Safe2Drive: A Biometric Scanning Door Handle

Annie Dudrear, Jack Kelly, and Jenny Smith

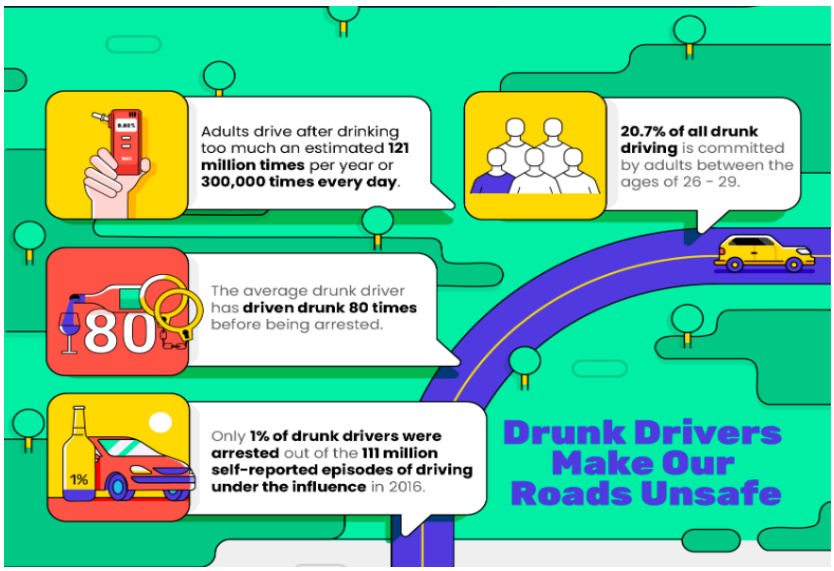
04/24/2022

1. Project Definition

1.1 Purpose

The purpose of this project is to create a device that would help eliminate the dangers that are associated with drunk driving. This device is designed to not only check a person's Blood Alcohol Concentration (BAC), but also other biometrics including fingerprint, in order to ensure that the person scanning in is the person driving. In the United States, drunk driving causes "28 deaths per day" (2) and in total, drunk driving kills around "10,000 Americans every year". (2) Along with this, "⅓ of all car accidents involve drivers under the influence of alcohol"(2). Below in figure 1.1 are several other statistics relevant to the argument that drunk driving is plaguing the United States. This number of deaths is costly to our population, and there must be a change in the design and regulation of drunk driving. This is why this project is important. Safe2Drive will be a device that will help decrease the number of lives lost every year from drunk driving.

Figure 1.1.1 (1)



1.2 Objectives

The objective of this design is simple: create a functioning biometric door handle that is simply incorporated into existing designs of all car manufacturers' doors. Now when this objective is broken down there are several important aspects that must be achieved. First, the design must be functional. It cannot be difficult to operate and must be user friendly. This means a straightforward user interface for the regular person to be able to use. The next aspect would be that this design must be element proof. Whether that is weatherproof or the basic wear and tear that a car door handle will go through, it must be able to withstand all that it will go through with minimal up-keep required. The last aspect is that this design must be compatible with a majority of all manufacturers of cars in order to make this product widely available to everyone. The product would not be profitable if it was not compatible. With all of these aspects of the design, this product will be extremely profitable and help the American public save lives.

1.3 Specifications/Constraints

This design will incorporate a biometric scanner, which will obtain an individual's fingerprint, BAC, and other biometrics. This scanner will fit into a regular sized car door handle, and will be very similar in design to biometric scanners that are already incorporated into high security environments. An example of these types of scanners is shown below in Figure 1.3. The device will have the software capability to store up to 10 different fingerprints, for family and friends of the owner of the vehicle. This way the car can be assigned to a different driver with no hassle. The constraints of this device mainly are limited to the technological limits of the design. First, this design must be able to fit within a car door handle, a smaller surface than most other functions for biometric scanners before. The next constraint, this technology must be weather resistant and must be able to operate in every condition. The final constraint is the ability to incorporate this technology into existing cars and the software related to the locking mechanism.

