

Breathalyzer Test

Problem: Drunk driving causes 30% of accidents and 55% of fatal accidents while only being around 17% of the population on weekends and less than that on weekdays.

Background research: A breathalyzer, an alcohol meter, is a device for measuring breath alcohol content. It is commonly utilized by law enforcement officers whenever they initiate traffic stops. Not many solutions to our issue are similar to ours. The most useful pieces will be the Alcohol gas sensor to test them followed by the LCD screen to display their current alcohol level, and lastly, a traffic light LED to display how drunk they are on a scale of, Green – Sober, Yellow – Semi-intoxicated (not recommended to drive) or an alcohol level that isn't completely sober and less than 0.08, Red – Intoxicated (not allowed to drive) a blood alcohol level of 0.08 or higher.

Problem: Drunk drivers are very common, causing a total of 55% of fatal car crashes in Canada. This is a major issue because of how common it is and how simple it is to stop.

Solution: Usually, police must stop people to figure out if a person is drunk or bad at driving, but our device will be a lot cheaper than an average breathalyzer, so every business that sells liquor will be able to afford it and place it in their establishment, letting them test peoples blood alcohol levels to make sure it's safe to drive before they leave the building. This will lower the number of drunk drivers going home from a pub or a restaurant. With our device, police won't have to spend too much time stopping people and drivers will be able to know if they're sober enough to drive before going on the road.

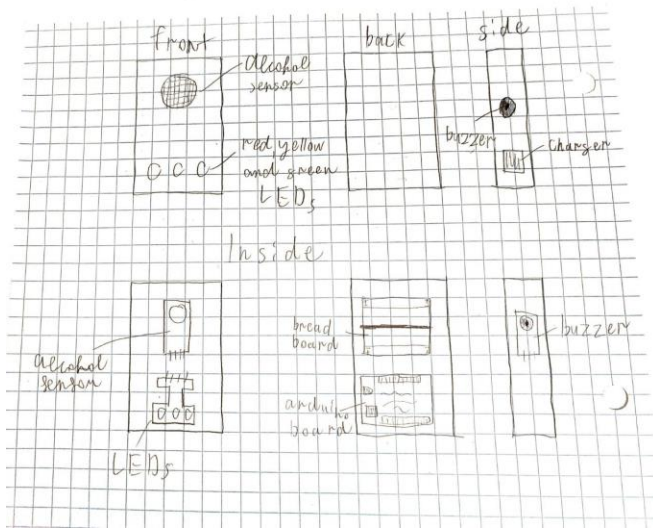
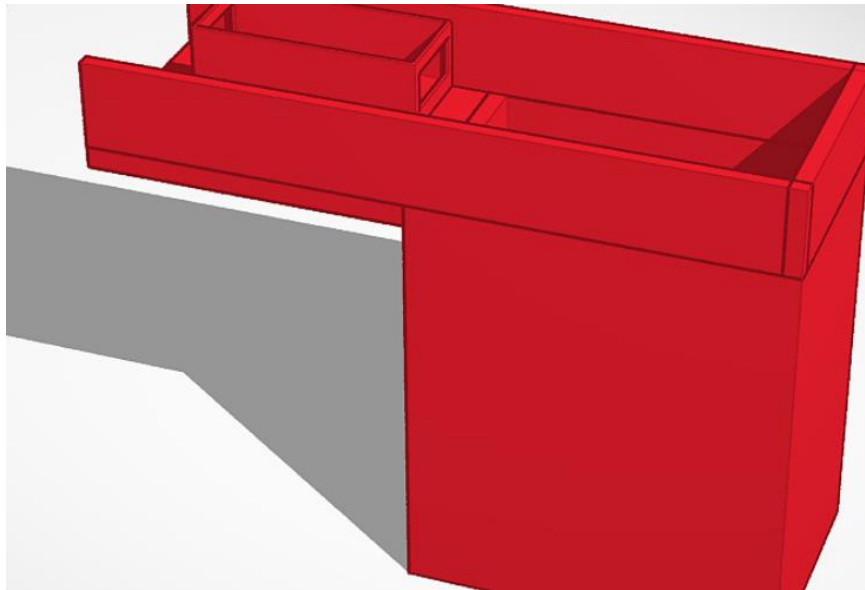
The most common way of building this device is using an analog alcohol sensor, LCD screen, and traffic light LED.

