

Aim: To design a parking sensor system

Apparatus: RaspberryPi 4, Raspbian OS, Ultrasonic Sensor, Buzzer, Breadboard, Jumper wires, LED

Theory: Raspberry Pi is a small, affordable, single-board computer designed to encourage learning and experimentation in the field of computer science and electronics. Developed by the Raspberry Pi Foundation, the Raspberry Pi has gained immense popularity due to its versatility and ease of use. Ultrasonic sensors are devices that use ultrasonic sound waves to measure distances and detect objects. They operate on the principle of emitting a sound wave (typically above the range of human hearing) and measuring the time it takes for the wave to bounce back after hitting an object. This time delay is used to calculate the distance between the sensor and the object. A buzzer is an electronic sound-producing device that converts electrical signals into audible sound. It is often used to provide audio feedback or alert signals in various applications.

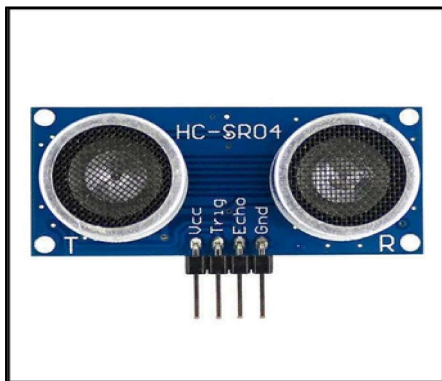


Fig 1. Ultrasonic Sensor

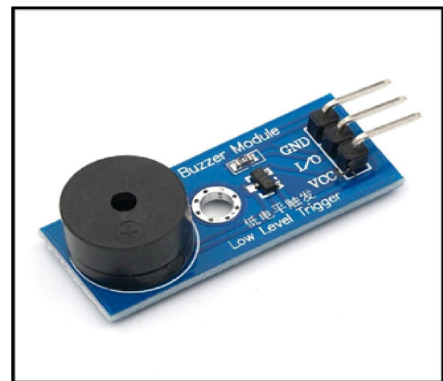


Fig 2. Buzzer

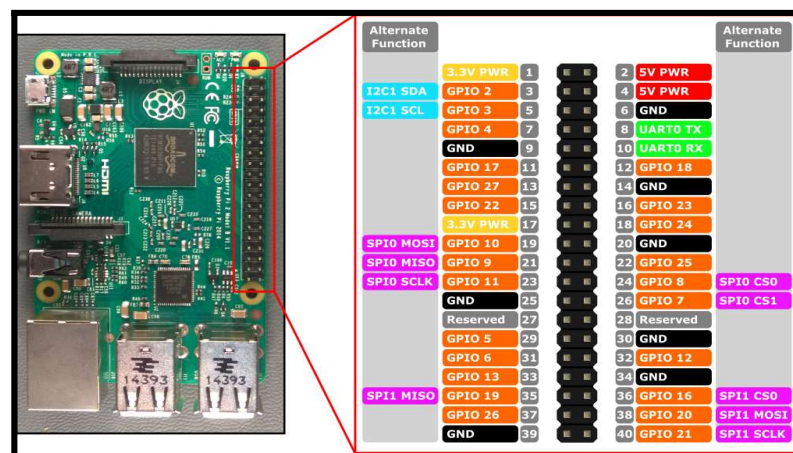


Fig 3. Raspberry Pi along with its pin configuration

Procedure:

Step 1: Hardware Setup

- i. Connect the ultrasonic sensor's VCC and GND pins to the Raspberry Pi's 5V and GND pins respectively.
- ii. Connect the ultrasonic sensor's trig pin to a GPIO pin (e.g., GPIO17) on the Raspberry Pi.
- iii. Connect the ultrasonic sensor's echo pin to another GPIO pin (e.g., GPIO18) on the Raspberry Pi.
- iv. Connect the buzzer to a GPIO pin (e.g., GPIO22) and a GND pin on the Raspberry Pi.
- v. Connect the screen to the Raspberry Pi's HDMI port using an appropriate cable.

Step 2: Software Setup

- i. Insert the SD card with the Raspberry Pi OS installed into the Raspberry Pi.
- ii. Power on the Raspberry Pi.
- iii. Open a terminal.

Step 3: Coding and Implementation

- i. Install the required libraries by writing pip install Rpi.GPIO
- ii. Write the Python code to interface with the ultrasonic sensor and control the buzzer and LED screen and save it as parking_sensor.py
- iii. Execute the Python code on the Raspberry Pi terminal by python parking_sensor.py

Circuit Configuration:

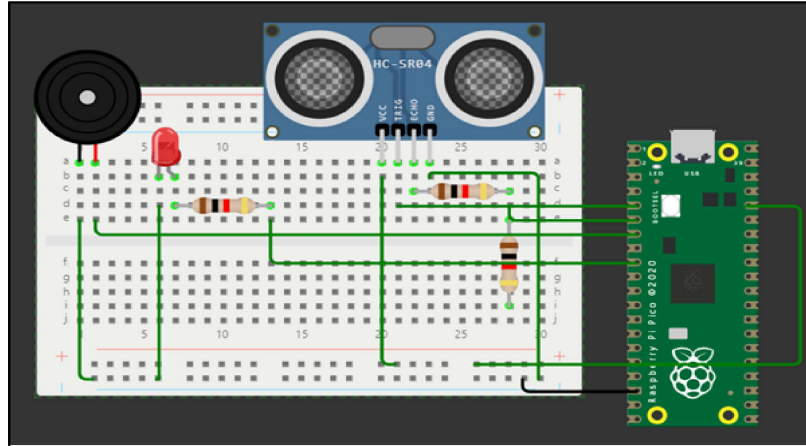


Fig 4a. Circuit diagram

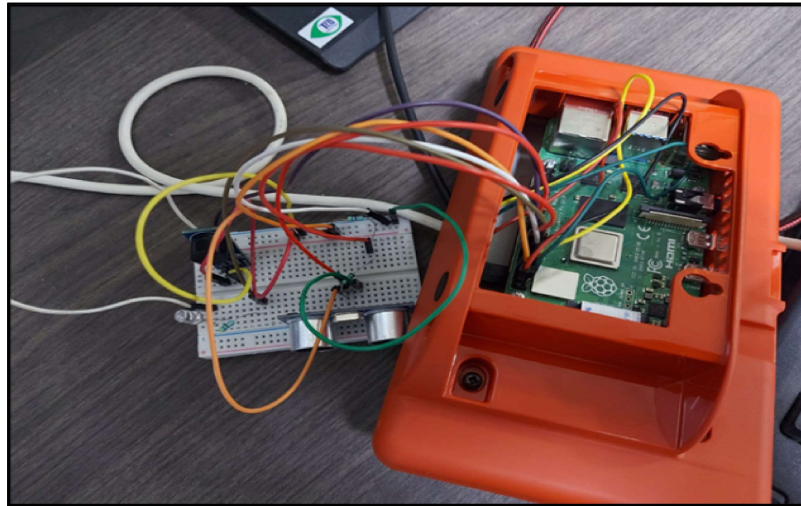


Fig 4b. Circuit diagram

Observations:

1. Observe the LED screen for distance readings.
2. Note the behavior of the buzzer when an obstacle is detected and led glows.

Courtesy:-

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