JRTE

Journal Of Research Technology & Engineering

www.jrte.org

ISSN 2714-1837
JOURNAL OF RESEARCH TECHNOLOGY & ENGINEERING

A Large Scaled Drunk Drivers Detection System For Police Checkpoints

Sanjana K.D.S. Jayasinghe, Udara S.P.R. Arachchige

Faculty of Technology, University of Sri Jayewardenepura
*ssavindu@gmail.com

Abstract: Even though people know it is too risky, they used to drink and drive. So the police put a significant effort to catch them. There are some systems to verify that a person has consumed alcohol or not. But still, a lot of drunk drivers are escaping from police checkpoints. The goal of this project is to catch every drunk driver on the road and record their details in a remote database automatically to ensure that every guilty driver is caught and even the police cannot let them go under any circumstances.

1 INTRODUCTION

Alcohol consumption has become a significant cause of road accidents. Nearly 1.35 million people die, and 20-50 million people suffer due to road crashes yearly [1]. Even with a little consumption of alcohol can double the chance of happening an accident [2]. Many countries, including Sri Lanka, has implemented many police regulations to avoid people from driving while they have consumed alcohol. Police have put fines to charge from those who break laws. There are many techniques on police stations to check whether the driver has consumed alcohol or not. However, still, there is a considerable chance to escape a driver from a checkpoint without being caught. Also, police taking bribes from drunk drivers to let them go has become a significant problem, especially in countries like Sri Lanka. The main goal of this project is to maximize the probability of catching a drunk driver on the road by police stations and provide a solution to avoid taking bribes by police officers from people.

Nowadays, police use portable Breathalyzer to check drunk drivers whether they have consumed alcohol or not [3]. The mouthpiece of those devices should be replaced after each test. And also several types of devices have been made to fit inside the vehicle, and those devices can detect the driver has consumed alcohol or not, then the device takes some actions like turning off the ignition, give some warning sounds, etc [4]. Some of the research team has been developed the system which results from testing the requirements for starting a car's engine once the level of alcohol detected in the breath of the driver is higher than the prescribed level permissible by law [5], [6].

2 THE SPECIALTY OF THIS PROJECT

This project is fully designed to capture every drunk driver on the road. All the parts are interconnected, and every record is synchronized with a remote database on the internet, so the chance of escaping a driver

33

will be getting dramatically low. Also, the Breathalyzer in this project has been designed with a germicide UV light to let go of the need to replace the mouthpiece after every test.

3 METHODOLOGY

This project contains three main parts which are interconnected.

1. Alcohol Detection System and the radio transmitter inside the vehicle.
2. Police station's main receiver.
3. Handheld much accurate Breathalyzer for policemen in the police station.

1. Alcohol Detection System and the radio transmitter inside the vehicle.
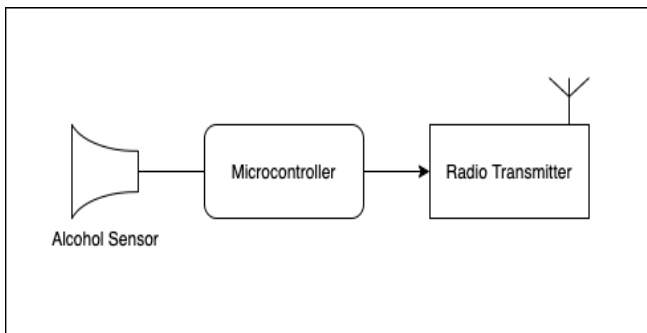

Fig.1. Vehicle's Unit

Fig. 2. Alcohol Sensor

Fig. 1 shows the basic diagram of the vehicle's unit. This unit contains an alcohol sensor (MQ-3) showed in Fig. 2 is placed near the steering wheel. This sensor has an alcohol detection concentration of 0.05-10 mg/L [7]. Even though this unit is not designed for an accurate measurement, it represents to identify the victims. It only detects whether the driver is suspicious or not. If even a small alcohol amount is detected by the sensor, the microcontroller gets that signal, and it will broadcast a radio signal which contains the number of the vehicle. This signal is captured when the vehicle is going near any police checkpoint.

