Hot Car Emergency Project

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Background

Countries such as the United Arab Emirates that have critical weather conditions, are facing a critical issue that has taken the life of many children and pets. Due to the rising summer temperatures that often reach a high of 50 degrees Celsius, when children or pets are left locked inside the car, it takes under 10 minutes for these children and pet to die due to heat stroke and CO2 asphyxiation.

Objective and Problem Statement

The main objective for our project as described by our professor Muslim Majeed, was to create, design, and manufacture a device that can alert the parent/guardian of the children or pet, as well as any passersby that there is someone in the car in risk of dying if actions are not taken immediately.

Needs (as described by our client Mansour Kharoub)

- Device must alert parent/guardian/passerby
- Must sense the presence of a car occupant
- Must detect critical temperatures
- Should be separate and independent from car components
- Should be affordable
- Should have its own power source
- Should be able to be installed in any type of vehicle
- Notifications or alerts should be sent to the user regardless of the temperature

Design Criteria

- The device will have sound and/or lights to alert those passing by.
- The device will send notifications to the parent(s)/guardian's smartphone.
- The device will have a temperature sensor which will be the main switch for the notifications and alarm system.
- The device will have its own battery system.
- The cost of the device will be kept under $50.
- The device will also have a motion sensor to detect movement regardless of the temperature.
- The device's batteries will not be rechargeable

Different Solutions

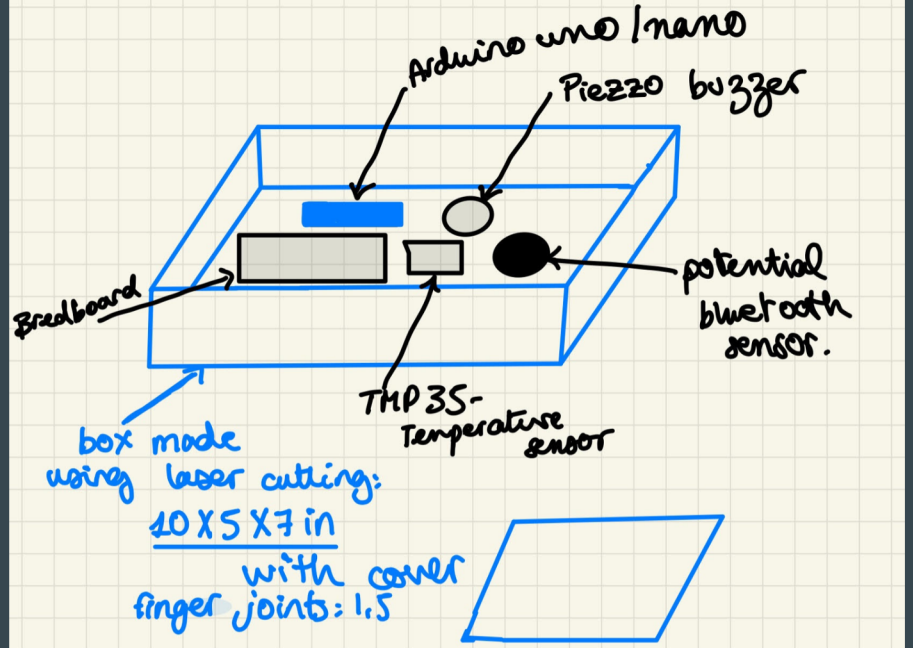
Three main solutions considered were:

1. Temperature and load sensors, combined with a buzzer alarm.
2. Temperature and motion sensors, combined with a buzzer alarm.
3. Temperature and CO2 sensors, combined with a buzzer alarm.

