DAYALBAGH EDUCATIONAL INSTITUTE
(Deemed to be University)
DAYALBAGH, AGRA-282005

Notice Inviting tenders

Limited tender No: DEI/USIC/RS/2019-20/TDR-09 Date: 25.08.2019

Sealed tenders are invited from the Manufacturers/ Suppliers/Authorized dealers/ agencies for the supply of the following-

SlNo	Item	Quantity
1	Robotics Study Platform (Refer to Annexure 1)	**Single Platform**

The tenderer shall be required to submit the Earnest Money Deposit (EMD) for an amount of **Rs.40,000/-** by way of demand drafts/banker's cheque/FDRs which is refundable and a non-refundable tender fee for an amount of **Rs. 200/- (Rupees two hundred only)** by Demand draft. The demand drafts (validity 45 days beyond final bid) for earnest money deposit & tender fee must be enclosed in the envelope containing the bid documents, super-scribed with tender number, due date of submission on the envelop and addressed to :

"The Registrar
Dayalbagh Educational Institute,
Dayalbagh, Agra – 282005,
Uttar Pradesh"

Note: Central Purchase Organization, Small Scale Industries/ National Small-Scale Industries Corporation shall be exempted from payment of Earnest Money Deposit. Tenderer seeking exemption should enclose a self-attested photocopy of valid registration certificate with NSIC.
(The Earnest Money will be liable to be forfeited if quotation is not honored or if contract is not signed with the Institute, after the award is made to the Tenderer)

1. Time and last date of submission of the Bid: 11.00 am on 17.09.2019
2. Time of Bid Opening: 11.30 am on 17.09.2019
3. Venue of Bid Opening: Conference Hall , CAO, Dayalbagh Educational Institute in the presence of bidders who want to be present at the time of opening of bid..

Interested bidders may post (at the above address) or put the tender documents completed in all respect and other requisite documents in the tender box kept in the General Section, CAO, Dayalbagh Educational Institute, Dayalbagh, Agra- 282005. The bidders are also informed that they may come personally or send their representative to be present at the time of opening of bid. Please note that tender box shall be opened at the time mentioned above irrespective of whether bidders himself or any of their representative are present or not. The tenders shall not be entertained after this deadline under any circumstances what so ever. For more details please visit the Institute's website http://www.dei.ac.in. or contact Dr. Rajat Setia – 9897035359

Registrar
Dayalbagh Educational Institute
Dayalbagh, Agra-282005

General Terms & Conditions

Note: Bidders must submit the following primary information/documents with the quotation. Bidders will have to indicate these particulars in their quote failing which the offer may be rejected. Please do produce the related documents whenever required by the Institute.

1. Trade License/Company Registration No.
2. Goods / Service Tax Regn. No.
3. Income Tax PAN No.
4. Firm's Bank A/c details
5. Bidders are requested to quote rate(s) per unit(s) only in the recognized Accounting units otherwise your quotation will not be accepted.
6. Cost of items shall include installation, support and troubleshooting.
7. Warranty and Support: for Hardware and Software should be explicitly mentioned.
8. Bidders should be OEM/Authorized partner/Authorized dealer of OEM.
9. Bidders should quote rates as per details/specifications mentioned in notice inviting Tender. The Institute reserves the right to place order for each job to single/separate vendor(s) if necessary.
10. Bidders should quote rates on FOR/Free Delivery at the sites specified in the Notice inviting Tender, inclusive of all charges else should mention estimated cost of packing, forwarding, insurance and freight by Rail/Road/Post etc. as the case may be.
11. Bidders must indicate if their rate is inclusive of Taxes.
12. In case opening date of Tender happens to be holiday, tender will be received and opened on the next working day at the same time and same place. Quotation received after the closing date will not be entertained and revision in the price will render the bid invalid. Quotation should indicate clearly the period of Validity, preferably not less than 45 days**.**
13. In case of an offer for items having multiple options, you should clearly indicate item-specific price(s). Please quote separate item-wise rate(s), when quotation has been asked for so. For every offer, packing and forwarding charges, Taxes etc. should be shown separately.
14. Bids will be evaluated after equated comparison of offers upon calculating all tax/duty/cess/surcharge/discount/packing/transportation costs, other charges with price and non-compliance of technical and commercial terms will render a bid liable for rejection.
15. Bidders will have to submit Bills/Invoices on dispatch of stores, if ordered, to this office in triplicate duly pre-receipted (and stamped for amount over Rs. 5000/-) and supported by the relevant delivery documents for audit and payment directly in your bank account through RTGS/NEFT. Generally, payments can be expected within one month and are made against acceptance of supplies/ jobs completed and in deserving cases, against shipment documents.
16. No insurance charges are allowed unless otherwise specified and agreed to by us. In the absence of any specific instructions, it will be the responsibility of the supplier to ensure a consignment against transit risk at his own expense if he so desires.
17. The Institute is not bound to accept the lowest rate or any other offer and the acceptance of the offer is entirely at the discretion of the Committee.
18. All purchases are subject to the approval of the Governing Body of the Institute.
19. The Institute reserves the right to select certain items in single or multiple units and reject the others or all as mentioned in the schedule and to revise or alter the specifications before acceptance of any tender and accept or reject any or all tenders, wholly or partly or close the tender without assigning any reason whatsoever.
20. The Bidder shall be required to submit the amount of **Earnest Money Deposit** (EMD) by way of demand drafts/banker's cheque/FDRs as mentioned in the Notice Inviting Tender which is

