Robotics System And Control Lab (240504)

Robotics is the science of designing and building robots suitable for real-life applications in automated manufacturing and other non-manufacturing environments. Robot are the means of performing multifarious activities for man's welfare in the most planned and integrated manner, maintaining their own flexibility to do any work, effecting enhanced productivity, Guaranteeing quality, assuring reliability and ensuring safety to the workers.

Faculty In Charge:
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Department of Information Technology

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Major Equipment's

- **EZ Robot –JD Humanoid**

Specifications: Servo Motor: Operating speed: 0.24sec/60degree (7.4V),Stall torque: 15.0kg-cm/529 oz-in.(7.4V), Operating Voltage: 4.8V to 7.4, EZ-B v4/2 Wi-Fi Robot Controller, EZ-Builder Control Software with Apps, Humanoid Head with Camera & RGB Eyes, Humanoid Body (includes battery),Lever Servo-motor, Servo-motor Gripper, LiPo Robot Battery 7.4v 1300mAh.


- **Auto- Self Driving Car**

Specifications: Programable and portable Self-Driving Car: quad tyre with an onboard camera feed of at least 640 x 480-pixel (30Hz/60Hz) resolution and a Raspberry Pi 3 or higher model. Minimum car dimensions LxWxH 25.9 x 16 x 10.9 cm. Training to program the car online/offline

- **TETRIX® MAX Dual-Control Robotics Set**

Specifications: PRIZM controller (with USB cable): 32 KB flash programmable memory ATmega328P processor with Arduino Optiboot bootloader installed 4 digital sensor ports (D2 can be used as a serial port) and 3 analog sensor ports, I2C port, USB programming port, motor controller expansion port, and quadrature encoder input ports high-current DC motor control ports, standard control servo ports and 2 continuous rotation (CR) servo ports.
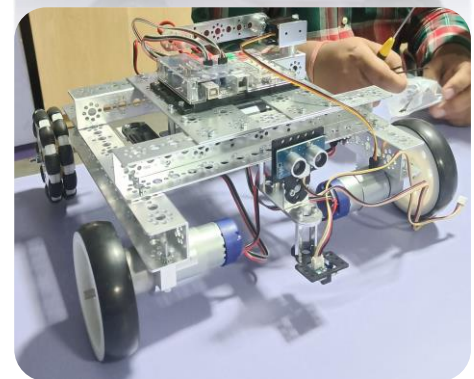
- **GPU enabled Robot Simulation Systems**

Specifications: 12th Gen Intel® Core™ i7-12 Gen processor 8GB GPU unit 16 GB DDR4 Windows 11 Home 512GB M.2 PCIe NVMe Solid State Drive + 1TB 7200 rpm 3.5"" SATA Hard Drive Monitor 24".

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SAFETY RULES

1. No bare feet or open sandals are permitted.

2. No horseplay or running is allowed in the labs.

3. When working on equipment where more than 120 volts exist between circuit points and/or ground, get your lab instructor's approval before energizing the circuit.

4. Read the appropriate equipment instruction manual sections or consult with your instructor before applying power or connecting unfamiliar equipment or instruments into any circuits.

5. Position all equipment on benches in a safe and stable manner.

6. Do not make circuit connections by hand while circuits are energized. This is especially dangerous with high voltage and current circuits.

7. Do not work alone in the lab if equipment is energized; at least one other person is to be present. You must not work alone after normal business hours.

8. For safety reasons, metal cases of instruments and appliances are usually grounded through the third wire ground. Do not consider any departure from the use of the third wire ground. e.g., "cheater plugs", without the instruction and supervision of your instructor. Failure to know whether or not an instrument case is grounded can lead to hazardous circuit conditions

9. Do not bring food or beverages near the work areas in the labs

10. Don't uninstall the software in the laboratory

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DO'S	DON'TS
Be punctual and regular to the laboratory	Don't touch live electric wires.
Maintain discipline and obey instructions all the time.	Don't TURN ON the circuit unless it is completed.
Inspect all equipment for damage prior to use—do not use damaged equipment.	Avoid making loose connections.
Check the connections properly before Turning ON the circuit.	Don't leave the lab without permission.
Turn OFF the circuit immediately if you see any component heating.	Do not handle any equipment before reading the instructions/ Instruction manuals
Dismount all the components before returning the kit.	Do not use the prohibited items like personal audio or video equipment in the laboratory
Know emergency procedures.	Never block access to EXITs or emergency equipment.
Any failure/break-down of equipment must be reported to the faculty.	Never leave experiments while in progress.

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List of Experiments

1. Study of ARC software for EZ- Robot calibration and servo profile making process.

2. Study of four unique movements for EZ- robots.

3. Program EZ- Robot for various Yoga positions.

4. Study of sound and movement multiplexing in EZ robot.

5. Study of PRIZM Controller Commands for PRIZM Controller Commands using Arduino IDE

6. Demonstration of LED commands can be used to manipulate PRIZM's red and green LEDs.

7. Study to understand a robot to move forward, pivot a robot, and stop a robot using different motor power levels at DC Motor.

8. To study the accurate movement of a robot for specific distances at specific speeds using encoder.

9. To study pedestrian detection and survival using a robot car.

10. To study Traffic sign detection using a robot car.

Course Outcome's (COs)

1. apply programming concept to implement robotics tasks.

2. explain sensors and instrumentation in robotics

3. illustrate the Kinematics and Dynamics of robotics

4. implement robotics tasks using Jetson Nano.