ARDUINO BASED ANTISLEEP PROTOTYPE MODEL FOR DRIVERS

Dr. Hemanth Kumar C S[1],Umesha H S[2],Channe gowda C[3] ,VeerabhadraSwamy K M[4]

[1, 2, 3] Assistant Professor, Dept. of ECE, Government Engineering College, Ramanagara – 562159, India

[4] Assistant Professor, Dept. of ECE, Government Engineering College, Mosalehosahalli – 573212, India

Abstract:

Now a day's accident are becoming inevitable during late nights due to driver tiredness during long journeys. Normally Drivers who do not take the breaks during driving of long distances run through the higher risk of sleepy conditions and thereby causes accidents. Due to this scenario, there exist a possibility of enhancing the risk of fatalities injuries and deaths. This has become a serious problem, which has to be resolved. If there exists a system which could warn the drivers before they go too sleepy and to drive safely, some of these crashes could be prevented. The growth in advanced technology enables the present society to prevent accidents, which happens by human negligence through building advanced accident prevention prototype models. In the current context advanced accident prevention prototype Anti sleep model has been developed using Arduino.

Keywords: Infrared Sensor, Single pole single throw switch

Introduction:

With the busy work and stress, it is very hectic for the truck drivers to carry out the longer duration of driving. As the drivers will be engaged in driving since from morning and night and there by chances of occurring accidents [1]. Imagination of a situation in which a person is driving home, after his daily work and he feels drowsy such that his eyes gets closer and vision gets blurred which may lead to accident [2]. Normally with in a 24-hour period, the human body may tend to approach sleep during certain times than at others. This could be majorly during the late night and early morning around 5am as the human body naturally turns to tend sleepy which in turn reduces the vigilance during that time [3]. Generally, road accidents are increasing enormously with the enhancement of vehicles travelling on road as the people are fond about purchasing new vehicles. These accidents are more in places with higher crowded area and roads. According to the survey carried by the National Crime Records Bureau (NCRB) stated that roughly around more than 1.5 lakhs accidents took place during the year 2021.Also stated that these accidents happened because of negligence shown by the driving person [4]. Normally road accidents carried has more effect over the individuals, families and society. With the report revealed by WHO during 2016 stated that more than 1.24 million road accidents have been occurring every year and predicted that the accidents tend to increase to 1.9 million by 2030 [5]. Factors that majorly responsible for road accidents are uncontrolled speed, drunk and driving, restless driving, night driving, driving with the effect of drugs and drowsy driving [6]. Generally, the main cause for road accidents is drowsiness. Also some reports have revealed that the millions of people are injured in road accidents mainly due to driver fatigue and drowsiness [7].

Normally transportation exhibits an important role in our busy life activities. Anyone can be victim for the road accidents but generally most of the road accidents are happening due to drivers because of various reasons like long journey travelling, lack of sleep, drowsiness etc [8]. Hence this issue need to be considered seriously in obtaining the solution. With the advancement of technology one has to provide the solution for lorry drivers during their journeys during lack of sleep. The work carried is exhibited with various partitions of introduction, existing literatures, proposed system and Implementation followed by conclusion.

Related work:

Work [1] is about the system, which alerts the driving person who feels asleep during driving night times. This proposed system prevents the accidents and saves the life. The system circuit is implemented through the aurdino nano, buzzer and eye blink sensor that meant in detecting the drowsiness and there by alerts the driver. The serious disadvantage of the proposed system is that repeated yawning of eyes is also detected as drowsiness and may cause false operation. The authors in [2] proposes a system using tilt sensor which mainly operated on the motion, while a person bends the tilt sensor is enabled and sends the signal to buzzer. This system is mainly simple to design and affordable. The lacuna of this system is that even sneezing also considered as a tilt and results in false operation. Work [3] is about the system designed over the physical signals which operates on EEG, ECG and EOG to find the drowsiness, heart rate and brain activities. The proposed system primarily uses camera to capture real time facial features. The major drawback of the system is that fail to operates in dark lights and varying light conditions.

