperature Range 41° to 104°F (5° to 40°C) Max Charging Power 160 W</p>	
25	3D scanner for scanning real world objects	0.3	1	<p>Sense 3D Scanner</p> <ul style="list-style-type: none"> Supported operating systems: 64-bit Windows 8 or later Scan volume: Min: 0.2m x 0.2m x 0.2m Max: 2m x 2m x 2m Dimensions: 5.08(w) x 7.08(h) x 1.3(d) inches 12.9(w) x 17.8(h) x 3.3(d) cm 	For Object recognition applications and for keeping 3D data of objects

				<ul style="list-style-type: none"> ● Operating range: Min: 0.2m Max: 1.6m ● Depth image size: 640(w) x 480(h) px ● Color image size: 1920(w) x 1080(h) px ● Field of view: <ul style="list-style-type: none"> ○ Horizontal: 45° ○ Vertical: 57.5° ○ Diagonal: 69° ● Spatial x/y resolution @ 0.5m: 0.9mm ● Depth resolution @ 0.5m: 1mm ● Operating temperature: 10-40° C ● Data interface: USB 3.0 ● USB cord length: 6 feet ● Maximal image throughput: 30 fps ● Warranty: 1 year 	and using them for processing later stages.
26	3D Printers for printing 3D objects	0.6	1	<ul style="list-style-type: none"> ● Dual Extrusion ● Swappable print cores ● Optimized cooling ● LED status indicators ● Build Volume (Left or right nozzle): 215 x 215 x 200 mm or greater ● Assembly type Pre-assembled ● Layer resolution 0.25 mm nozzle: 150 - 60 micron ● 0.40 mm nozzle: 200 - 20 micron ● 0.80 mm nozzle: 600 - 20 micron ● Build plate 20 °C to 100 °C heated glass build plate ● Build plate leveling Active leveling ● Print technology Fused Deposition Modeling (FDM) ● Print head Dual extrusion print head ● Print core replacement Swappable print cores ● Build speed < 24 mm³/s ● Print head travel speed 30 to 300 mm/s ● Feeder type Dual geared feeder ● XYZ accuracy 12.5, 12.5, 2.5 micron ● Nozzle diameter 0.25 mm, 0.40 mm, 0.80 mm ● Nozzle temperature 180 °C to 280 °C ● Nozzle heat up time < 2 minutes ● Build plate heat up time < 4 minutes 	For Object recognition applications and printing

				<ul style="list-style-type: none"> ● Operating sound 50 dBA ● System Open filament system ● Filament diameter 2.85 mm ● Supported materials Nylon, PLA, ABS, CPE, CPE+, PVA, PC, TPU 95A, PP, and Breakaway ● Ultimaker filament A spool of Ultimaker filament is 750 g ● Software Ultimaker Cura, our free print preparation software ● Supported OS Free on macOS, Windows and Linux ● Supported file types STL, OBJ and 3MF ● File transfer WiFi, LAN or USB ● Operating ambient temperature 15 °C to 32 °C (59 °F to 89 °F) ● Input 100 - 240 V, 4A, 50-60 Hz, 221 W max. Output 24 V DC, 9.2 A 	
27	Laser Cutter for cutting thing using laser	0.8	1	<ul style="list-style-type: none"> ● 【UPGRADED Front-Rear Double Door & ROTARY AXIS】 : Front-Rear Double Door for object with no-limited length, Less size restrictions to engraving materials. With rotary axis, rolling engraving. ● 【LEADING BRAND LASER TUBE】 : The leading brand laser tube has high quality, reliable performance and durability. ● 【TEMPERATURE CONTROL DISPLAY】 : The cooling water temperature is always displayed, safe and convenient ● 【Electric lifting system & CNC DISPLAY PANEL】 : Build-in Lift-platform. Simple buttons, digital display, and visual operation. ● 【HIGH-POWER AXIAL FAN】 : Excellent suction effect, high speed, low noise, anti-corrosion and anti-oxidation treatment. 	For working with 3D visual contents and making different objects for object recognition
28	Bionic Ear and booster	0.16	2	<p>Specifications:</p> <ul style="list-style-type: none"> ● 300ft Pick up range ● Portable 20" snap together parabolic dish ● 6 panel snap together parabolic dish ● Advanced electronic circuitry ● 3 band equalizer ● Output jack for tape recording ● Communications input jack ● Can be mounted on tripod ● Uses 2AAA batteries <p>Includes:</p>	Listening criminal activity from distance and processing very low intensity voices

