Echipa 5:

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Project name: Parking sensor with acoustic and visual warning

Code: https://github.com/TAlex-cmd/SM

Video: https://youtu.be/eO7WS3araSA
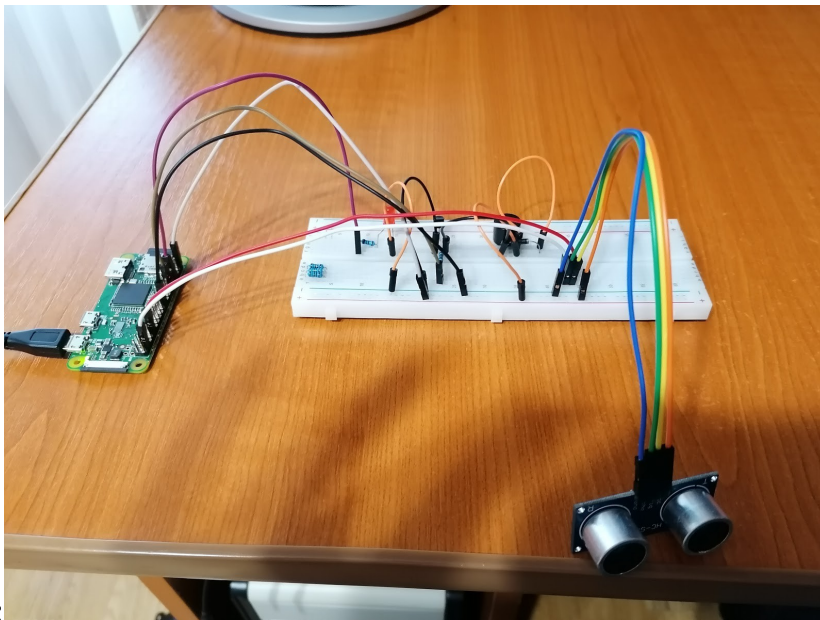
Cover Photo:

Elevator Pitch: This project measures the distance between your car and the nearest object. If the distance is less than 25 cm, the buzzer and the LED start to warn you, and the intensity increases as the distance decreases.

Story: The project will analyze the distance to the nearest object using the Ultrasonic module HC-SR04+. If the distance is less than 25 cm, but greater than 15 cm, the buzzer will emit a 500hz sound and the LED will light for 0.1 seconds and the process will repeat after 0.1 seconds if the object is in the same interval. If the distance is between 15 and 10 cm the buzzer and the LED will work for 0.05 seconds(x2 speed), and for distances less than 10 cm the buzzer and the LED will work almost continuously until the distance increases or the system is stopped.

We used 3 python modules:

- time – to measure the time between signal transmission and reception;
- pigpio – to generate the PWM signal for the buzzer;
- RPi.GPIO – to control the GPIO pins;

The ultrasonic module consists of an ultrasonic transmitter and an ultrasonic receiver. The transmitter is used to generate an ultrasonic sound at about 40kHz. When there is an object in front of the transmitter, the ultrasound is bounced back to the receiver and using the speed of sound and the time between transmission and reception, we calculate the distance to that object with an accuracy of up to 3mm. **The buzzer** is a passive one so it can make different tones, but it requires a PWM signal from the device which controls the buzzer, in order to produce a noise. We always used a frequency of 500hz and a duty cycle of 50% for the warning sound. Using the transistor(NPN) and the 1kΩ resistor we amplify the board output(3.3V) up to 5V to power the buzzer, and the diode ensures the passage of current in only one direction.

In order to blink an **LED**, you connected the negative terminal to a GND pin of the development board, and the positive terminal to a digital pin(8). We used the 150Ω resistor to reduce the current flow.

Software setup:

- sudo apt-get install python3.8
- sudo apt-get install RPi.GPIO
- sudo pigpiod
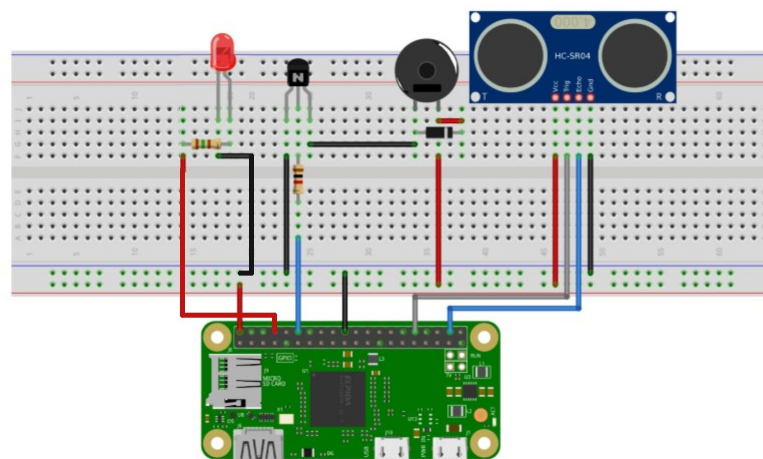
Components and apps:

    Hardware components:

- Development board with accessories;

- Breadboard 830p;
- 1 x passive buzzer;
- Diode;
- Transistor;
- 1 x 1000Ω resistor;
- 1 x 150Ω resistor;
- 1 x LED;
- male-to-male jumper wires;
- female-to-male jumper wires;
- Ultrasonic module HC-SR04+.

Software apps and online services

- Raspberry Pi Raspbian
- Python 3.8 programming language
- Python modules: time, pigpio, RPi.GPIO
- PuTTY - SSH Client

Schematics: