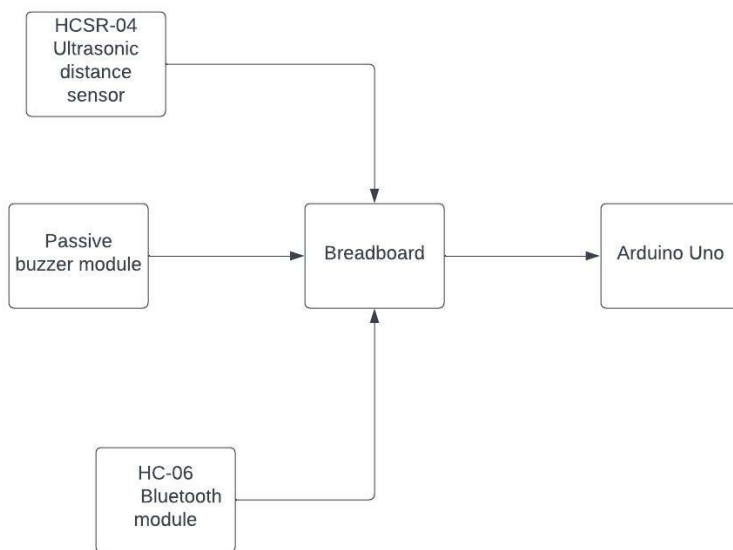


Proximity Alarm

Introducere

The proximity alarm is a defensive device that gives an audio signal when a person passes within its direct range. The goal is to detect unwanted visitors, so someone is aware of their position. The idea behind the project is taken from an online tactical shooter game and it acts like previously stated. The device can be used in Close-Quarters Battle by slowing down attackers and helping out defenders in certain areas.

Descriere generală



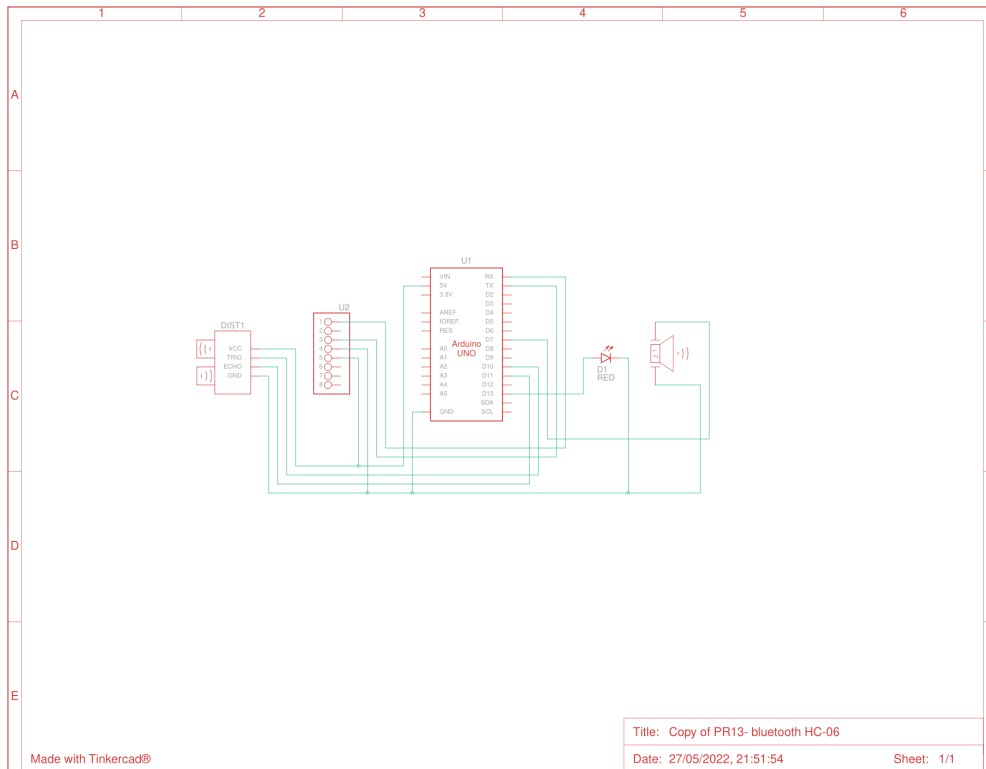
Hardware Design

Components:

- Arduino UNO board,
- Breadboard,
- HC-SR04 Ultrasonic Sensor,
- HC-06 Bluetooth module,
- Passive buzzer module,
- Jumper wires,
- Leds,

- Resistors.

Schema circuit :



Software Design

The IDE used to write the program was Arduino IDE. The modules used in the circuit are:

- HC-SR04 - Ultrasound distance sensor.
- HC-06 - Bluetooth module
- Passive buzzer

The program uses a few functions such as :

- pulseIn() → Reads a pulse (either HIGH or LOW) on a pin. For example, if value is HIGH, pulseIn() waits for the pin to go from LOW to HIGH, starts timing, then waits for the pin to go LOW and stops timing. Returns the length of the pulse in microseconds or gives up and returns 0 if no complete pulse was received within the timeout. The function is used for the echo pin of the ultrasonic sensor.
- tone() → Generates a square wave of the specified frequency (and 50% duty cycle) on a pin. A duration can be specified, otherwise the wave continues until a call to noTone(). The pin can be connected to a piezo buzzer or other speaker to play tones. Only one tone can be generated at a time. If a tone is already playing on a different pin, the call to tone() will have no effect. If the tone is

playing on the same pin, the call will set its frequency. We use the function to give an audio warning if something is detected by the sensor.

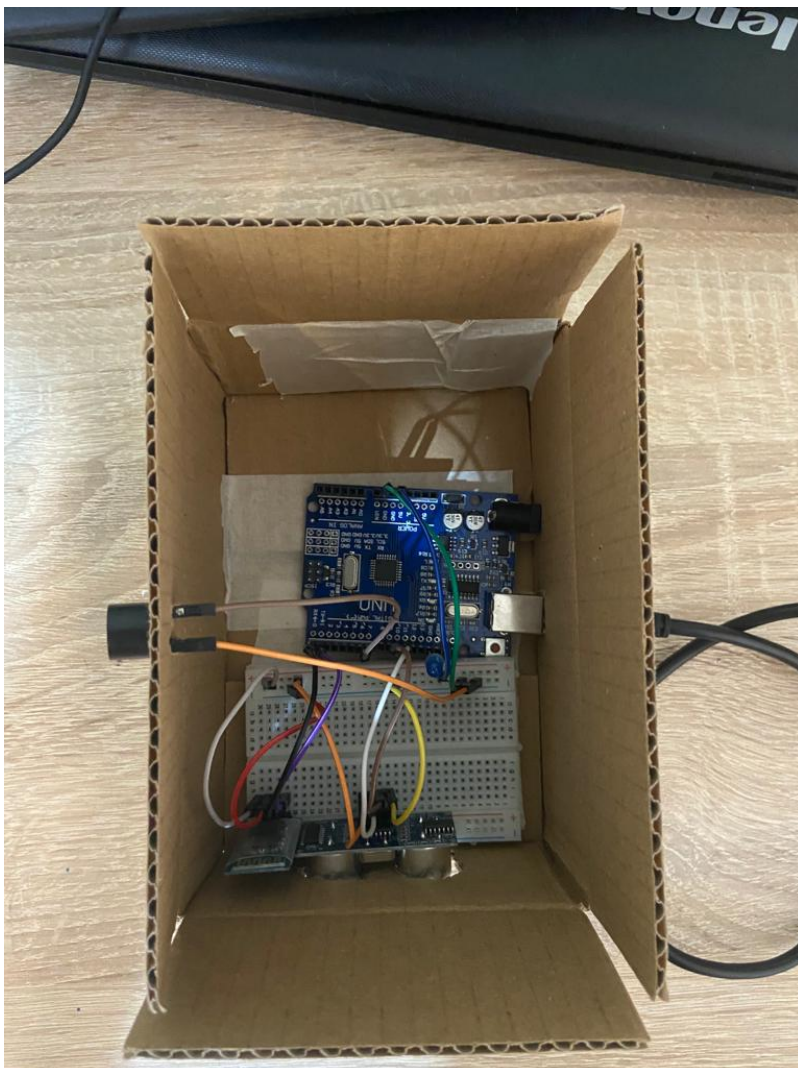
- `noTone()` → Stops the generation of a square wave triggered by `tone()`. Has no effect if no tone is being generated.
- `delay()` → Pauses the program for the amount of time (in milliseconds) specified as parameter. (There are 1000 milliseconds in a second.)
- `setup()` → Initialize the components .

