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RF-BASED SMART HELMET SYSTEM

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Abstract: Accidents are happening more frequently as there are more 2-wheeled motor vehicles on the road. A large percentage of fatalities are the result of the individual not wearing a helmet, failing to report the accident in a timely manner, being admitted to the hospital too late to rescue him, or riding while intoxicated. The primary goal of the project is to create a smart helmet that can detect alcohol use, prevent accidents, and pinpoint the location of an accident. Two modules are present here to perform the aforementioned tasks. a helmet and bicycle module. The brain of the system, an Arduino UNO, serves as the brain of the bike module. It is connected to an accelerometer and an RF receiver to receive signals from the helmet module. The helmet module has an RF transmitter for sending the CPU the signals from the IR sensor, alcohol sensor, and vibration sensor. The IR sensor determines whether or not the user is donning a helmet. The rider's breath is detected by the alcohol sensor as having alcohol in it. The bike won't start if the rider is intoxicated and not wearing a helmet. Only the bike will start if a helmet is worn and there are no signs of alcohol usage. When the rider has an accident, the sensor detects the bike's state and, using GSM and GPS modules, notifies the registered number of the accident's location and its location. Utilizing an accelerometer and vibration sensor, the accident situation is identified. The output from the sensors will be compared to the program's limit values.

Index Terms **– Smart helmet, Detect alcohol, IR sensor, Breath analyzer, Vibration sensor**.

I. INTRODUCTION

In recent years, Kerala State has made helmet use mandatory. India has seen an annual increase in traffic accidents. According to Section 129 of the Motor Vehicles Act of 1988, every person operating a two-wheeled vehicle must wear protective headgear that complies with BIS (Bureau of Indian norms) norms. Driving while intoxicated is a crime in India under the Motor Vehicle Act of 1939. This declares that the bicycle rider will be disciplined. A bike rider can currently easily elude the law. These three key concerns are what drives us to create this project. Identifying whether or not to wear a helmet is the first step. If you are wearing a helmet, the ignition will start; otherwise, it will stay off until you remove it. We utilize an IR sensor for these. The following is the alcohol detection step. Alcohol sensors are used as breath analyzers to check for alcohol in the rider's breath. If the level is higher than what is allowed, the ignition will not turn on. The message will be delivered to the registered phone. These make use of the MQ-3 sensor. The ignition will begin when these two requirements are met. Accidents and delayed medical care make up the third major problem. If the rider gets into an accident with him, he cannot get medical care very away, which is a major cause of deaths. About one death due to delayed medical attention or an unattended accident occurs every second. We install an accelerometer at the bike unit for fall detection. These mechanisms enable us to determine whether an accident actually happens. The aim of this project is to make a protection system in a helmet for a good safety of bike rider. The smart helmet that we made is fixed with IR sensors which act as to detect wear helmet or not. For bike unit we use Arduino Uno R3. Signal transmission between the helmet unit and bike unit is using a RF concept.

II. BASIC BLOCK DIAGRAM

The bike and the helmet are the two halves of the project. The IR sensor module for the helmet unit is positioned on the inside top portion of the helmet where the rider's head touches the sensor surface. The alcohol sensor is positioned close to the helmet's chin surface. The helmet is connected to an AC power adaptor.

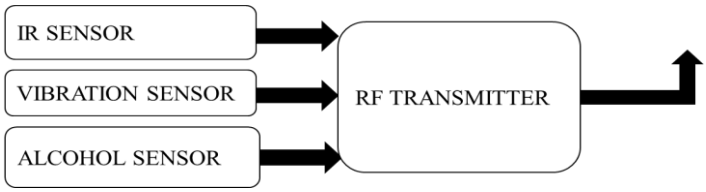

Figure 1: Block diagram of helmet unit

III. PROPOSED MODEL AND SYSTEM ANAYLSIS

The bike has a control device affixed on it. The ignition wiring is linked to the microcontroller and relay. The position and speed of the vehicle are shown on a 16x2 LCD screen. Bike's ignition system is started by the vehicle unit. When an accident happens, the gyro sensor built into the vehicle unit detects the axis shift brought on by the impact of the collision and shuts off the relay to turn the car off. In order to prevent sending an unwanted communication to the ambulance service, the rider can turn off the ignition key while aware or in the event of a false accident detection. Otherwise, the GSM module will use the GPS module to deliver a message with geometric coordinates. Additionally, a message will be sent to the provided number if the bike's speed rises.

