Sensors in Robotics

Main Points: Types, Classifications, and Functions

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Types of Sensors Based on Application

Sensors are used based on application domains:

- Vision
- Tactile
- Temperature
- Range and Proximity
- Motion
- Navigation
- Speech Recognition

Examples: Vision, Tactile, Temperature

Vision: Webcam, Thermal camera, Kinect

Tactile: Capacitive touchpad, Force-sensitive resistor

Temperature: Thermocouple, Thermistor

Examples: Proximity, Motion, Navigation, Speech

Proximity: Ultrasonic sensor, IR sensor, LIDAR Lite

Motion: MPU6050, ADXL335 accelerometers

Navigation: uBlox GPS module, HMC5883L

Speech Recognition: MEMS mic, Google Voice Kit

Classification of Sensors

Sensors are classified into:

- Internal Sensors
- External Sensors

Internal Sensors

- Position: Rotary Encoders, Potentiometers
- Velocity: Tachometers
- Acceleration: ADXL345

External Sensors

- Contact Type: Bump sensors, Tactile switches
- Non-contact Type: IR sensors, Ultrasonic, LIDAR

Functions of Sensors

- **Perception**: Detect environment/internal state
- **Feedback**: Provide real-time control signals
- **Safety**: Detect hazards and prevent damage
- **Navigation:** Assist in path and location tracking
- **Interaction:** Enable physical interaction

Thank you

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