Also in order to get the distance in centimeters we use a little formula: $\text{distance} = (\text{duration} * 0.034) / 2$. Speed of sound travels at 340 meters per second or 0.034 centimeters/microseconds. The alarm gets more alert as you get closer to it. In this case if an object is less than 20 centimeters away from the sensor, but its adjustable according to your needs.

Rezultate Obținute

The proximity alarm in action.

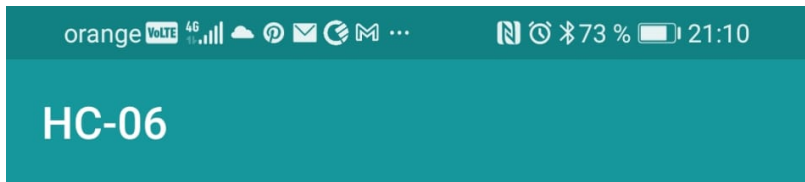
[Here](#) is the demo that I uploaded on youtube.



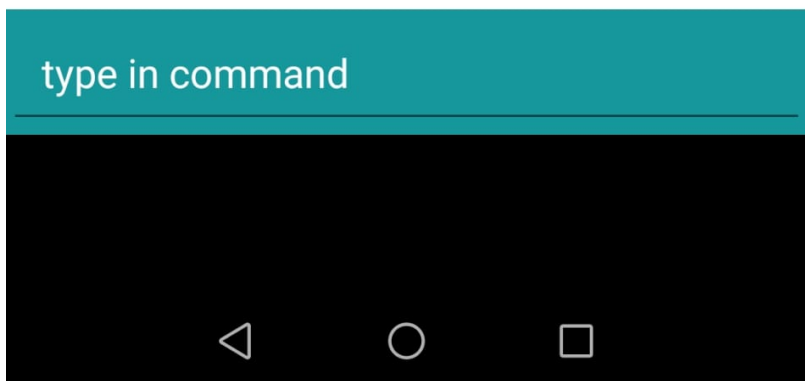




Results that you receive on the remote device (smartphone).



```
... ..  
HC-06: Distance: 176.60 cm  
HC-06: -----  
HC-06: Distance: 176.58 cm  
HC-06: -----  
HC-06: Distance: 1183.34 cm  
HC-06: -----  
HC-06: Distance: 23.31 cm  
HC-06: -----  
HC-06: Distance: 22.51 cm  
HC-06: -----  
HC-06: Distance: 21.62 cm  
HC-06: -----  
HC-06: Distance: 15.52 cm  
HC-06: -----  
HC-06: Distance: 11.49 cm  
HC-06: -----  
HC-06: Distance: 11.48 cm  
HC-06: -----  
HC-06: Distance: 11.59 cm  
HC-06: -----  
HC-06: Distance: 17.10 cm  
HC-06: -----  
HC-06: Distance: 23.04 cm  
HC-06: -----  
HC-06: Distance: 23.04 cm  
HC-06: -----
```




Concluzii

Although the project may look “Raw” this might be due to the low grade quality(especially the sensor)

of the components or the lack of a casing to protect the circuit as in a real situation in can easily be destroyed. There are a few things that may be worth implementing such as .

- A replaceable battery so it doesnt have to be plugged 24/7.
- You could maybe work an actual Entry Denial Device that uses the Proximity alarm as a base and use explosive or other traps that may help in denying entrace from a point, not just an information device.
- If you attach a camera to it you can even get a functional parking assistance device.

In the end the Proximity alarm can set the base to a lot of practical devices, not only for tactical use by soldiers/special troops, but even for day to day activities like parking your car or a package delivery detector, so you know when that sweet order of yours arrived .The limit is only your imagination. 

Download

Here's the archive with all the files I used during the making of this project(schematics, video, photos and the code file)

[proximityalarm.zip](#)

Bibliografie/Resurse

1. [HC-06 Bluetooth module datasheet](#)
2. [HC-SR04 Ultrasound distance sensor datasheet](#)
3. [Main source for schematics](#)
4. [How to use a Piezo Buzzer](#)
5. [How to use an Ultrasound distance sensor](#)
6. [App used for the remote information output](#)

[Export to PDF](#)

From:

<http://ocw.cs.pub.ro/courses/> - **CS Open CourseWare**

Permanent link:

http://ocw.cs.pub.ro/courses/pm/prj2022/agmocanu/proximity_alarm 

Last update: **2022/05/27 20:34**