

Brief project description

The purpose of this project was to create a voice controlled robot that is capable of operating autonomously.

The robot has 4 directional ultrasonic distance sensors to deal with the outside environment.

Voice control is processed using Google's speech-to-text API.

The robot is able to give visual and audio feedback of its state using the LCD display and passive buzzer.

Ultrasonic distance sensors, the buzzer and the display are controlled by Raspberry Pi Pico. To exchange data between the robot and the Pico, serial connection is established.

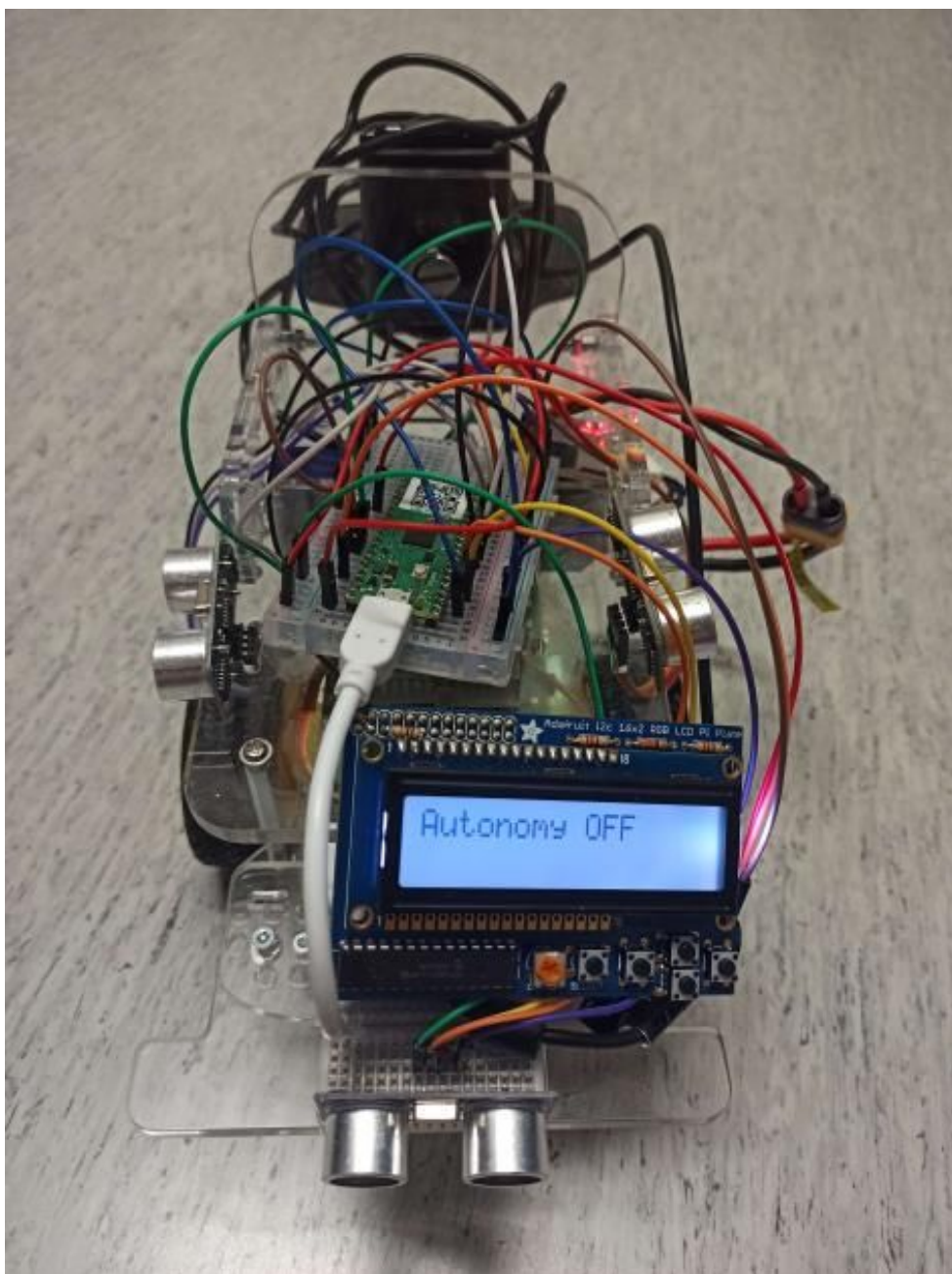


Figure 1. The robot after receiving the command to turn off its autonomous mode.

Autonomous mode

The autonomous mode of the robot is employing the use of ultrasonic distance sensors. It will keep going forward until it reaches an obstacle, then it will decide whether or not to turn left or right based on the side sensors.

We are able to turn this mode on or off by speaking to the robot and telling: "Autonomy on/off".

Voice control

To process voice commands, we are using Python's speech recognition together with Google's speech-to-text API. The main drawback of this method is that it is online, so it heavily depends on the connection. It is constantly listening to its surroundings and will execute commands only when it has heard the ones that it understands:

- Go forward / Go backward x cm
- Turn left / Turn right x degrees
- Go left / Go right
- Stop
- Autonomy on / Autonomy off

Programming and testing

We have tested out our implementation on both noisy and noiseless environments. Unfortunately the robot itself is producing noise as it is driving so it is sometimes having difficulties hearing our commands. In spite of this, the overall implementation works adequately.