refundable and a non-refundable **Tender Fee** for an amount of **Rs 200/-** (Rupees two hundred only) by way of demand drafts/banker's cheque. The demand drafts shall be drawn in favour of **"Dayalbagh Educational Institute, Agra"** payable at **Agra**. The demand drafts (validity 45 days beyond final bid) for earnest money deposit & tender fee must be enclosed in the envelope containing the bid.

a.) The firm(s) that are registered with the National Small Industries Corporation (NSIC) / or Small-Scale Industries (SSI) are exempted from furnishing the EMD. Self-attested photocopy of the valid registration certificate must be enclosed with their bid.

b.) The demand drafts for EMD & tender fee must be enclosed in the envelope containing the technical/price bid and super-scribed with tender number and due date of submission on it. Any technical/price bid is found without the demand drafts of EMD and tender fee will be rejected. The Institute will not be liable to pay any interest on such an amount. The EMD shall be forfeited, if the Bidder withdraws its bid during the period of validity of Tender.

21. Arbitration and Laws: In case of any dispute or difference arising out of or in connection with the tender conditions / order and Contract, the Institute and the Supplier will address the dispute / difference for a mutual resolution and failing which, the matter shall be referred for arbitration to a sole Arbitrator to be appointed by the Institute. The Arbitration shall be held in accordance with the provisions of the Arbitration and Conciliation Act, 1996 and the venue of arbitration shall be at Agra only. The resolution of the Arbitrator shall be final and binding on both the parties.
22. Jurisdiction: The courts at Agra alone will have the jurisdiction to try any matter, dispute or reference between parties arising out of this tender /contract. It is specifically agreed that no court outside and other than Agra court shall have jurisdiction in the matter.
23. Customs Duty & Excise Duty: Please note that the Dayalbagh Educational Institute, Agra, Uttar Pradesh other than Hospital is registered with the DSIR for purpose of availing Customs Duty Exemptions in terms of Notification No.51/96-CUSTOMS dated 23.7.1996, Notfn. No.47/2017-Integrated Tax (Rate) dated 14-11-2017 and Notfn. No.45/2017-Central Tax (Rate) dated 14-11-2017, Notfn. No.45/2017-Union Territory Tax (Rate) dated 14-11-2017 & Notfn. No.9/2018-Central Tax (Rate) dated 25-01-2018, Notfn. No.9/2018- Union Territory Tax (Rate) dated 25-01-2018 as amended from time to time, for research purpose only, the bidders are, however, requested to quote accordingly for relevant supplies.

