Robotics Proposal

Project Title: Hand Gesture Controlled Robot

Description

Our robot will be a gesture-controlled robot that responds to hand gestures captured by a webcam. The system will use computer vision techniques to recognize specific gestures made by the user and translate them into movement commands for the robot. For example, gestures such as a closed fist, or other finger positions will instruct the robot to move forward, backward, turn, or stop. The robot will also incorporate an ultrasonic sensor to detect nearby obstacles and prevent collisions, and a gyroscope to maintain balance and stability during movement.

Track: Hardware

Main Objective

The main objectives of this project are:

1. To acquire real-time visual input from a webcam.
2. To process this input using computer vision algorithms to detect and classify hand gestures.
3. To map each recognized gesture to a corresponding robot movement command. (see appendix)
4. To integrate obstacle detection (with the ultrasonic sensor) and motion stabilization (with the gyroscope) for safer and more accurate movement.

Sensors and Inputs Used

- Webcam: For visual input.
- Ultrasonic Sensor: For detecting obstacles and maintaining safe distances.
- Gyroscope: For tracking orientation and ensuring stability during movement.

Expected Outputs/Behaviours

The expected behaviour of our robot is that when the user does different hand gestures in front of the camera, the robot will act and move depending on the gesture made. For example, a specific hand gesture will mean that the robot must start moving forwards or backwards, turn to a certain direction, or stop moving. Additionally, if an obstacle is detected by the ultrasonic sensor, the robot will automatically change direction to avoid collisions.

Team Members and Roles

Daniel Pace
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Command	Left Hand (Control)
Turn Left	Point left 👈
Turn Right	Point right 👉
Move forward	Point up ☝️
Move backward	Point down 👇
Stop	Closed fist ✊
Secret	??? 🤔💬

The right hand specifies the angle for turn commands (left / right), and the duration for the other commands. Find out the secret.