Figure 1.3.1 (4)

2. Methodology

2.1 Feasibility Analysis

Drawing inspiration from the already existing *Intox-a-lock* system that is put into cars today measuring someone's Blood Alcohol Content through breathing, this company tried thinking of a more feasible and convenient approach. A flaw recognized with the *Intox-a-lock* was that it simply just measures any given breath, there is no way to check who's actually breathing into the device. Taking this into account, the engineers creating this device thought of a better way to check who is actually getting behind the wheel of a car and if it is safe. Safety is the number 1 priority. The possible approaches that were taken into consideration included but were not limited to: a fingerprint scanner that was implemented into ones existing door, a fingerprint scanner that worked similar to a push start button inside of the car, and an Intox-a-lock similar device with a fingerprint scanner on the device to confirm the person blowing into the device. The company settled on a device that is installed onto existing doors to eliminate the possibility of complications of the intoxicated driver behind the wheel.

2.2 Proposed Approach

This device will be an external door handle that will then universally fit onto any given car's door as outlined in figure 2.2(1). It will then be connected to the car's system manually by the technician installing this device.

Figure 2.2(1)

Safe2Drive works similarly to a kill switch connecting to the car's wiring system. Without it passing successfully, it cannot send the signal to the ignition switch to turn the car over. Included below is a basic ignition system, figure 2.2(2).

Figure 2.2(2)

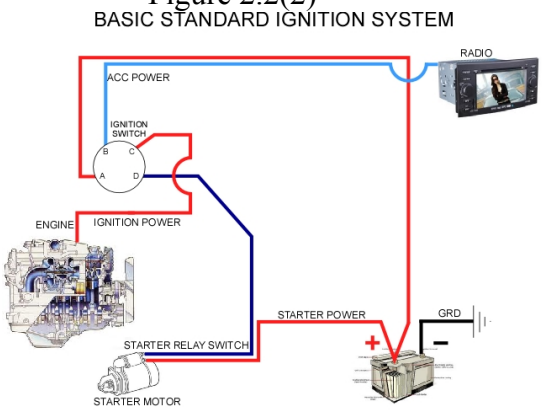


Figure 2.2(2) has a circled box labeled “Ignition Switch”, and each part connected to the switch is labeled A through D. Safe2Drive will act in that switch box, making a new label “E”, not allowing any of those subsequent parts to fire unless it is successfully initiated.

The fingerprint scanner itself will be primarily powered by infrared light. The infrared component called “Alcotest” essentially determines BAC by measuring the absorption rate of ethyl alcohol molecules contained in an individual’s fingerprint. Ethyl alcohol molecules have quantifiable infrared light absorption rates at different levels.

2.3 Non-Technical Aspects

This technology will not play any part in environmental destruction other than that it will save peoples lives behind the wheel of a car and those on the road. Globally, this company strives to slash the numbers of people being killed and hurt in drunk driving related accidents. This device will require minimal installation time and create jobs for the engineers behind this device and the people involved in installation. It aligns with the engineering community’s ethical mission, to create a safer world for everyone to live in. Safe2Drive took on the task to save the lives of thousands of people worldwide.

3. Administration

3.1 Major Tasks-

The top administrators in this project are Jenny Smith, Annie Dudrear, and Jack Kelly. This team oversees all operations, finances, and employees. Jack Kelly is the head manager of the finances and budgeting. Jenny Smith is the head of research and Annie Dudrear oversees the development and scheduling. The team has a goal of running an efficient and timely schedule so that Safe2Drive can hit the market and help people as soon as possible.