The proposed system in [4] demonstrates the method of detecting driver's drowsiness through the movements like closed eyes, opened mouth, nodding with hand and using hand on mouth while yawning. The various techniques adopted for feature extraction are EAR, MAR and FAR. The basic limitation of this system is that gestures gets varied dynamically from person to person. Work exhibited in [5] depicts the system meant in detecting the road accidents during drowsy driving. The proposed system mainly uses ECG sensor chip which is meant in continues monitoring of heart action to analyse the driver status of sleep or asleep. The heart sensor detects the drowsiness and intimates the driver through buzzer. Paper [6] is about the system that detects the condition of driver during driving by capturing the real time images. The system mainly adopts aurdino controller and opencv for iris detection through video tracking. The main disadvantage is that the system provides still positive and negative results even with the absence of driver. Work carried in [7] is about the determination of driver current state depending on image

sequences. The images are mainly based on eye blink and yawn signals, which are captured through the smart phones that behaves as noncontact optical sensors. The proposed system in [8] is about the usage of spectacles which is embedded through IR sensor and buzzer. The system designed mainly uses aurdino controller and GSM 800 module. The proposed work is affordable through cost but it mainly requires line of sight.

Proposed System:
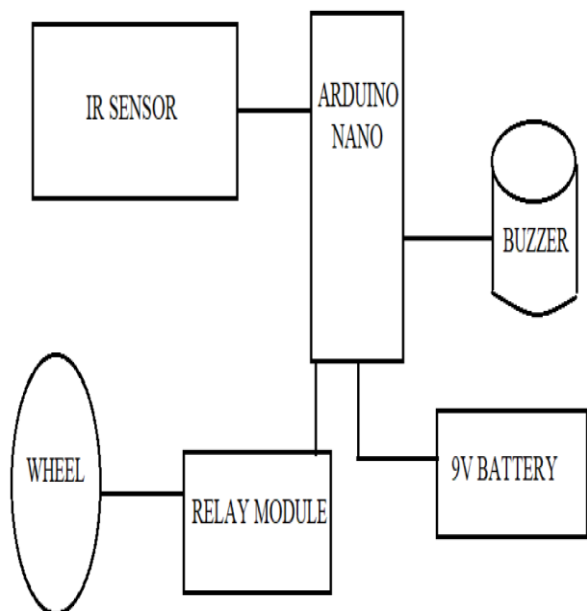
Fig 1: Proposed system

The proposed system is implemented from the existing system with the inculsion of relay module to the driver. This driver draws the input through Arduino Nano and helps in controlling, running and stopping the wheel as depicted in fig 1.The system built on some surface instead of sticking over the glass and hence advantageous over the existing system in terms of weight. The proposed work is implemented using Arduino nano with ATmega328P, which has 2KB SRAM, 32KB flash and 1KB EEPROM. The system also employs IR sensor, which behaves like the heart of the proposed system. In addition, system uses buzzer, relay, LED, SPST switch and supporting batteries.

Implementation and Results:

The proposed prototype is implemented with the help of various hardware components such as Arduino nano, IR Sensor, buzzer, relay, gear motor with wheel,SPST swith and glass frame. The proposed prototype circuit diagram and finally developed model are depicted in fig 2 and fig 3 respectively. The work employs Arduino nano, which has 22 digital I/O pins that can operate at a clock speed of 16 MHz with SPI and I2C option. The IR sensor mainly used to detect movements of human visionary with IR LED and IR Photo diode as emitter and receiver respectively. The buzzer employed in the work is piezo buzzer with compact speaker that directly suits to the Arduino. These kinds of buzzers can able to generate the