				<ul style="list-style-type: none"> • Detect Ear • Headphones • Instructions 	
29	Digital sound mixer and Voice changer	0.2	1	1) Roland VT-4 Sound Transformer	working with sound and speech signals for crime investigation
30	Game Development softwares pro	0.2	1	<ul style="list-style-type: none"> • Unity Professional Bundle • Corona Professional Bundle • Apple Developer Account 	For generating gaming and virtual environments
31	Humanoid Robotic Development Kit	1	1) 2 2) 2 3) 1 4) 4	1) Asus Zenbo Robot or equivalent Can move, See, speak, Hear, refined sound, connect, Learn and Adapt, And Express different Facial Expressions 2) Darwin Mini Robot or equivalent Mobile and programmable robot for students 3) Intelligent Humanoid App Control Robot or equivalent (Robot Size: 47.3 X 24.0 X 11.4 CM, Servo: 17pcs digital Servo, Motor: Brushless Motor, Supported systems: IOS, Android, For iPad) 4) DIY 17 DOF BiPed Robot or equivalent 17 servo, 12 DOF robot with frame and controller	For working with environments where human's presence is difficult and mimicking human behavior in robots
32	Swarm Robotics Development Kit	0.3	1) 1 2) 1	1) Cubelets Creative Constructors Pack or equivalent <ul style="list-style-type: none"> • 14 sense cubes • 24 think cubes • 18 act cubes 2) Littlebits Steam Education Class Pack or equivalent <ul style="list-style-type: none"> • 6 steam student sets • 2 littlebits tackle boxes • Invention guide book • Set for 18 students • 6 buttons, 6 buzzers, 12 dc motors, 6 fans, 6 forks, 6 inverters, 6 light sensors, 6 long leds, 6 7-segment displays, 6 power modules, 6 pulse generators, 6 rgb leds, 6 servos, 6 slide dimmers, 6 temperature sensors, 6 usb power modules, 12 connector modules, 6 battery packs, 6 temperature sensors, 18 mechanical arms, 24 motor mates, 12 mounting boards, 12 	For working with environments where human's presence is difficult

				screwdrivers, 24 screws, 6 servo hubs, 6 servo mounts, 144 hook and loop shoes, 12 power adapters.	
33	Equipment for testing (Scopes, Analyzers)	0.2	1) 2 2) 2	1) NI Analog Discovery Oscilloscope/ Logic Analyzer or equivalent 2) Function Generator: High precision, 3+ channel, 250 MSa/s, 14bits, 60MHz frequency	For hardware testing purposes
34	Tracking equipment (Indoor/Outdoor)	0.08	1	Pozyx Ready to Localize or equivalent <ul style="list-style-type: none"> ● Accurate 2D and 3D indoor and outdoor positioning ● Accurate motion sensing (using 9-axis sensor fusion) ● Accurate ranging with the anchors ● Arduino and Raspberry pi compatible ● Simple installation ● Wireless communication between all devices ● Position Accuracy 10 cm ● Update Rate: 140 Hz. 	For tracking humans
35	Smart Sensors	1	1, 4	1. LIDAR TF02 (ToF) Laser Rangefinder or equivalent Detection Range: 0.3-10m, Power: 5VDC, <200ma, Interface: UART/CAN, Measuring Speed: Default 100Hz (maximum: 500Hz) 2. Human Activity Sensing device Engine Specs: <ul style="list-style-type: none"> ● 3584NVIDIA CUDA® Cores or equivalent ● 1582Boost Clock (MHz) Memory Specs: <ul style="list-style-type: none"> ● 11 GbpsMemory Speed ● 11 GB GDDR5XStandard Memory Config ● 352-bitMemory Interface Width ● 484Memory Bandwidth (GB/sec) Technology Support: <ul style="list-style-type: none"> ● YesSimultaneous Multi-Projection ● YesVR Ready ● YesNVIDIA Ansel ● Yes - SLI HB Bridge SupportedNVIDIA SLI® Ready1 	Motion, temperature, acoustic sensors etc

