SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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Chennai

DEPARTMENT OF AEROSPACE ENGINEERING

19ASZ301– ROBOTICS & AUTOMATION IN SPACE

III YEAR VI SEM

UNIT 4 –PLC, SCADA AND SENSORS IN AUTOMATION

TOPIC - TOUCH SENSORS, TACTILE SENSOR, PROXIMITY AND RANGE SENSORS

TOUCH AND TACTILE SENSORS IN ROBOTICS

Touch Sensor:

- Detects binary contact (touch/no-touch).
- Typically used for collision detection, gripper feedback.
- Examples: push buttons, capacitive switches.

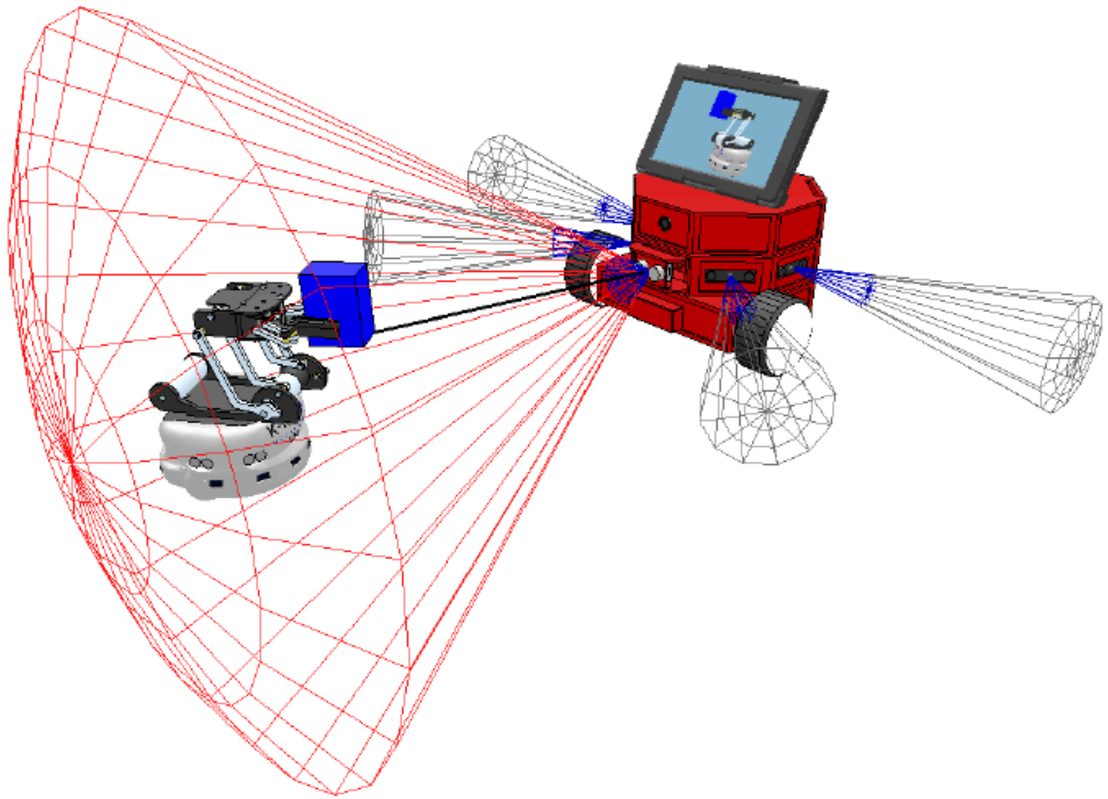
Tactile Sensor:

- Measures distributed pressure or force over a contact surface.
- Enables robotic hands to detect object texture, shape, or slip.
- Examples: piezoresistive arrays, capacitive skin sensors.

Touch Sensor	Tactile Sensor
Detects contact/no-contact	Measures pressure over an area
Binary output	Analog/matrix output
Simple, discrete signal	Complex sensing for fine manipulation

PROXIMITY SENSORS

Type	Senses	Common Application
Inductive	Metal	Conveyor belt automation
Capacitive	Any material	Level detection in tanks
Ultrasonic	Distance (non-contact)	Robotic obstacle detection
Infrared	Heat/light	Edge detection, alignment



RANGE SENSORS AND THEIR ROLE IN SPACE ROBOTICS

Range Sensors:

- Measure distance to objects or surfaces – vital for navigation, mapping, and manipulation.

Types:

- LIDAR (Light Detection and Ranging)
- Ultrasonic Distance Sensors
- Stereo Vision Systems
- Time-of-Flight (ToF) Sensors

Applications in Space:

- Obstacle avoidance in planetary rovers
- Precision docking of spacecraft
- Terrain mapping for autonomous navigation

Sensor	Range	Resolution	Use Case
LIDAR	0.1–100 m+	High	Mars rover navigation
Ultrasonic	2–400 cm	Medium	Short-range object detection
Stereo Vision	Variable	High	Visual 3D perception

Thank You