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Juggling Robot

Project Number: 22-1-12463
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Objectives

- ❑ Establish an ultrasonic microphone array that detects a collision with a flat surface.
- ❑ Set up communication between the microcontroller (the microphone array) to the ROS controller for future closed loop control.

Implementation

- ❑ Control the UR3E and configure the controller for bouncing motion.
- ❑ Build an ultrasonic microphone array that detects the place of impact on surface.
- ❑ Implement a differential algorithm that uses the delay between the measured signals on each axis for detecting the position of the ball.
- ❑ SW GUI that visualizes the place of impact on the surface in real time.
- ❑ Create SW communication between the microcontroller and the ROS controller.
- ❑ Implement a basic PID controller on the ROS controller.

Results

- ❑ Fast and steady open loop control of the robotic arm for the required functionality.
- ❑ Microphone array can detect the ball position on the board accurately in real time.
- ❑ Arm controller receives the data from the microcontroller and drives it to a PID controller.