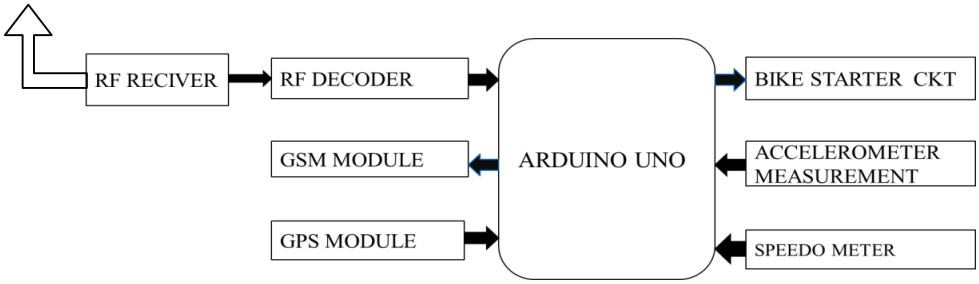

Fig 2: Block diagram of vehicle unit

IV. CIRCUIT DIAGRAM

Figures 3 and 4 display the circuit schematic for our smart helmet system for accident alarm. The 12V battery powers both circuits. The circuit diagram for the helmet unit is shown in figure 3, and the circuit diagram for the vehicle unit is shown in figure 4.