Design Chosen

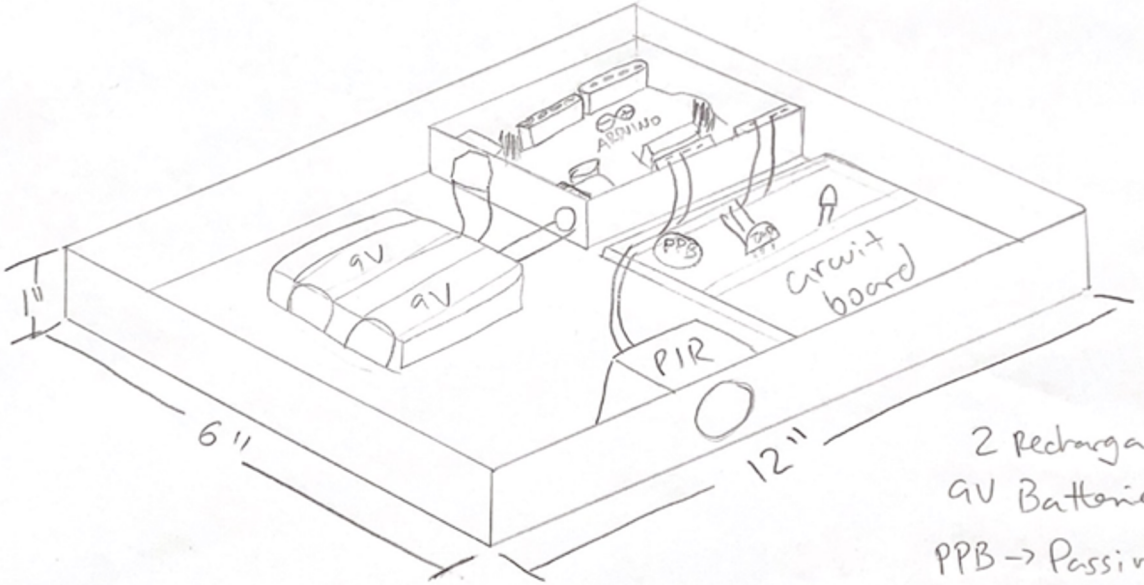
After listening to our client's feedback, combined with several hours of brainstorming, we came to the conclusion that the best way to achieve all of the objectives for the project, while prioritizing the client's needs, is to choose a design that uses a motion sensor and a temperature sensor to monitor the internal state of the car. These sensors are then connected to a buzzer that acts as the alarm system. The system is powered by two 9V batteries.

Initial Prototypes



sketch for the box.

PS: the motion sensor will be placed on the ceiling / backseat corner of the car.