beeps and tones as needed for the signaling. In the proposed prototype, initially the IR sensor will receive the input signal from the driver side and there by triggers the buzzer to alert the driver when he feels sleepy.
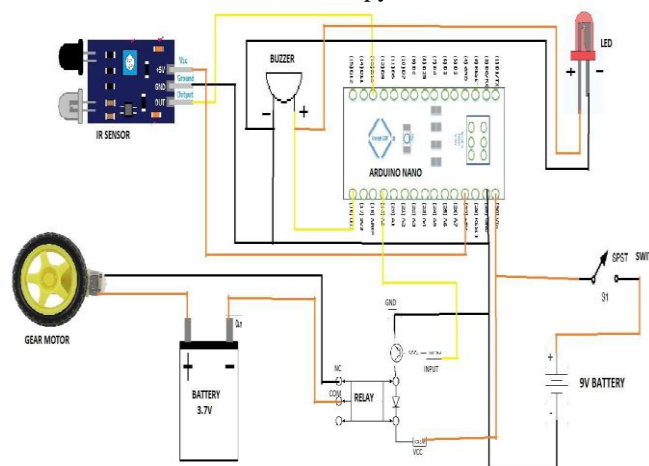
Fig 2: Circuit diagram of proposed porotype model

During the time of journey the driver eye movements are watched by IR Sensor and as soon as it comes through the closing eyes it will automatically enables the buzzer and there by stopping the wheel through the Arduino nano within a delay 3 seconds. Hence, accidents can be prevented.

In addition, driver can wake up and as driver, wakes up the eye movement are once again captured by IR sensor and sends the signal to Arduino nano.
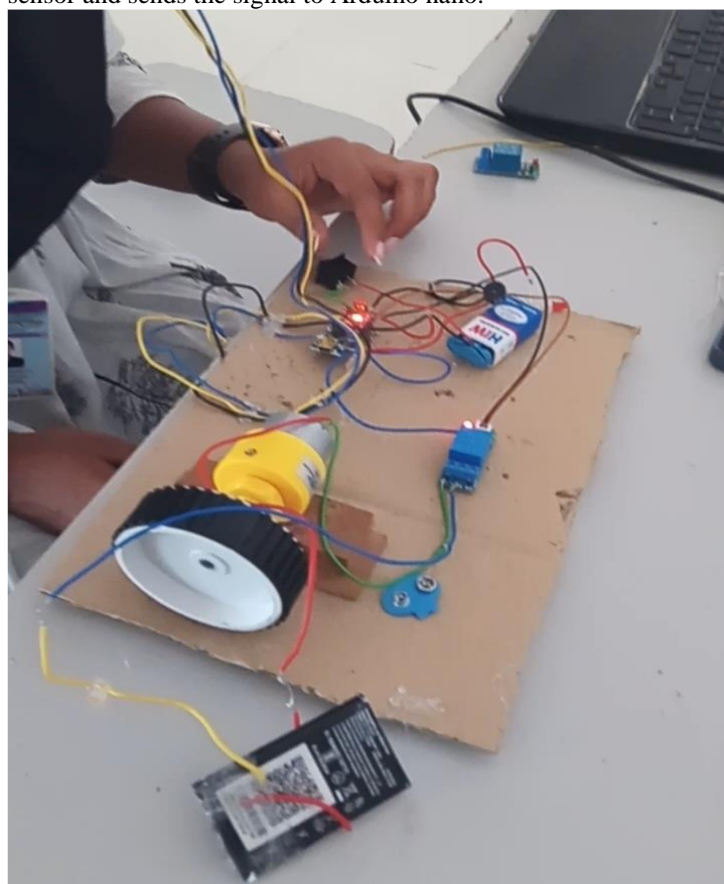
Fig 2: Proposed Prototype

There by the buzzer stops and the driver can start the vehicle. The proposed prototype can able to operate in any conditions of temperature and other disturbances.

Conclusion:

The proposed prototype aims at alerting the driver during sleepy condition at late nights and there by awaking him through the Arduino controller. The designed prototype is much efficient in alerting and preventing the accidents, which may occurs normally during tiredness. This proposed prototype is mainly applicable for the people who used to travel long distance during late night.

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