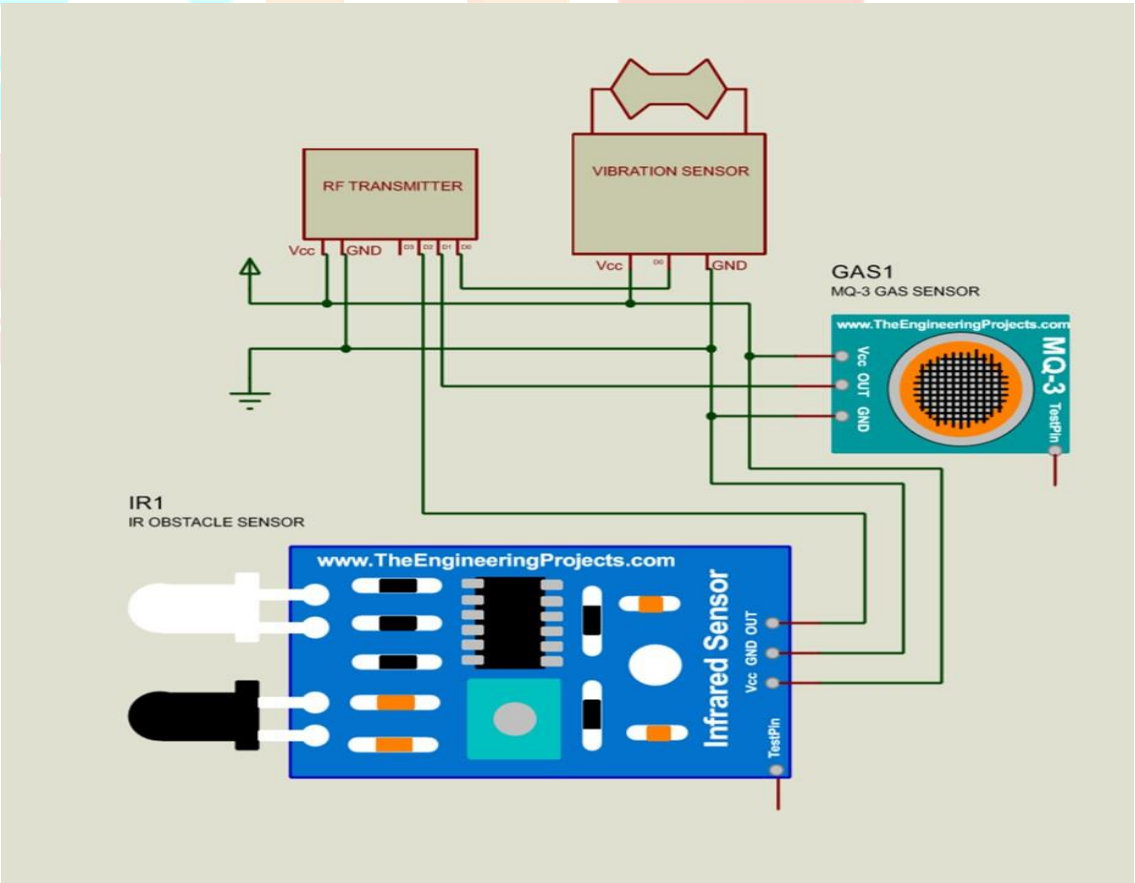

Figure 3: Circuit diagram of helmet unit

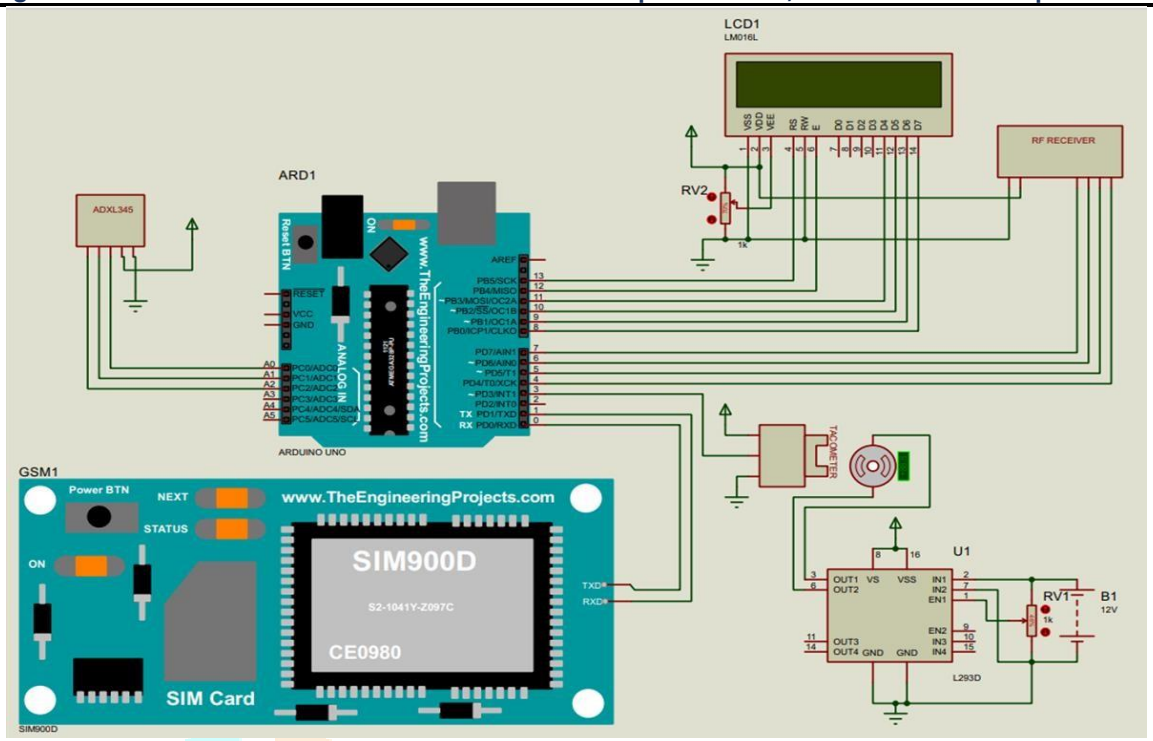

Figure 4: Circuit diagram of vehicle unit

V. FLOWCHART AND REPRESENTATION

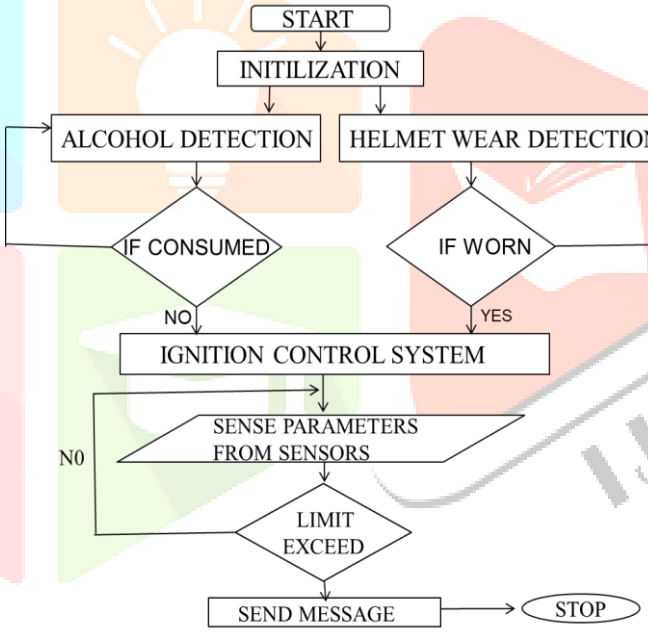

Figure 5: Flow chart

VI. STEPS OF WORKING

Initializes all the ports., initializes all RF communications between bike and helmet, check weather helmet is worn or not and also check if the driver is drunk. If these conditions are not satisfied then LCD will display message "Helmet side is not ok". Otherwise the LCD will display message "System ready". User can access the bike. If the speed of the bike increases a message will be sent to registered number. If any accident occurs the bike will stop and send message with location to ambulance service.

VII. HARDWARE

Arduino Uno based on the ATmega328, MQ-3 gas sensor as alcohol sensor, IR sensor, Rf modules (433.92MHz), Accelerometer - ADXL355, Liquid Crystal Display (LCD), SIM808- Quad-Band based GSM/GPRS module, L293d Driver Module, IR Speed Sensor are the significant hardware parts used in the modules.

VIII. ADVANTAGES

Detection of accident in remote area can be easily detected and medical services provided in short time. Simply avoiding drunken drive by using alcohol detector. It reduces the probability of accident. Record driving data, collision data and position data and analyzes the accidents in detail. Operates on solar as well as battery supply.

IX. APPLICATIONS

Insurance companies: - Accidents are frequently untrue. The data stored in the black box may be simply analyzed by the insurance company. Additionally, they can determine if the accident was caused or happened. The erroneous assertion is thereby avoided.
Research and development of vehicle: - Since it is impossible to monitor a large number of factors simultaneously and for every second of testing, accurate data is not provided. Black box not only makes the data available but also allows for graphical plotting of the data, such as speed vs. time and engine temperature vs. time, using the LABVIEW program.
For Personal vehicle: - If an awful accident had happened to a black box-equipped car, the victimized vehicle may receive rapid assistance upon receiving an SMS.