Registrar, DEI

Annexure-1

Sr. No.	Robotics Study Platform	Qty
1	Mars Rover Prototype	1
2	Pneumatic back-hoe loader	1
3	Quad copter (Flying robot)	1
4	Omni wheel robot	1
5	The Robotic Hand	1
6	Mobile Phone operated robots	6
7	Hex crawler robots	6
8	Miniature Industrial Robotic Arm	1
9	Miniature Industrial Production System	1
10	4 Axis Robotic Arm	1
11	Humanoid Study platform	1

SPECIFICATIONS:

Name of Robot: Mars Exploration Rover

Technical Specification:	
- Mechanism for locomotion	- Rocker bogie mechanism - 4 links (2 on each side) with 6 wheel drive - Motors : 6 metal geared 12V DC motor, 100 rpm and 4kgcm torque
- Manipulator	- Length 200mm - 1 DoF actuated by metal geared 12V DC motor, 30 rpm and 10kgcm torque
- End effecter (Parallel link gripper)	- Jaw opening : 60mm - Servo motor(6V 4Kgcm torque)
- Live video link (Wireless image and video transmission)	- Pan and tilt mechanism for camera - 1/3" image sensor with 628 x 582pixels - Frequency 1.2G,voltage Tx-9V Rx-12V,power dissipation 640mW - Linear link distance 50-100m - 180^0 rotational movement for wide area coverage
- Electronic circuit	- Atmel Atmega 16 controller IC development board - Relay motor drivers - Servo motor drivers - Bluetooth module
- Wireless communication	- 2.4G frequency and 115.2kbps interface data rate

- Mode of Control	- 3.3V CMOS UART interface level - Bluetooth communication - Controlled by Android mobile phone
Performance: - Line of sight operation - Operating terrain - Interaction object	- 50m video transmission - 90m indoor and 1.6km outdoor data exchange - Dry land with gravels - Weight 50gm, maximum volume 40x40x40 mm cube
Electrical connections: - Supply voltage - Supply current capacity - AC adapter supply	- 11.1V DC (Lithium Polymer battery) - 2200mAh - 12V 0.5Ah for video receiver unit
Physical: - Wheel dimensions - Protective shell - Weight - Body material	- Diameter 100mm x width 40mm - 500 x 500 x 400 mm - 5kg (robot only) - Acrylic

Name of Robot: Pneumatic controlled back-hoe loader

Technical Specification: - Mechanism for locomotion	- Track belt drive - Chassis with rear motor drive - Motors : 2 metal geared 12V DC motor, 100rpm and 6kgcm torque
- Manipulator	- 3 rotational DoF(2 - horizontal axis, 1 – vertical axis) - Motor : One 12V DC motor, 30rpm and 12Kgcm torque - Arm: 1 Pneumatic cylinders of bore diameter 20mm and stroke 50mm - Boom: 1 Pneumatic cylinders of bore diameter 12mm and stroke 80mm - Length : Arm 300mm, Boom 250mm
- End effecter (Scoop)	- Scoop motion: $0^0 – 80^0$ - Scoop: 1 pneumatic cylinder of bore diameter 12mm and stroke 50mm
- Pneumatic valves	- 3 pilot acting double solenoid direction control valves 5/3way, G1/8 in configuration - 3 flow control valves - Max. operating pressure : 10bar - Pilot pressure : 2bar
- Electronic circuit	- Atmel Atmega 16 development board - Relay motor drivers

- Mode of Control	- Pneumatic solenoid valve driver - Bluetooth communication - Controlled by Android mobile phone
Performance: - Operating pressure - Operating speed - Terrain - Interaction object	 - 4 - 6bar - Surface 50mm/s, arm, boom and swing 45^0 /sec - Ground with no gravel (outdoor) - Sand and pebble
Electrical connections: - Supply voltage - Supply current capacity	 - 11.1V DC (Lithium Polymer battery) - 2200mAh
Physical: - Track dimensions - Protective shell - Weight - Body material	 - Length 300mm (centre to centre) - 400 x 400x400 mm enclosure - 5.8kg (robot only) - Acrylic

Name of Robot: Quad copter (Flying robot)

