Baby Car Alarm

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BACKGROUND

As society has progressed so has technology. There have been huge strides to make our lives safer. However, there are still some areas which are lacking. An area of concern is inside a vehicle in the summer. A car's internal temperature can exceed 110°F. This raises the risk of a child is left in a vehicle.

Figure 1

Credit: nytimes Wirecutter

Problem Statement

Figure 2

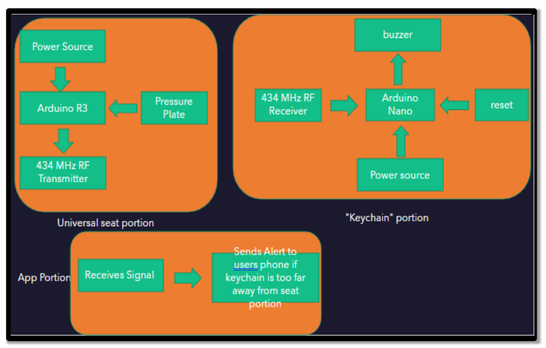
Credit: Ford.com

The design project is to make a device that alerts the user when they have forgotten their baby in the car so that the baby does not die from the heat. The device needs to be loud enough so the user can hear it, small enough so that it can fit into a pocket or purse, and reliable so the user does not have to worry if the battery will die at a crucial time

Block Diagram

The block diagram is sectioned into 3 portion. The first is the transmitting side. It send s a signal to the receiving side. Next it activates the buzzer to notify the user. While also using the IoT cloud via Wi-Fi to send a text message to the user.

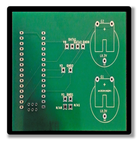
Figure 3



PROPOSED SOLUTION

Our solution will be a receiver and transmitter device attached to the car seat and the user. There will be a sensor on the car seat to notify the device that there is a child present. If the receiver goes outside the range of the transmitter. Then the receiver will be notified via a buzzer and a notification from the user's phone. The benefit of our solution is that the user will be notified in multiple separate ways to make sure that they do not forget their child.

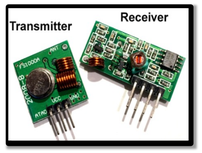
SYSTEM DESIGN



PCB

The PCB consists of 2 3-pin 2032 Batteries in series, a switch, RF receiver buzzer and Arduino nano 33 IoT pin layout. The final size of the PCB is 5.71cm by 8.0cm

RF Transmitter and Receiver

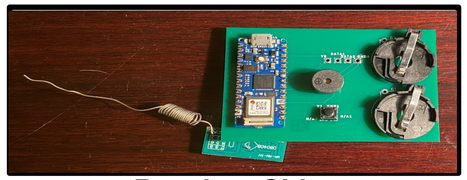


The 433MHz transmitter and receiver is used to relay a wireless signal. The transmitter and receiver are used to communicate between the nano and uno.

IoT Cloud

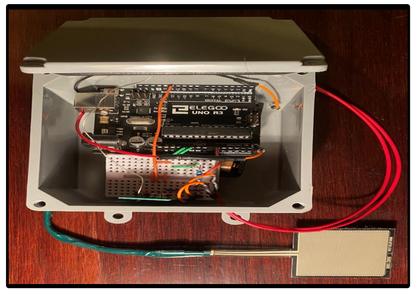
The IoT cloud connects to the Arduino nano through the internet using the WifiNINA library. The IoT cloud was used to build an interactive dashboard that will control the Arduino. The user can input up to two phone numbers in email format. A text message will be sent to the phone numbers when the receiver is out of range of the transmitter. The IoT can turn the buzzer on and off. It will display the date and time. It has an RF status function which will turn green and display “ON” when the Arduino is receiving from the transmitter. Finally, it has a built-in battery scheduler which when activated will turn the buzzer on and turn the Battery Status red. Once the batteries have been replaced the user will hit the battery reset button which will turn the Battery Status back to green.

Figure 4



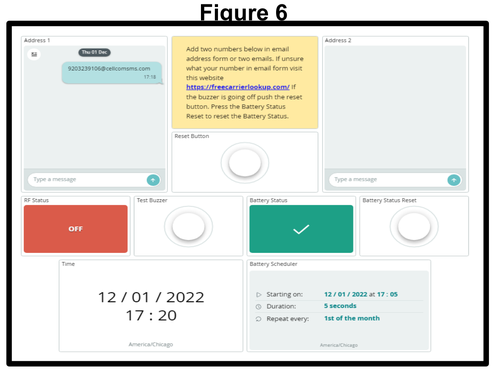
Receiver Side

Figure 5



Transmitter Side

Figure 6



IoT Application

Arduino Uno R3

The Uno is on the transmitting side of the project. This microcontroller takes in the signal from the force sensing resistor and delivers a signal to the 433MHz transmitter to tell the "keychain" portion information

Arduino Nano 33 IoT

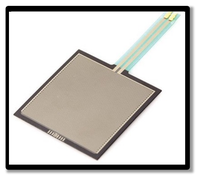
The nano is on the receiver side of the project. The Arduino is connected to the IoT cloud which the user can interact with to tell the nano to do specific tasks. The nano will activate a buzzer when it is out of range of the transmitter. The nano also has a button input the user can push to turn the buzzer off.

Power Management

The Transmitter side of the design uses 4 AA Batteries in series to deliver 6 volts. The receiver side of the design uses 2 2032 batteries in series to output 6 volts. The IoT cloud has a battery scheduler so that the user can be reminded when to change the batteries.

Force Plate Sensor

The plate is a force sensing resistor. When there is no pressure, the sensor looks like an infinite resistor. The harder the user presses on the sensor, The lower the resistance. This plate will be placed in the car seat and the weight of the baby will activate the sensor which will turn the transmitter on.



FUTURE DIRECTION

- The integration of a heart rate sensor. This would be used in case of an accident; to aid first responders.
- The addition of another PCB for the transmission side. With on-board power supply.
- A redesigned PCB for the receiver side.
- Creation of casing for both sides.

REFERENCES

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https://www.nytimes.com/wirecutter/reviews/best-convertible-car-seats/

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CONTACT INFORMATION

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