X. CONCLUSION

Designed a circuit for a smart helmet that assures the rider's safety by mandating the use of a helmet and checking to see whether the rider has drunk any alcohol over the legal limit. The suggested technology will stop the rider from starting the bike circuit if any of these key safety regulations are broken. This section discusses the flowchart, which shows how the suggested technique basically operates. The proposed system has a completed schematic diagram. The planned program's interface between the helmet and bike modules components has been successful. According to the program, when an accident due to speeding happens, GSM and GPS will notify the rider's precise position to the registered number.

XI. FUTURE SCOPE

Given that two-wheeler accidents are the leading cause of fatalities worldwide, this concept has a significant chance of being implemented in real life if the government does so. Additionally, it can aid in minimizing the harm that accidents do to automobiles. In the future, a tiny version of this intelligent system might be created, making it appropriate for notification around the world. Every two-wheeler must have this system installed, and the government must enforce the rule. Implementing such a device in two-wheelers can significantly reduce the number of fatalities on the road from drunk driving and other causes. On the helmet, different biometric sensors may be included to assess different types of activity. A tiny camera can be used to capture the actions of the driver. By employing a wireless transmitter, it may be utilized to convey messages from one vehicle to another. The helmet's solar panels may be used as a power source and a mobile device charger. Now, users may just leave their helmets on their two-wheelers when parking. A beep on the helmet will constantly blare if it leaves the area after the security system automatically locks it to the car. Future enhancements to our system could offer options for turning the device off while the bike is operating or when security is not required. The buzzer can be used for future development if it has the right speaker.

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