We can also use LEDs instead of buzzers, which will indicate how drunk the person is.

Who will this benefit?

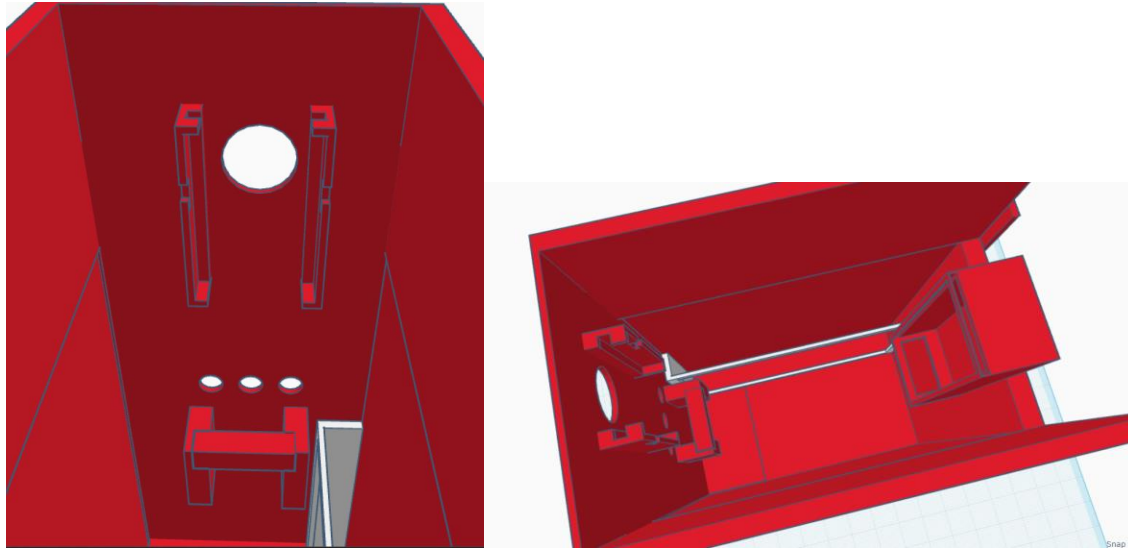
Average people driving on the roads won't have to worry as much and police officers won't have to put too much effort to find drunk drivers, because our device will be affordable for every person, so drivers should have one breath analyzer in their car.

Ideas:



(originally had a long notch at the top which was to breath into but was removed for being impractical)

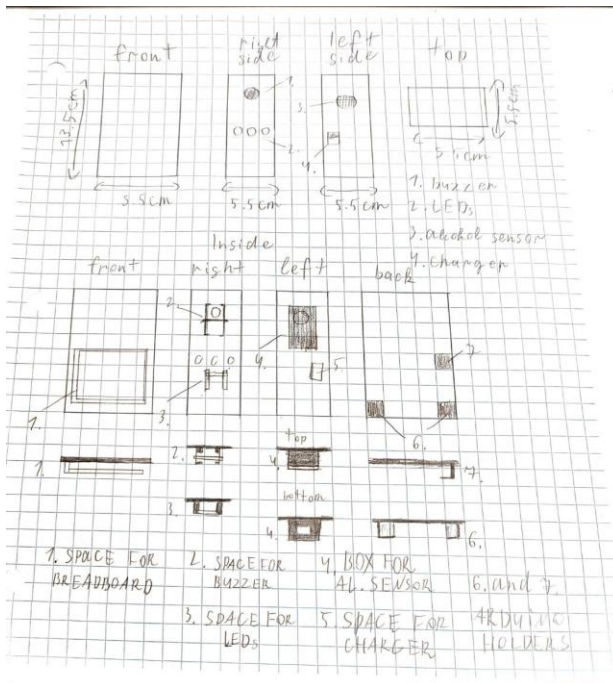
Final design:



This design is the best one because it has enough space for all details and because it has all small objects (like alcohol sensor, LEDs and buzzer) on side walls, it has enough space for Arduino board, breadboard and wires, which is the main difference between this design and other two.