				<ul style="list-style-type: none"> ● YesNVIDIA G-SYNC™-Ready ● YesNVIDIA GameStream™-Ready ● 3.0NVIDIA GPU Boost™ ● 12 API with feature level 12_1Microsoft DirectX ● YesVulkan API ● 4.5OpenGL ● PCIe 3.0Bus Support ● Windows 7-101, Linux, FreeBSDx86OS Certification <p>Display Support:</p> <ul style="list-style-type: none"> ● 7680x4320@60HzMaximum Digital Resolution2 ● DP 1.43, HDMI 2.0bStandard Display Connectors ● YesMulti Monitor ● 2.2HDCP <p>Graphics Card Dimensions:</p> <ul style="list-style-type: none"> ● 4.376"Height ● 10.5"Length ● 2-SlotWidth <p>Thermal and Power Specs:</p> <ul style="list-style-type: none"> ● 91Maximum GPU Temperature (in C) ● 250 WGraphics Card Power (W) ● 600 WRecommended System Power (W)4 ● One 6-pin, One 8-pin Supplementary Power Connectors 	
36	Smart Switches	1.2	<p>1) 2</p> <p>2)2</p> <p>3)6</p>	<ol style="list-style-type: none"> 1. Amazon Echo Plus or equivalent <ul style="list-style-type: none"> ● 9.2" x 3.3" x 3.3" dimensions ● 33.6 Oz weight ● Control smart home devices ● Streaming wifi music ● Play videos ● Dual speakers with romm0-filling sound ● Line-out with 3.5mm cable or Bluetooth ● 2.5" woofer and 0.8" tweeter 2. Amazon Echo Spot or equivalent <ul style="list-style-type: none"> ● 1.3" x 3.3" x 3.3" dimensions ● 5.7 Oz weight 	Switches for recording automatic breach data and behavior analysis

			<p>4)10 5)10 6)10 7)15 8)15</p>	<ul style="list-style-type: none"> ● Control smart home devices ● Streaming wifi music ● Play videos ● Dual speakers with room-filling sound ● Line-out with 3.5mm cable or Bluetooth ● <p>3. Home Automation Hub</p> <ul style="list-style-type: none"> ● Supports ZigBee, WiFi, Z-Wave, Bluetooth ● Backup Power source available ● Ethernet capable ● 512 MB memory ● 600 Simultaneous Pairable devices ● Amazon Alexa compatible ● Google Assistant compatible ● Timing scheduling capable <p>4. 600W smart switch board (4 channels)</p> <p>5. 1000W smart switch board (4 channels)</p> <p>6. 3000W smart switch</p> <p>7. 1000W smart dimmer (2 channels)</p> <p>8. 1200W smart plug</p> <p>Smart switches specifications:</p> <ul style="list-style-type: none"> ● Amazon Alexa compatible ● Google Assistant compatible ● Timing scheduling capable ● Supports Mobile Application based control ● Wifi capable ● Supports high-power loads 	
37	Wireless Camera	0.15	10	<ul style="list-style-type: none"> ● High Definition:720P(HD) ● Technology:Pan / Tilt / Zoom ● Connectivity:IP/Network Wireless ● Network Interface:Wi-Fi/802.11/b/g (only support 2.4G wifi) ● Supported Operating Systems:Windows 7,Windows Vista,Windows 98,Windows 8,Windows XP ● Supported Mobile Systems:Android,iOS <p>Sensor:CMOS</p>	Smart Surveillance based on sensor alerts with motion sensing

