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Automobile immobilization for drunken driving

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ABSTRACT

The epitome of this topic focuses on the problem of drunken driving is one of the major reasons for on-road accidents and deaths. Alcohol affects the drunk driver's judgmental abilities and driving adversely. Many solutions have been proposed to reduce the after effects of drunk driving. However, most of these solutions were based on certain prototypes which consisted of control units or computerized protection systems including wireless monitoring facilities. This resulted in having systems with lots of demerits, high cost and slow response in the case of remote monitoring and decision making. To avoid all the mentioned disadvantages, and this paper introduces a simple, cheap and highly responsive design. The proposed design is based on simple electronic components with processing and decision made locally and does not involve wireless transmission to guarantee the required fast response. This Arduino based system detects the presence of alcohol content in the breath of the driver and immobilizes the vehicle accordingly.

Keywords: *Arduino, Liquid crystal display, Gas sensor, Motor, Alcohol detection, Immobilization, Master-slave.*

1. INTRODUCTION

India has earned a bad name by having many numbers of fatalities due to road accidents in the world. Accidents due to drunk driving is a major concern in India. This problem goes mostly unrecognized and remains hidden due to lack of research. A study conducted by Alcohol & Drug Information Centre (AIDC), India revealed that 40% of road accidents are caused due to DUI (Driving Under Influence). Drinking and driving is already a serious public health problem, which is likely to emerge as one of the most significant problems in the near future. Here, a very efficient, low cost embedded based system has been discussed to stop driving while drunk. The system detects the presence of alcohol in the vehicle and immediately locks the running engine of the vehicle or keeps it locked if the engine is not ON. Hence the system is aimed at reducing the number of road accidents and fatalities due to drunk driving in future.

2. HARDWARE DETAILS

2.1 Gas Sensor

The gas sensor is a device that detects the presence of gases in an area. This type of equipment is used to detect a leak or other emissions and can interface with a control system. GasSensor (MQ2) module is used for gas detection (home and industry). It is suitable for detecting LPG, CO, Alcohol, Smoke or Propane. Due to its high sensitivity and fast response time, measurement can be taken as soon as possible. The sensitivity of the sensor can be adjusted by a potentiometer to vary the resistance.

2.2 Liquid Crystal Display

LCD (Liquid crystal display) is an electronic display module and has a wide range of applications. These modules are preferred over seven segments and other multi-segment LEDs. The reasons being LCDs are used as they are 1) Economical 2) Easily programmable 3) have no limitation of displaying special & even custom characters as compared to former.

2.3 Arduino

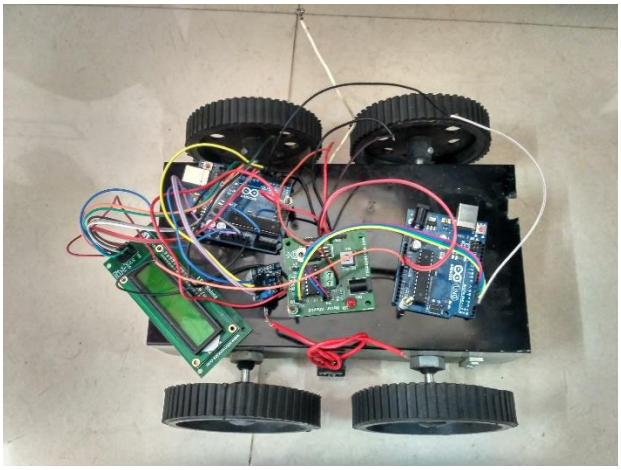
Arduino Uno is a microcontroller board. The ATmega328 microcontroller is the MCU used in Arduino UNO R3 as the main controller. ATmega328 is an MCU from the AVR family; it is an 8-bit device. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started**.** The MCU accepts supply voltages from 1.8 to 5.5 V. However, there are restrictions on the operating frequency; for example, if we want to use the maximum clock frequency (20 MHz), we need a supply voltage of at least 4.5 V. This MCU is a DIP-28 package. These pins include power and I/O pins. Most of the pins are multifunctional. This reduces the necessary pin count because the microcontroller does not require a separate pin for every function.

3. WORKING

The project is based on an Arduino system which detects the presence of alcohol content in the breath of the driver. The system consists of a gas sensor as input, LCD as output, and motor as output. Since Arduino -UNO was used; there was a need for a master-slave.

Master (Arduino Board 1): When the system is switched ON, the Arduino will initially send a message “Blow here” to the LCD display asking the driver to blow on the gas sensor. The master takes the analog and digital values from the gas sensor. After a delay of 2 seconds, the Arduino will take actions based on the further programming. Based on the manually set threshold value, the gas sensor will send digital value 0 or 1. If the alcohol content is below the desired threshold value, the gas sensor will send a digital value 0. If the alcohol content is above the desired threshold value, the gas sensor will send a digital value 1. Based on these digital values the Arduino will send a message to the LCD display. The message displayed will be “Ready to go.” If the digital value is 0 and it will be “You are drunk!” if the digital value is 1. If the digital value is 0, the Arduino will send a low signal to another Arduino (Slave). If the digital value is 1, the Arduino will send a high signal to another Arduino (Slave).

Slave (Arduino Board 2): If the Arduino receives a low signal, it will send an (LOW LOW) signal to the motor shield signaling the motor to be in switched off mode. If the Arduino receives a low signal, it will send a (HIGH HIGH) signal to the motor shield signaling the motor to rotate.



4. CONCLUSION

The study in this paper presents a simple electronic design for a system that measures alcohol levels through breath analysis and takes steps towards enabling or disabling the driver from turning the vehicle ON based on whether the alcohol level is acceptable or not. The system is simple, easy to build and made of general purpose discrete electronic components. It enhances the driving safety and consequently reduces the chance of car accidents. It can be considered as a promising solution for the drunk driving problem.

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