Technical Specification: - Control and thrust generation	 - Four BLDC motors for controlling basic 3 DoF: roll, pitch, yaw and altitude - Two pairs of propellers: 1 CW & 1 CCW - Motor: Brushless DC Out-runner - ESC 30A
- Radio transmitter and receiver	- Channel: 6channel ppm - Display: 128*64LCD (Backlit) - Support Type: Heli/Acro/Glid - Encoder type: ppm/pcm
- Electronic circuit	- Ardu Pilot Mega 2.6 autopilot system - Arduino Compatible! - Atmel's ATMEGA2560 and ATMEGA32U-2 chips - 6 DoF Accelerometer/Gyro MPU-6000 - Magnetometer - Onboard 4 Mega Byte Data flash chip for automatic data logging - Barometric pressure sensor MS5611-01BA03
- GPS module	- Main chip: U-BLOX NEO-6M

Performance: - Line of sight operation - Operation space - Sensor data	 - 500m outdoor open sky - Map GPS output with actual location of place of flying - Roll, pitch, yaw stability telemetry
Electrical connections: - Supply voltage - Supply current capacity	 - 11.1V DC (Lithium Polymer battery) - 4200mAh
Physical: - Size of chassis - Propeller configuration - Weight - Wing loading - Body material	 - Standard 450mm - 10” (diameter) x 4.5” (pitch) - 1500 gm (complete) - 29.2g/dm2 - High strength polymer and glass fiber

Name of Robot: Omni wheel robot

Technical Specification:	
- Mechanism for locomotion	- Omni-directional wheels - 4 wheel drive - Motors : 4 metal geared 12V DC motor, 100rpm and 4kgcm torque
- Electronic circuit	- Atmel Atmega 16 controller IC - Power distribution board - Bluetooth Module - Onboard battery indicator and charging circuit
- Mode of Control	- Wireless communication - Controlled by Android mobile phone
Performance:	
- Operating terrain	- Flat smooth surface
- Maximum speed	- 0.8 m/s
Electrical connections:	
- Supply voltage	- 11.1V DC (Lithium Polymer battery)
- Supply current capacity	- 2200mAh
Physical:	
- Protective shell	- 500mmx 500 x 700 mm enclosure
- Weight	- 4.8kg (robot only)
- Body material	- Acrylic

Name of Robot: The Robotic Hand

Technical Specification:	
- Mechanism	- Anthropomorphic mechanism resembling the Human Hand - 5 high torque, geared DC servo motors, 10kgcm torque - Pulling action through high tension cables - Spring loaded retrieval action of the fingers
- Electronic circuit	- 2 Arduino Nano microcontrollers - 2 NRF modules - Tx Board with sensor interfacing - Rx Board with high current rating servo motor drivers (15 Amp continuous current)
- Sensor	- 5 Flex force sensor
- Mode of Control	- Wireless connection from Glove to circuitry
Performance:	
- Calibration	- Simple and user friendly calibration capability
- Response time	- 0.3 second
Electrical connections:	
- Supply voltage	- 11.1V DC (Lithium Polymer battery)
- Supply current capacity	- 2200mAh
Physical:	
- Size	- 1.3 times the size of an average human hand
- Body Material	- Acrylic

Name of Robot: Mobile Phone operated robot

Technical Specification:	
- Mechanism for locomotion	- 2 wheeled robot with vertical orientation. No separate castor
- Electronic circuit	- A single board consisting of the microcontroller (Atmega 8 development board), L293d motor driver and Bluetooth communication module
- Mode of operation	- Operated wirelessly using android based mobile application - Reprogrammable platform
Performance:	
- Operating terrain	- Flat smooth surface
- Maximum speed	- 0.25 m/s
Electrical connections:	
- Supply voltage	- 11.1V, 3 Cell, DC (Lithium Polymer battery)
- Supply current capacity	- 1000mAh
Physical:	
- Wheel dimensions	- Diameter 70mm x width 8mm
- Weight	- 0.25 kg (robot only)
- Body material	- Acrylic, easy to assemble