				<ul style="list-style-type: none"> ● Dimensions (L x W x D)(mm):145*110*120MM ● Minimum Illumination(Lux):F1.4 /35.49 ● Video Compression Format:MJPEG,H.264 ● IR Distance(m):10-15M ● Special Features:Vandal-proof ● Lens (mm):3.6mm ● Wall Bracket:Ceiling ● Type:IP Camera,Mini Camera,WiFi ● Camera,Security Camera ● Power Supply:Normal ● Power Consumption(W): 3W ● Power Supply(V):110-220V 	
38	Wireless Hub	0.1	4	<p>GENERAL</p> <ul style="list-style-type: none"> ● Frequency Band 2.4 GHz / 5 GHz ● Authentication Method RADIUS ● Authentication Method RADIUS ● Status Indicators Port status, power ● Encryption Algorithm WPA, WPA2, WEP ● ManufacturerCisco <p>MODEM</p> <ul style="list-style-type: none"> ● Antenna Qty 2 <p>EXPANSION / CONNECTIVITY</p> <ul style="list-style-type: none"> ● Interfaces LAN: 4 x 10Base-T/100Base-TX - RJ-45 ● USB 2.0: 1 x 4 pin USB Type A ● WAN: 1 x 10Base-T/100Base-TX - RJ-45 <p>NETWORKING</p> <ul style="list-style-type: none"> ● Form Factor desktop, wall-mountable ● Type wireless router ● Connectivity Technology wired, wireless ● Data Link Protocol Ethernet, Fast Ethernet, IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n ● Features DLNA Media Server, IPv6 support, reset button, Quality of Service (QoS), RADIUS support, SimpleTap technology, Stateful Packet Inspection (SPI), Wi-Fi Protected Setup (WPS), parental control, port forwarding, port triggering ● Compliant Standards DLNA CERTIFIED, IEEE 802.11a, IEEE 	Gateways for devices

				<ul style="list-style-type: none"> ● 802.11b, IEEE 802.11g, IEEE 802.11n, UPnP, Wi-Fi CERTIFIED ● Wireless Protocol 802.11a/b/g/n ● WAN Ports Qty 1 ● Integrated Switch 4-port switch ● Key Features USB port <p>POWER DEVICE</p> <ul style="list-style-type: none"> ● Type external power adapter <p>ANTENNA</p> <ul style="list-style-type: none"> ● Antenna External detachable ● Antenna Qty 2 ● Antenna Form Factor external detachable <p>INTERFACE PROVIDED</p> <ul style="list-style-type: none"> ● Interface Ethernet 10Base-T/100Base-TX ● Qty 1, 4 ● Connector Type 4 pin USB Type A, RJ-45 ● Type LAN, USB 2.0, WAN ● MISCELLANEOUS ● Encryption Algorithm WEP, WPA, WPA2 ● Color Category black <p>SYSTEM REQUIREMENTS</p> <ul style="list-style-type: none"> ● OS Required Microsoft Windows 7, Windows 8 ● ENVIRONMENTAL PARAMETERS ● Min Operating Temperature 32 °F ● Max Operating Temperature 104 °F ● Humidity Range Operating 10 - 80% (non-condensing) <p>DIMENSIONS & WEIGHT</p> <ul style="list-style-type: none"> ● Width 7.9 in ● Depth 6.9 in ● Height 1.3 in ● Weight 10.51 oz ● CABLE DETAILS ● Type network cable 	
39	Raspberry Pi 3	0.16	<ol style="list-style-type: none"> 1) 4 2) 2 3) 4 4) 4 	<ol style="list-style-type: none"> 1) Raspberry Pi 7" Touch screen Display or equivalent 2) Pi-Cam 5 Mega Pixels or equivalent 3) Ultra high speed micro SD card <ol style="list-style-type: none"> a. Class 10 	Board, SD Card, Power Adapter for testing applications and