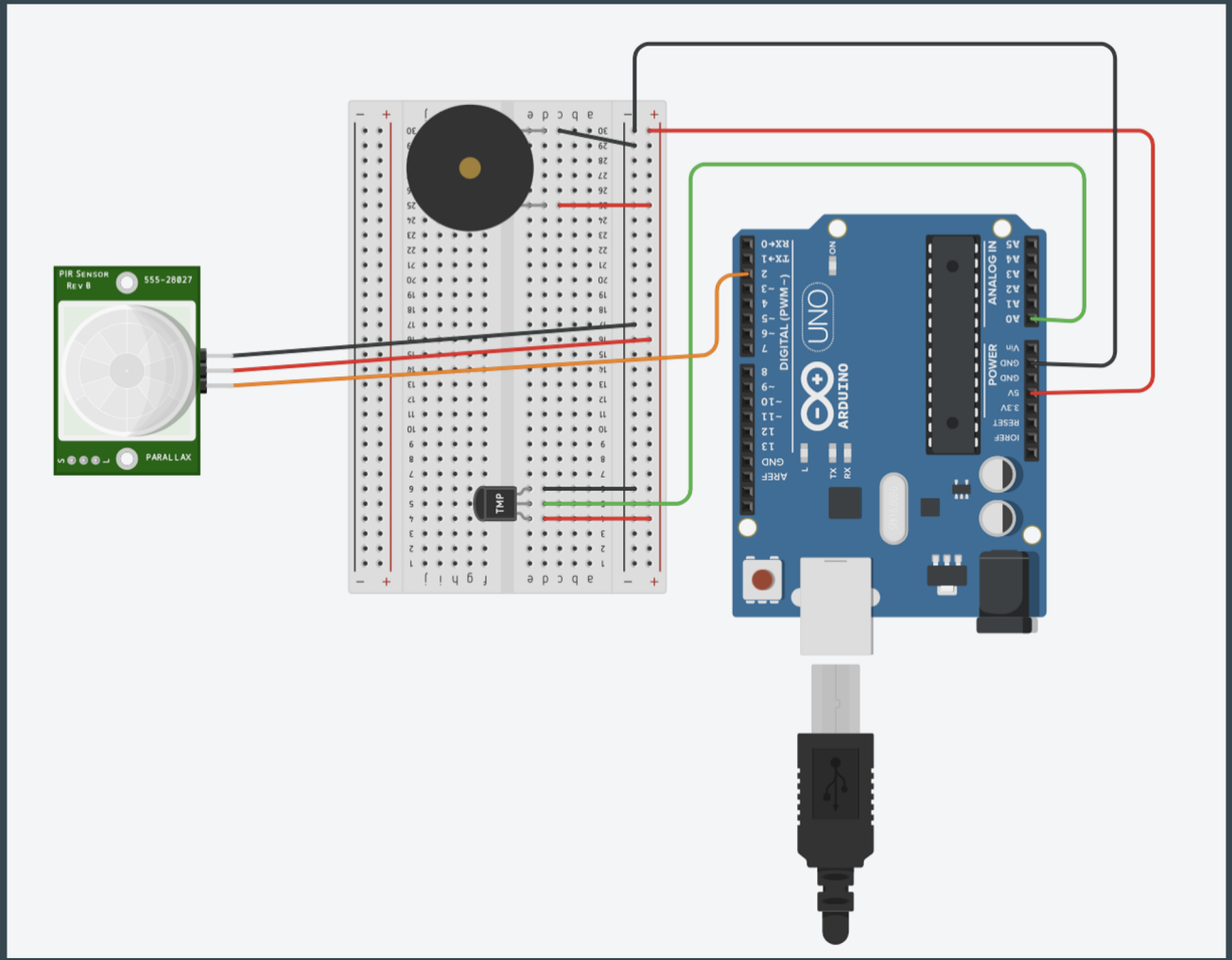


2 Rechargable 9V Batteries

PPB → Passive Piezo Buzzer

TMP → Temperature Sensor

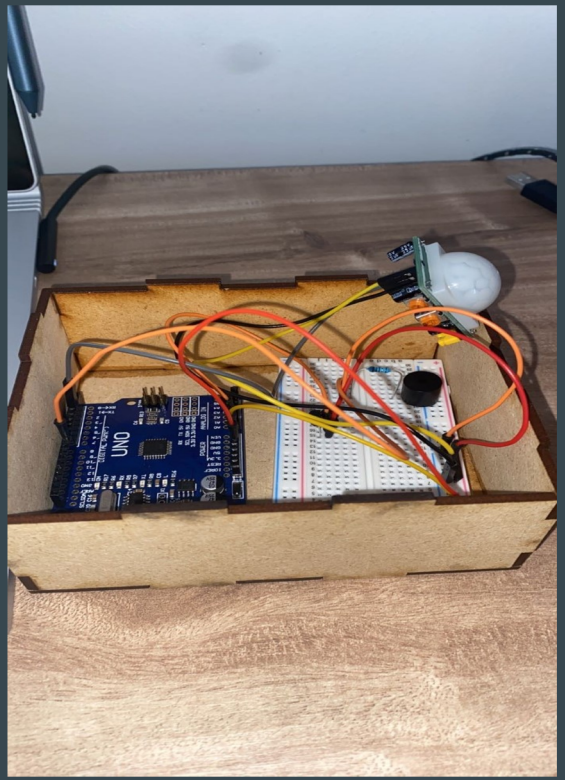
PIR → Motion Sensor


PIR Sensor
Rev B
555-28027
PARALLAX
TMP
UNO
ARDUINO
DIGITAL (PWM~)
ANALOG IN
POWER

Alarm Systems In Our Prototype

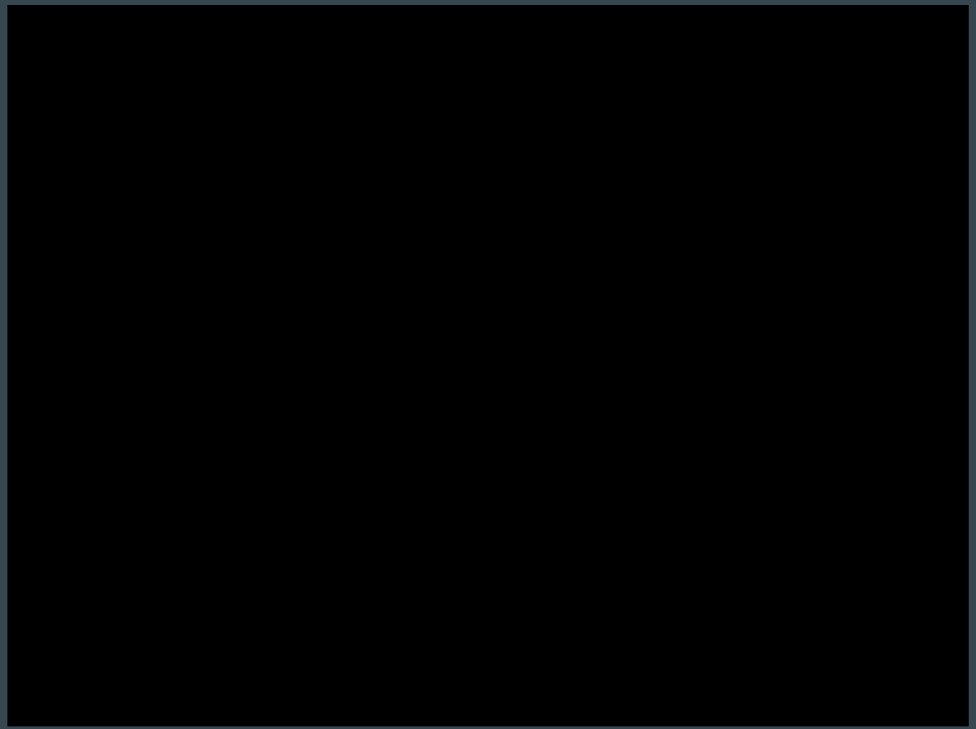
- Temperature & Motion Sensors: the temperature and motion sensor are used in conjunction in order to detect if there is a child left in a hot car unattended
- How It Works: the Arduino uno is constantly assessing the ambient temperature and state of motion in the car using the TMP36 temperature sensor and HC-SR501. If a threshold temperature of 35℃ and motion is detected, the alarm will sound alerting bystanders of the situation.
- Future Plans For The Alarm System: The next iteration of our product will have smartphone connectivity. By using bluetooth push notifications we would alert the parent/guardian of the situation. This push notification system will also make false alarms less likely as the parent/guardian can disable the alarm if the child is with them.

Final Prototype



Alarm system at work

Note: threshold temperature set to 20℃ for demonstration purposes



Product Description

The final product will uses a combination of an on site alarm system and push notifications to alert a person to the potentially dangerous situation. When the person finally returns to the car, they will have 10 seconds do push a disable button in order to deactivate the alarm before it sounds.

Lessons Learned

Throughout the length of this project we were able to put the design process into practice, along with the concepts of design thinking that we have seen in this course. This helped us to get a more thorough understanding of what working in the engineering industry is like, which is working in teams and following a series of steps that assure the best quality of work possible. Following the stages of the design thinking process along with working through client feedback can help to make sure your design can comply with all the criteria while keeping the client's best interest in mind.