Name of Robot: Hex crawler robot

Technical Specification:	
- Mechanism for locomotion	- 6-legged coordinated link based locomotion - Motors: 2, metal geared 12V DC motor, 100 rpm and 2 kgcm torque
- Electronic circuit	- 2 DPDT (Double Pole Double Throw) switches
- Mode of operation	- Wired (2 meter) - Remote with switches (robot is controlled using 2 DPDT switches)
Performance:	
- Operating terrain	- Flat rough surface
- Maximum speed	- 0.1 m/s
Electrical connections:	
- Supply voltage	- 11.1V, 3 Cell, DC (Lithium Polymer battery)
- Supply current capacity	- 1000mAh
Physical:	
- Weight	- 0.5 kg (robot only)
- Body material	- Acrylic

Name of Robot: Miniature Industrial Robotic Arm

Technical Specification: - Mechanism - Electronic circuit - End effector - Mode of Control	- 5 DOF - 3 high torque, metal geared DC servo motors, 10kgcm torque - 2 medium torque, plastic geared DC servo motors, - Arduino Nano microcontroller - Advanced MIRA controller with high current rating servo motor driver - Bluetooth modules - Servo motor operated parallel link gripper - Jaw opening : 40mm - Servo motor(6V 1Kgcm torque) - Bluetooth communication - Mode: Auto & Manual - Controlled by Android mobile phone
Performance: - Load caring capacity - Response time	 - 150gm - 0.3 second
Electrical connections: - Supply voltage - Supply current capacity	 - 11.1V DC (Lithium Polymer battery) - 2200mAh
Physical: - Type - Body Material	 - Standard articulated industrial robotic arm structure - Acrylic

Name of the platform**: Miniature Industrial Production System (MIPS)**

Technical Specifications

Sr. no.	**Components**	**Detailed Specifications**
1	Stacking Magazine Module	1. Capacity of discs: 4 discs 2. Magazine Height: 264mm 3. Materials of construction: Aluminium, Stainless steel, Acrylic plastic, Brass, Nitrile 4. Proximity sensor 1: Capacitive 24V 500mA 5. Pneumatic Cylinder 1 :- a. Working Pressure : 0.5-10 bar b. Force: 40N c. Stroke: 160mm Cylinder position sensors :- . Operating voltage: DC/AC 5-240V a. Switching current: 100mA max b. Response time: on/off <1ms
2	Linear Transfer Module	1. Materials of construction: Aluminium, Stainless steel, Acrylic plastic, Brass, Nitrile 2. Pneumatic cylinder 2 :- a. Working Pressure : 0.5-10 bar b. Force: 40N c. Stroke: 160mm Pneumatic cylinder 3 :- . Working Pressure : 0.5-10 bar a. Force: 40N b. Stroke: 100mm Cylinder position sensors :- . Operating voltage: DC/AC 5-240V a. Switching current: 100mA max b. Response time: on/off <1ms
3	Lifting Module	1. Rodless Pneumatic Cylinder 1 a. Working Pressure : 0.5-10 bar b. Force: 100N c. Stroke: 400mm Cylinder position sensors :- . Operating voltage: 10-30V DC a. Switching current: 100mA max b. Power rating: 3W max Lift: Stainless steel bent part

		Materials of construction: Aluminium, Stainless steel, Acrylic plastic, Brass, Nitrile
4	Ramp Module	1. Rodless Pneumatic Cylinder 2 a. Working Pressure : 0.5-10 bar b. Force: 100N c. Stroke: 500mm Cylinder position sensors :- . Operating voltage: 10-30V DC a. Switching current: 100mA max b. Power rating: 3W max Slope of ramp module: 18 degrees (2 degree tolerance) Proximity sensor 2: Capacitive 24V 500mA Materials of construction: Aluminium, Stainless steel, Acrylic plastic, Brass, Nitrile
5	Indexing Module	1. Pneumatic cylinder 4 :- a. Working Pressure : 0.5-10 bar b. Force: 40N c. Stroke: 160mm Cylinder position sensors :- . Operating voltage: DC/AC 5-240V a. Switching current: 100mA max b. Response time: on/off <1ms Indexing Rotation (motor 1) . Voltage: 0-24V DC a. RPM: 30RPM b. Gear box: Metal sintered gears Proximity sensor 3: Inductive 24V 500mA Proximity sensor 4: Inductive 24V 500mA Materials of construction: Aluminium, Stainless steel, Acrylic plastic, Brass, Nitrile
6	Drilling Station	1. Ball screw: a. Axial load capacity: 250N b. Multi - start: 4 start c. Drill movement: 100mm Ball screw (motor 2) . Voltage: 0-24V DC a. RPM: 438RPM Ball screw (motor 3) . Voltage: 0-24V DC a. RPM: 500RPM Proximity sensor 5: Diffused Scan 24V 500mA Proximity sensor 6: Diffused Scan 24V 500mA

