National Council of Science Museums
33 Block GN, Saltlake Sector V
Bidhannagar, Kolkata 700 091

I-18012/7/23(71)

Technical Specification

1. Supply, Installation, Commissioning and Training of Programmable Humanoid Robot
                                                                    - 2 Sets

(Height: minimum 55 cm)

The humanoid robot should be an ideal platform for teaching Science, Technology, Engineering and Math (STEM) concepts at all levels.

- At least 25 degrees of freedom which enable the robot to move and adapt to the environment.
- At least 7 touch sensors located on the head, hands and feet, sonars and an inertial unit to perceive the robot's environment and locate itself in space.
- At least 4 directional microphones and speakers to interact with humans.
- Speech recognition and dialogue available in multiple languages (especially English).
- Minimum Two 2D cameras to recognize shapes, objects and even people.
- Open and fully programmable platform.

It should have enhanced audio visual capabilities and Natural motion reflexes which include:
- Object Recognition
- Face Detection and Recognition
- Text to Speech conversion
- Automatic Speech Recognition
- Sound detection and Localization

Key Features:
- The device should be Fully programmable, open and autonomous: fully integrate this state-of-the-art hardware and software
- The device should be Easy-to-use and understand: achieve better project results and improve learning effectiveness
- The device should be Attractive and motivating: increase engagement and catch audience attention

Technical Specifications:

Construction	
Height	Minimum 55 cm
Weight	Not more than 6Kg with all accessories
Material	ABS-PC or better
Controller	
CPU	ATOM E3845; Clock Speed: 1.91GHz or better
RAM	Minimum 4 GB DDR3
Flash Memory	Minimum 32 GB
Degrees of Freedom	Minimum 25 DOF
Sensors	
Sonar	Numbers: 2 or more Range : 0.2m to 0.8m Resolution: 1cm Sensitivity: -86dB Frequency:20 to 60KHz
Force Sensitive Resistor	Numbers: 4 in each foot or more Range: 0 to 110N Sensitivity: 40g approx
Position Sensor	Number: 36 or more Type: MRE (Magnetic Rotary Encoder) Precision: 12bits/0.1˚
Inertial Unit	
Gyrometer	Numbers: 1 Axis: 3 Angular Speed: 400 to 600°/s Precision: 5%
Accelerometer	Numbers: 1 Axis: 3 Acceleration: ~2g approx.
Contact Sensors	
Tactile Head Sensor	Numbers: 3 or more
Tactile Hand Sensor	Numbers: 3
Foot Bumper	Numbers: 2 (1 per foot)
Interaction	
Loud Speakers	Numbers: 2 or more Frequency range: up to 20KHz Input: 2W

Microphone	Numbers: 4 or more Frequency range: 100Hz to 10KHz
Camera	Numbers: 2 or more Resolution: 4 to 8MP
LED	Interactive LED for Tactile Head, eyes, ears and foots
Motor Specifications	
Type 1 for Leg joints	No Load Speed: 8000 to 10000 RPM Continues torque: 10 to 20 mNm
Type 2 for Hand and Wrist	No Load Speed: 8000 to 10000 RPM Continues torque: 4 to 10 mNm
Type 3 for Head and Arm joints	No Load Speed: 9000 to 11000 RPM Continues torque: 4 to 7 mNm
Connectivity	
	Should have connectivity to Ethernet, Wifi and Bluetooth
Battery	
Battery Type	Lithium Ion
Nominal Voltage/Capacity	21.6V/2.9 Ah or better
Programming	Choregraphe Software Suite Python C++ Java

Package must include Charger & perpetual license for Software Single seat for each set

The robot will be installed at (1) Science Centre, Port Blair and (2) Sub Regional Science Centre, Jodhpur. Necessary training should be imparted to the selected officials of each centre for at least two days for operation and maintenance of the system.

Manufacturers Authorization Certificate must be submitted along with the bid.

Warranty: Should not be less than one year to be provided at Port Blair & Jodhpur

Make & Model offered: _____

To be entered by bidder

Dated   **Official Seal**   **Signature of the Tenderer/Constituted Attorney**

Technical Compliance Sheet

Compliance Sheet for Humanoid Robot:

Sl. No.	Specification	Complied (Yes/No)	Comments
1	Height: Minimum 55 cm		
2	Weight: Not more than 6Kg with all accessories		
3	Material: ABS-PC or better		
4	CPU: ATOM E3845; Clock Speed: 1.91GHz or better		
5	RAM: Minimum 4 GB DDR3		
6	Flash Memory: Minimum 32 GB		
7	Degrees of Freedom: Minimum 25 DOF		
8	Sonar Sensors: Numbers: 2 or more Range : 0.2m to 0.8m Resolution: 1cm Sensitivity: -86dB Frequency:20 to 60KHz		
9	Position Sensor: Number: 36 or more Type: MRE (Magnetic Rotary Encoder) Precision: 12bits/0.1°		
10	Gyrometer: Numbers: 1 Axis: 3 Angular Speed: 400 to 600°/s Precision: 5%		
11	Accelerometer: Numbers: 1 Axis: 3 Acceleration: ~2g approx.		
12	Contact Sensors: Tactile Head Sensor> Numbers: 3 or more Tactile Hand Sensor> Numbers: 3 Foot Bumper> Numbers: 2 (1 per foot)		
13	Loud Speakers: Numbers: 2 or more Frequency range: up to 20KHz Input: 2W		
14	Microphone: Numbers: 4 or more Frequency range: 100Hz to 10KHz		

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Dated   **Official Seal**   **Signature of the Tenderer/Constituted Attorney**

15	Camera: Numbers: 2 or more Resolution: 4 to 8MP		
16	LED: Interactive LED for Tactile Head, eyes, ears and foots		
17	Motor: Type 1 for Leg joints: No Load Speed: 8000 to 10000 RPM Continues torque: 10 to 20 mNm Type 2 for Hand and Wrist: No Load Speed: 8000 to 10000 RPM Continues torque: 4 to 10 mNm Type 3 for Head and Arm joints: No Load Speed: 9000 to 11000 RPM Continues torque: 4 to 7 mNm		
18	Connectivity: Should have connectivity to Ethernet, Wifi and Bluetooth		
19	Battery Type: Lithium Ion Nominal Voltage/Capacity: 21.6V/2.9 Ah or better		
20	Programming: Choregraphe Software Suite Python C++ Java		
21	Perpetual license for Software Single seat for each set		
22	Installation at (1) Science Centre, Port Blair and (2) Sub Regional Science Centre, Jodhpur. Necessary training should be imparted to the selected officials of each center for at least two days for operation and maintenance of the system.		

Dated   **Official Seal**   **Signature of the Tenderer/Constituted Attorney**