Fig. 3. FM Transmitter

For this transmission, a 433MHz radio transmitter is used (which is shown in Fig. 3). It has a transmission range of around 100 meters in open air [8]. So the range is fairly enough to get the warning alert and stop

the vehicle by the checkpoint.
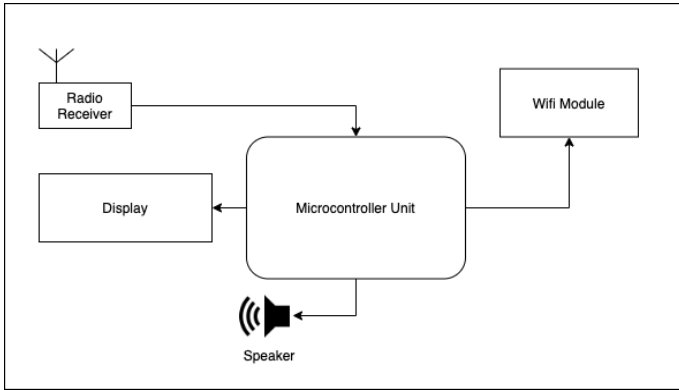
2. Police station's main receiver

Fig. 4. Main Receiver

Fig. 5. NodeMCU Microcontroller

Fig. 4 shows a diagram of the components of the main receiver. The heart of this module is a NodeMCU microcontroller (Showed in Fig. 5), which has a built-in Wi-Fi chip so it can be connected to the internet so easily. This module is also contained a 433MHz radio receiver to detect signals emitted by suspected vehicles. Then it sounds an alert and displays the vehicle number to be checked by the checkpoint. This suspicious vehicle detection event is recorded and will be uploaded to the database server for further inspections and assessments about checkpoints. Also, the handheld Breathalyzer's results are sent to the main receiver separately to upload them to the database.

3. Handheld much accurate Breathalyzer for policemen in the police station
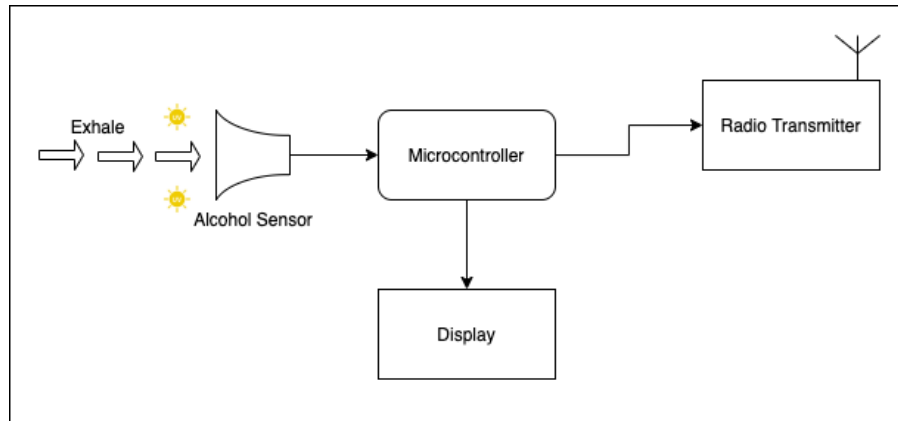

Fig. 6. Breathalyzer's diagram

Fig. 6 shows the diagram of the handheld Breathalyzer. This module uses the same sensor and the transmitter, which is used in the vehicle's alcohol detection system. This is created to check suspected drivers captured by the above system. The driver will have to breathe into the Breathalyzer, then that exhaled air is gone into the alcohol sensor in the Breathalyzer. Then the alcohol sensor verifies whether the

35

exhaled air contains alcohol or not. Then the Breathalyzer shows the result on its display, and it sends the report to the police station's main server via radio signals to store those records in the main database server. Currently, there are different types of Breathalyzer devices used by police stations. But they all have a common issue of having to replace the removable mouthpiece after every test. This is done to avoid spreading any type of disease. The Breathalyzer in this project provides a solution for the above problem by making the breathable part not needed to contact with the mouth and, that part is also contained a **germicide UV light**. So the mouthpiece is no needed to replace after each test.

4 CONCLUSION

The probability of catching a drunk driver can be maximized using this system. It saves all the records of suspected vehicles and alcohol positive drivers to a remote database on the internet automatically, so the chance of escaping a guilty driver from police will be almost zero. Even the police cannot let a guilty driver go even if they wanted under any circumstances. Because all the records are synced with the database server instantly, so the police headquarters can monitor them in real-time. Also, the self-germicide mouthpiece increases the easiness of using the device.

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