		Materials of construction: Aluminium, Stainless steel, Acrylic plastic, Brass, Nitrile
7	Colour Sensing Module	1. White light RBG Sensor: a. Input voltage: (2.7V to 5.5V) b. Interface: Digital TTL c. High-resolution conversion of light intensity to frequency d. Programmable colour and full-scale output frequency e. Working temperature: -40C to 85C f. Interface: 10 Pin FRC cable Proximity sensor 7: Capacitive 24V 500mA
8	Robotic Manipulator Module	1. Mechanism: a. Degrees of freedom: 3 DOF b. Torque: 9.4 kg-cm (4.8v) per motor Arm Speed: 1 sec/60 deg max Weight: 950g Base bearing: 35 mm Metal ball bearing Vacuum Gripper : 11 mm diameter * 2 Vacuum Suction: 0-16" Hg vacuum range Air flow (free) range 12 - 15 LPM In-out nozzle diameter: 1/4" barbs Tube diameter: 4mm Proximity sensor 8: Capacitive 24V 500mA
9	Conveyor Module	1. Conveyor speed: 200mm/s 2. Type: Flat belt 3. Material: Polyvinyl chloride (PVC) 4. Conveyor Distance: 1000mm 5. Motor power: 25W max 6. Conveyor Drum Size: 25mm diameter
10	Sorting Module	1. Sorter travel length: 750mm max 2. Sorter speed: 200mm/s max 3. Sorter load capacity: 50N max 4. Adjustable Push angle: 0 - 120 degrees 5. Drive mechanism: rack and pinion 6. Motor power: 25W max 7. Proximity sensor 9: Inductive 24V 500mA 8. Proximity sensor 10: Inductive 24V 500mA
11	Storage Station	1. Number of Compartments: 7 2. Travel length: 750mm(5mm tolerance) 3. Drop Slope: 30 degrees (2 degrees tolerance) 4. Marking: Plastic / Metal labels with colours

12	MIPS Disc	1. Disc Diameter: 76mm(1mm tolerance) 2. Disc Height: 67mm(1mm tolerance) 3. Plastic Disc weight: 94gm(5gm tolerance) 4. Metal Disc weight: 140gm(5gm tolerance) 5. Quantity : Plastic 4, Metal 3
13	MIPS Table	1. Table Dimensions 2. Width: 2500mm 3. Height: 770mm 4. Depth: 800mm 5. Material: Aluminium Profile 6. Connectors and fittings: Cast Aluminium 7. Table top: Stainless Steel (non corrosive) 8. Casters: Rubber 3 Lockable, 3 free wheel
14	MIPS PLC panel	1. PLC make: Mitsubishi 2. Model: GOC35 3. HMI: 4. 3.2Inch Graphic LCD Display, 128 x 64 pixels 5. White characters on a blue background 6. 10 keys for display navigation and data entry 7. (User configurable functionality for 5 keys) 8. 8 (Keys with bicolor LEDs, Slide-in label) 9. Digital inputs: 24 Pt. 24 VDC sink/source 10. Digital Outputs: 14 Pt., 500mA per output, 220 VAC/30 VDC" 11. Communication: RS232 (module included) {Optional: RS422/RS485, Ethernet (separate module)} Power: 24 VDC , 400 mA, 9.6Watt. Memory Size: Program: 192KBytes Source code and Comments: 1.5MBytes Data Memory (Including marker): 24 KBytes Emergency Stop Switch: 24V 10A rating Push lock, turn reset
15	Power supply and I/O cabinet	Dimension: Width: 550mm max Height: 600mm max Depth: 450 mm max Tinted / transparent cabinet door Relay Output: 16 nos Input Interface board parameters: 22 nos input Arduino sensing board: 1