Materials: 3D printed pieces (plastic), Arduino board, breadboard, alcohol sensor, traffic light LEDs, buzzer, 12 wires

Design Diagram:

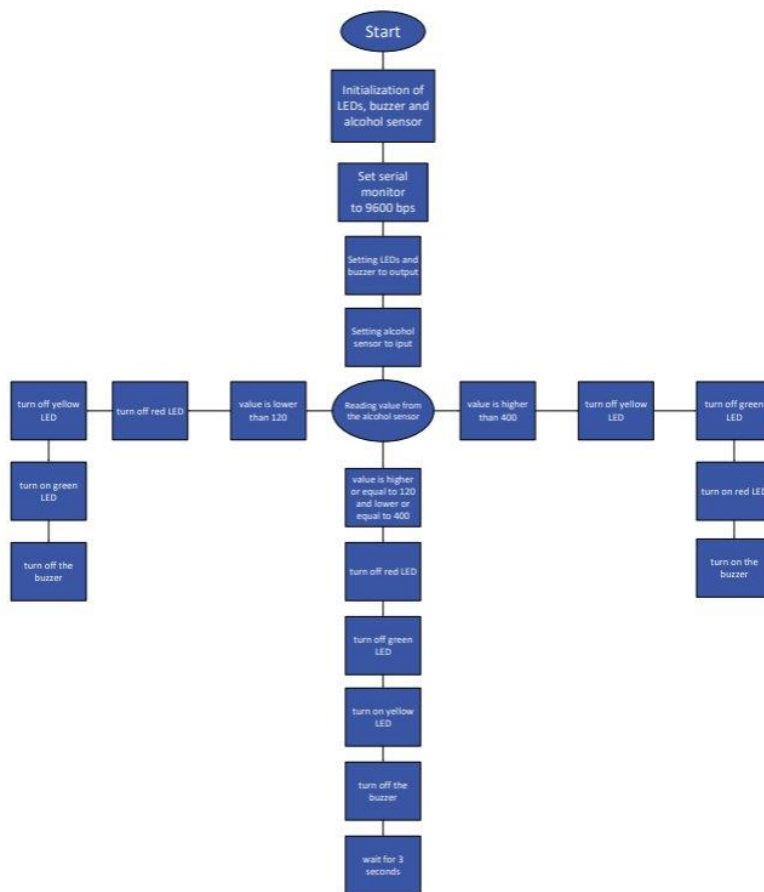


Build steps

-First Place and Secure Breadboard and Arduino circuit to be ready to attach everything with their wires

-Secondly place Analog Gas Sensor then slide the wall to lock it in place, do the same with Traffic lights and buzzer

-Thirdly connect all wires to the circuit and Arduino pieces the connect the Circuit to the Computer to get everything powered



Initial Testing:

On our initial testing everything was working smoothly, and we didn't have problems with alcohol sensor. But we noticed that you have to give some time to the alcohol sensor after turning it on because the air in it is condensed and it needs to cool down to show correct result.

Feedback:

We tested it on other people and some of their feedbacks were:

That we should add a screen.

That we should add a buzzer.

Other people said that our idea is cool, but we couldn't test our device with real alcohol.

Quote from tester: "Your stupid device can't detect sh##, I'm not even drunk" - Wise Words from a man 5 beers and 2 glasses of wine deep

Summary:

The alcohol sensor is working perfectly fine, so we don't need to fix it or improve its work.

Although we like the idea of adding a screen, we can't add it because our goal is to make this sensor as cheap as possible.

We added buzzer to our device, but the sound of it annoys a lot of people, so it only works when alcohol sensor detects a high percentage of alcohol, when red LED turns on.

From our own tests:

We decided that it's better to keep the value Un updated for 5 seconds when the percentage of alcohol is high enough to turn on the yellow LED, to make sure that person can see a result.

Iterations:

We added many things to make sure everything fit properly over time and had to sand down a few things due to messing up measurements

Reflections:

The device works best as a tester to see if you drank recently and not volume, this is best worked as a motivation for people to wait a while before attempting to leave if they did have alcohol so they can sober up

Challenges: Fitting everything in the box and wire management was easily the most difficult part as well as making and printing the 3d model

What you learned: Drunk driving is a prominent issue in a small population but making up a majority of fatal accidents and how it could be easily prevented with a few steps to shrink the numbers a comfortable amount and stop it at the root of the problem.

Improvements: I would have made the model bigger to make wire management significantly easier as well as removing unnecessary parts from the box to continue the idea of a “cheap but effective” product.

<https://www.electronics-lab.com/project/arduino-breathalyzer-using-mq3-gas-sensor-oled-display/>