				b. 32 GB 4) Raspberry pi 4 a. 4GB LPDDR4-3200 SDRAM	development
40	Tools, Components and Deployment	0.4	1) 3 2) 5 3) 2 4) 5 5) 2 6) 9 7) 2	1) Weller Soldering Iron (WE 1010) <ul style="list-style-type: none"> ● 1-Channel Power Unit, digital, 70 W ● Power unit, 1 channel with soldering iron WEP 70 and safety rest PH 70 ● 70W solder iron with ergonomic handle and providing toolless tip change ● ESD safe station, iron and heat-resistant silicon cable for safe handling ● Using ET soldering tips ● Standby mode and auto setback conserves energy, protects equipment ● Password-protected to preserve settings 2) Tool/Component Box <ul style="list-style-type: none"> ● Clip locks ● 4 sliding drawers ● Adjustable dividers ● 12 x 12 x 7 inches dimension 3) Electrical Screwdriver (drill alike) <ul style="list-style-type: none"> ● Interchangeable 12-bit set ● Flexible extension drill bit ● Battery powered ● Variable speed ● LED to light up the tool ● Tool direction flexibility 4) Third Hand <ul style="list-style-type: none"> ● 6 flexible arms with alligator clips ● Stickable base ● Empty spaces to hold components and soldering wire 5) Hand-Held Drill/Rotary-Tool-Kit <ul style="list-style-type: none"> ● 8000 to 30,000 rpm ● Cutting, sanding, drilling, polishing, grinding ● Felt polishing wheels 	Misc. tools for assembly, testing and deployment

				<ul style="list-style-type: none"> ● Grinding stones ● Cur-off wheels ● Sander bands ● Drill bits <p>6) Workstation Lamp</p> <ul style="list-style-type: none"> ● Height and position adjustable ● Variable light intensity ● Stickable base <p>7) Soldering Microscope</p> <ul style="list-style-type: none"> ● HDMI/AV connectivity ● Live video on in built screen ● 5-inch HD format LED screen ● Technical Grade lens ● Metal stand 26.5cm*20cm*12cm ● Adjustable Monitor ● UV filter ● Multiple Outputs (AV, HDMI, SD etc) ● IR remote for selections ● Magnification ratio: 10x to 300x optical ● 4x digital zoom ● LED lamps for illumination 	
41	Establishment of the ICRL Infrastructure	2	9	Cluster For 4 Persons Persons - Size: 96"x96"x30 Work Stations MDF Material	Establishment of the ICRL research lab Infrastructure to create working environment ensuring full productivity of the staff
			9	Cluster For 2 Persons Persons -Size: 48"x48"x30 MDF Material	
			1	Meeting Table <ul style="list-style-type: none"> ● High Quality MDF Melamine in Matt finish Dura lime Laminate ● Imported PVC edges ● Imported Gliders ● Export Quality 18 gauge MS Powder coated Leg Frame 	

			<ul style="list-style-type: none"> • High quality Hardware and fixtures • Leatherette padding on top. • Available in customize size. Size: L96''xW48''x H30''	
		1	Reception Counter <ul style="list-style-type: none"> • High Quality MDF Melamine in Matt finish Dura lime Laminate • Imported PVC edge • High quality Hardware and fixtures Size L48''x W24''x H 30''+18''	
		4	Sofa Double Double Seat: 44'' * 30'' *31'' <ul style="list-style-type: none"> • 1st Quality seat & back foam • Premium Quality leatherette/ fabric upholstery • Solid wood and plywood Durable structure, springs & belts 	
		3	Center Table Size: 48'' * 24'' *18'' <ul style="list-style-type: none"> • High Quality MDF Melamine in Matt finish Dura lime Laminate • Imported PVC edges • Imported Gliders • Export Quality 18-gauge MS Powder coated Leg Frame 	
		4000 Sq Ft.	False Ceiling Total Area of False Ceiling (as per approved sample)	
Estimated total Equipment Cost PKR				17m PKR