

Robotics Lab Details:

Sr No.		Details
1.	Lab Name	Robotics
2.	Incharge	Ms. Prajakta Koratkar
3.	Associated Members to the Lab: RAs , PhD Scholars/ Technical Staff	RA- Nil PhD- Nil Lab officer: Prajith P. Sr. Lab Assistant: Mr. Abhijeet Kamble
4.	Contact Details	020 2430 4188 020 24304186 (Lab. In-charge)
5.	Infrastructure Specs (H/W, S/W,...)	Both
6.	Area in sq units (optional)	1152 sq ft.
7.	Lab Facilities	<ol style="list-style-type: none"> 1. ABB IRB 1200, Six Axes Articulated Robot Manipulator. 2. Firebird VI-Mobile Robot. 3. Firebird V Hexapod 4. Dexter ER-2 Robotics Arm 5. Fire Bird V 2560, 2148, P89V51RD2, Spark V.
8.	Consultancy / Services Offered	NA
9.	Complete & On-going Projects (Details)	<p>Completed:</p> <ol style="list-style-type: none"> 1. Identification of Moving Target and Tracking by Laser Aiming Pointer Which Can be Installed on Autonomous Weapon System 2. SLAM based Autonomous Navigation of Differential Drive Mobile Robot using Laser scanner and ROS 3. Motion planning of robotics manipulation with deep reinforcement learning <p>Ongoing Projects:</p> <ol style="list-style-type: none"> 1. Solar powered UAV with increased endurance (time) by use of TEG and solar concentrator/collectors. 2. Indoor Swarm Robot Helpers 3. Dynamic Trot-Walking with Quadruped Robot: Simulation, optimization, and its control
10.	Collaborations (with DRDO lab, IISER, TATA, TCS, etc)	R & DE Engg., Dighi. CAIR, Banglore.
11.	Intellectual Outcome: publications/ patents/ etc.	Publication- <ul style="list-style-type: none"> • “Motion Planning Of Robotics Manipulator with Deep

		<p>Reinforcement Learning”, published in International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 5, Issue 5, and May 2020.</p> <ul style="list-style-type: none"> • Robot operating system based charging pad detection for multi-rotors, published in 4th international conference on intelligent computing and control systems in IEEE in June 2020. <p>Patents-</p> <ul style="list-style-type: none"> • A cylindrical multi order, multi point sampling system. Patent application no 202011036845 dated on 26th Aug 2020
12.	Mentors Associated: (Like Dr. APJ Abdul Kalam, etc.)	<ul style="list-style-type: none"> • Dr Alok Mukharjee, Head, Robotics , R& DE, Engg, Dighi. • Bharadwaj Amrutur, Chairman, Robert Bosch Centre for Cyber Physical Systems, Division of Interdisciplinary Sciences, IISc, Bangalore. • Dr. S K Saha, Professor, IIT Delhi.
13.	Area in sq units (optional)	1152 sq ft.
14.	Any other relevant data	Objective: To provides platform for Developing a practical understanding of Robotics and relevant areas of automation.

MAJOR ROBOTICS LAB EQUIPMENT



Robot version	Reach (mm)	Payload (kg)	Armload(kg)
IRB 1200-5/0.9	901	5	0.3
Protection	IP40/IP67/Foundry Plus 2/Clean Room		
Mounting	Any angle		
Controllers	IRC5 compact/IRC5 single cabinet		
Integrated signal and power supply	10 Signals on wrist		
Integrated air supply	4 air on wrist (5 Bar)		
Integrated ethernet	One 100/10 Base-TX Ethernet port		

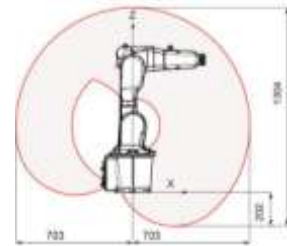


ABB IRB 1200 - SIX AXIS ARTICULATED ROBOT MANIPULATOR

- ABB IRB 1200 with teach pendant control
- Robot studio software for control over various nodes
- Pneumatic actuator gripper with compressor

MAJOR ROBOTICS LAB EQUIPMENT

- Firebird V Platform is reliable, versatile and rugged robot for advance research in mobile robotics.
- Equipped with onboard computer for Vision Processing, Laser Range Finder, Vision based Stereo Range Finders, Integrated Inertial correction to compensate for slippage, Digital Compass, GPS/DGPS receiver, support for Manipulators and Grippers.

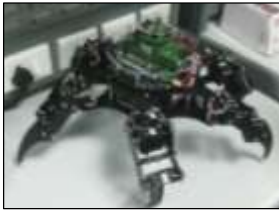


FIRE BIRD VI – MOBILE ROBOT PLATFORM

Research Areas:

- Mapping and autonomous navigation
- Vehicle navigation and control
- Machine learning and computer vision
- Mobile sensor network
- Multi agent systems
- Warehouse automation
- Reconnaissance
- Artificial intelligence and machine learning
- Vision (2D and 3D)
- Object manipulation
- Tele-presence
- Collaborative robotics, swarm robotics.

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Firebird V Hexapod

Fire Bird V Hexapod is based on Fire Bird V ATMEGA2560 platform. It has six legs, each leg has 3 degree of freedom (3 DOF). Robot has 18 NRS-995 dual bearing high torque metal gear servo motors. Robot is powered by 7.4V, 1800mAh, 20C Lithium Polymer battery. Robot can be controlled by modified Sony PS2 wireless remote control.



Dexter ER-2 Robotics Arm

Dexter ER-2 Heavy Duty Robotic Arm with Controller and Accessories is fully assembled and ready to use Robotic Arm. Robotic arm comes preassembled along with the Servo control card, Servo motion profile generator GUI, and Flex sheets with polar and rectangular coordinate systems for the robotic arm.

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Fire Bird V ATMEGA2560 Robotic Research Platform

It is powered by high performance rechargeable NiMH batteries. A 2.4 GHz ZigBee module provides state of the art secure and multi-channel wireless communication up to a range of one kilometre. Its modular architecture allows you to control it using multiple processors such as 8051, AVR, PIC and ARM7 etc. Modular sensor pods can be mounted on the platform as dictated by intended applications.



Fire Bird V P89V51RD2

Its modular architecture allows you to control it using multiple processors such as 8051, AVR, PIC and ARM7 etc. Modular sensor pods can be mounted on the platform as dictated by intended applications. on, algorithm development and testing. It is powered by high performance rechargeable NiMH batteries. A 2.4 GHz ZigBee module provides state of the art secure and multi-channel wireless communication up to a range of one kilometre.

MAJOR ROBOTICS LAB EQUIPMENT



Spark V

Spark V robot is based on ATMEGA16A microcontroller. Robot comes with rechargeable 7.2V 600mA NiMH Battery and on-board intelligent battery charger. It has 3 analog white line sensors, 3 analog IR Proximity sensors, 3 directional light intensity sensors, battery voltage sensing, TSOP1738 IR receiver for TV remote control and Position encoders.



Oscilloscope

Mixed Signal Oscilloscopes provide a deeper level of design insights with exceptional signal acquisition performance with a family of oscilloscopes ranging from the full featured 2000 series to the 70000 series that provide performance up to 33 GHz of analog bandwidth, and industry-best digital timing resolution for high speed logic capture.



With wide voltage and current ranges, the PWS4000 Programmable Power Supply Series makes a versatile addition to your bench. A basic voltage accuracy of 0.03% and less than 5 mVp-p noise means you can be confident in the power supply's output value. List mode and a USB port for remote programming accelerate complex test development.

DC Power Supply, Tektronix, PW S 4305