3.2 Schedule-

Safe2Drive Schedule

Date	Task
2022 May	Development and research begins
2023 January	Begin building prototype, hire more employees, get facilities ready
2023 March	Testing begins
2023 April	Advertising
2023 May	Testing done, begin to mass produce
2023 July	Safe2Drive hits the markets

This team is dedicating 8 months to finishing the research of the technology involved; the decision to have a shorter amount of research time means that it is more intense to ensure that the company is sticking with the goal of getting the product completed quickly. Jenny, the head of the research operations, will be leading the research schedule and process. During this time, the team will also be making time to meet with investors and get the word about the product out, Jack taking the most time to focus on this. Once the research is completed, in January 2023,the preparations of the facilities will be finished and the hiring of employees will be complete so that the building of the prototype can begin. There will be three months of prototype building and then in March 2023 testing of the products will begin. During the testing period, in April, the

marketing team will begin to heavily advertise the product. Finally, in May 2023 testing phase will be finished and mass production of the product will begin so that it is ready to be sold, and implemented into vehicles. This leads to July 2023 in which Safe2Drive will hit the markets!

3.3 Budget

The budget of the project will incorporate cost of parts, manufacturing, advertising, and labor. For labor costs, we will be paying employees $30 an hour as their starting pay. For the three main teams there will be around 55-60 employees. At $30 an hour and about 40 hours a week, the budget will be $66,000-$72,000 a week. There will be $30,000 in total for research efforts, and $10,000 for testing. Next, renting an office space is expected to be around $100,000 monthly, as the product hits the market and the company begins to make more profit, the intent is to eventually buy an office building as opposed to renting.

The production cost of each handle is $1,500- $3,000. So in the mass production stage of the project, $24,000,000 will be needed to make 8,000-16,000 door handles. In total, the budget will be $24,212,000.

3.4 Facilities and Resources

For the success of the project, a central location will be needed to house employees, research center (labs, testing areas, etc), and materials. There must also be a factory location in which the manufacturing phase of our product can be completed. The research team will consist of 10-15 members, led by Jenny due to her experience with research during undergrad. Jack is head of finance and investment because of his business background and he will have a small team of 5 to aid him in the financial endeavors of the project. The product development team will be led by Annie because of her many years of experience in the field. This will be the largest team with around 40 employees to start. All of these teams are subject to hire more employees if

needed at any point in time. Therefore the facilities needed must be able to house all of these employees and resources needed for each of the teams to complete their tasks.

Works Cited

1. Best Online Traffic School. (2021, January 14). *Drunk Driving Statistics [2022]*. Best Online Traffic School. Retrieved April 30, 2022, from https://www.bestonlinetrafficschool.co/drunk-driving-statistics/#drunk-driving-statistics-2022-infographic
2. Catedrilla, Christina. “Infrared Technology Used to Measure BAC in New Jersey.” *The Law Offices of Jonathan F. Marshall*, The Law Offices of Jonathan F. Marshall, 20 June 2019, https://www.newjerseycriminallawattorney.com/dui-drunk-driving/proof-of-intoxication/breath-tests/infrared-technology-measure-bac/.
3. NHTSA. (n.d.). *Drunk Driving*. NHTSA. Retrieved April 30, 2022, from https://www.nhtsa.gov/risky-driving/drunk-driving#:~:text=Every%20day%2C%20about%2028%20people,These%20deaths%20were%20all%20preventable.
4. Owano, N. (2011, September 30). *'Driving under influence' Test Inside Car Will Check Driver's Finger*. Phys.org. Retrieved April 30, 2022, from https://phys.org/news/2011-09-dui-car-drivers-finger.html
5. Reed, H. (2018, May 16). *8 Best Fingerprint Door Locks That Enhance Your Security*. United Locksmith. Retrieved April 30, 2022, from https://unitedlocksmith.net/blog/8-best-fingerprint-door-locks-that-enhance-your-security
6. Su, J. (2018, December 28). *Hyundai Motor Lets Drivers Use Fingerprints To Unlock and Start Its New Cars*. Forbes. Retrieved April 30, 2022, from https://www.forbes.com/sites/jeanbaptiste/2018/12/27/hyundai-motor-lets-drivers-use-fingerprints-to-unlock-and-start-new-car/?sh=4670546f3050

7. VIZPin. (2022, April 4). *Access Control System Pricing: 2022 Average Cost (Per Door)*. VIZpin Smart Property Systems. Retrieved April 30, 2022, from https://vizpin.com/blog/access-control-pricing/