		Arduino Output board: 1 Single channel relay: 1 Proximity sensor interface board: 1 Power distribution board: 2 Solenoid Valves: DCV single solenoid 5/2 - 5nos with inlet flow control DCV double solenoid 5/3 - 1nos with inlet flow control Inbuilt Output : AC to DC 24V 15A power supply AC to DC 12V 5A power supply

Name of Robot: 4 Axis Robotic Arm

a. Technical specifications:

ROBOT:

- Number of axes = 4
- Payload = 500 gram
- Max. reach = 320 mm
- Position repeatability (Control) = 0.2mm
- Communication = USB/Wifi/Bluetooth
- Power supply = 100V-240V, 50/60Hz
- Power in = 12A, 7A DC
- Consumption = 60W max
- Working temperature = -10°C to 60°C

AXIS MOVEMENT

- Joint 1 (base)= Range: -90° to +90°, max speed: 320°/sec
- Joint 2(rear arm) = Range: 0° to +85°, max speed: 320°/sec
- Joint 3 (forearm) = Range: -10° to +95°, max speed: 320°/sec
- Joint 4 (rotation servo) = Range: +90° to -90°, max speed: 480°/sec

PHYSICAL

- Net weight = 3.4kg for robot and total 8 kg
- Footprint = 158mm x 158mm
- Materials = Aluminium Alloy 6061, ABS Engineering plastic
- Controller = Integrated type
- Mounting = Desktop

END EFFECTORS:

- 3D printer kit with max print size of 150mm x 150mm x 150mm, PLA material with a resolution of 0.1mm
- 500mw, 405nm (Blue laser) powered by 12V, TTL trigger (with PWM Driver)
- 10mm diameter pen holder
- 20 mm diameter vacuum suction cup with a pressure of -35Kpa
- Pneumatic gripper with a range of 27.5mm and 8N force

Name of Robot: Humanoid study platform

Humanoid study platform with the following specifications:

Humanoid:

Height: 397 cm

Weight : 1.7 kg

DOF: 16 - 18

Main Controller: CM-530

- Weight-54g
- CPU-ARM Cortex STM32F103RE
- Operation Voltage-6V ~ 15V (Recommended Voltage 11.1V)
- Current Consumption-When IDLE : 50mA
- External I/O max current : 0.3A
- Overall max current : 10A (Fuse)
- Operating Temperature -50°C ~ 70°C
- Internal I/O device-Button : 6 (Reset 1 ; Port 5)
- MIC : 1 (For sound detection)
- Voltage Sensor : 1
- External I/O Device-compatible I/O 5pin port : 6
- AX/MX series (TTL) 3pin connector : 5

DYNAMIXEL (servo motor) : AX-12A : 18pc

- Baud Rate = 7843 bps ~ 1 Mbps
- Resolution = 0.29°
- Running Degree = 0° ~ 300°
- Endless Turn
- Weight = 53.5g(AX-12, AX-12+), 54.6g(AX-12A)
- Dimensions (W x H x D) = 32mm x 50mm x 40mm
- Gear Ratio = 254 : 1
- Stall Torque = 1.5 N*m (at 12V, 1.5A)
- No Load Speed = 59rpm (at 12V)
- Operating Temperature = -5°C to +70°C
- Input Voltage = 9.0 to 12.0V (Recommended : 11.1V)
- Command Signal = Digital Packet
- Protocol Type = Half Duplex Asynchronous Serial Communication (8bit, 1stop, No Parity)
- Physical Connection = TTL Level Multi Drop Bus
- ID = 0 to 253
- Feedback = Position, Temperature, Load, Input Voltage, etc
- Material = Engineering Plastic
- Sensor : Gyroscope, Distance Measuring sensor, Infrared sensor
- Power : LIPO 11.1V, SMPS 12V 5A
- Remote Control : Remote controlled , Bluetooth communication