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Optimal Two Wheeler Driving using Smart Helmet

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***Abstract*—The effect when a motorcyclist includes in a high speed mishap without wearing a helmet is exceptionally unsafe and can bring about casualty. Wearing a helmet can lessen stun from the affect and may spare an existence. There are numerous nations authorizing a direction that requires the bike rider to wear a head protector at the point when riding on their bike, Indian traffic is considered as an illustration in our work. With this reason, these anticipate is uncommonly created as to enhance the security of the bike's rider. Motorcyclist will be frightened at the point when as far as possible is surpassed. A Force Sensing Resistor (FSR) also, DC motor are utilized for identification of the rider's head and identification of bike's rate separately. A 315 MHz Radio Recurrence Module as remote connection is used which will be ready to convey between transmitter circuit and receiver circuit. SST8951 is a microcontroller to control the whole part in the framework. Just when the rider clasped the helmet then immediately the drivers motor will begin. A LED will streak if the engine speed surpasses 40 km/hour in our design. Our proposed work has considered the regulations defined by Bangalore Traffic Police for vehicles travelling in Bangalore city.**

Keywords— Component; formatting; style; styling; insert (key words)

I. INTRODUCTION

Traffic accidents in India have increased year by year. Fig 1 shows the percentage of accidents happened for various reasons; the accidents happened while travelling in motor bike due to not wearing the helmet is approximately 25% which is the major issue for Bangalore Traffic police while controlling the death rates.

A motorcycle's helmet is a type of protective head gear used by the motorcyclist. The main purpose is for safety, which is to protect the rider's head from the impact during an accident. It protects the rider's head as the helmet provides ventilation system. Speeding and not wearing a helmet are the main reasons of fatalities and injuries. It is proven that, as the speed of motorcycles increased, so did the number of accident and fatalities [1].This is again due to the shock of an impact during the accident.

The objective of this proposed work is to build a safety system in a helmet and speed alert for a better safety of motor cyclists. The safety helmet that we created is embedded with sensors which act as detectors the safety belt itself. The engine of the motorcycle can start only if the rider has buckle up its helmet safety belt. The second safety method that we introduced is another sensor which acts as an alarm to the rider when the motor cycle speed exceeds 40km/h. Indicator is placed and will flash to alert the rider about the speed limit.

A microcontroller is used in this project to control the system. The microcontroller used to operate the project is SST8951. The SST8951 is a 8- bit controller. Since it has a small number of inputs and output, Keil software is needed to write the program in basic compiler language. Other than that, Force Sensing Resistance (FSR) and the DC motor are used as speed sensors to operate this system.

Therefore, the scopes of the proposed work will be using two sensors which are Force Sensing Resistance (FSR) and a DC motor. The main purpose is actually to make some research correlation on a Force Sensing Resistance (FSR) with resistance and a DC motor with voltage. Signal transmission between the two circuits is using a radio frequency concept. 315MHz Radio Frequency Module is used since the range between the circuits is short. While the microcontroller SST8951 is used to control the system.

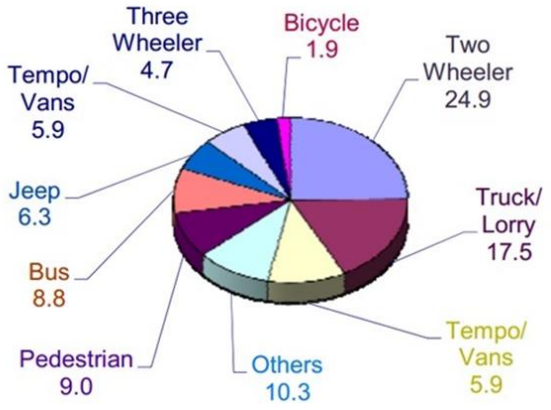

Fig 1. Road Accident Deaths due to type of vehicles. Curtesy Bangalore Traffic Police Department

II. HARDWARE DESCRIPTION

A. Motor Driving Circuit

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors. We have used this driver circuit too drive the motors of the robot. Each L293D is used to drive two motors. Two L293D's are used to drive four motors. When both the inputs are low the motor will be in the halt state, when the first input is high and the second input is low the motor will move in the forward direction, when first input is

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low and second input is high the motor will move in the reverse direction and when both the inputs are low the motor will be in the halt state.

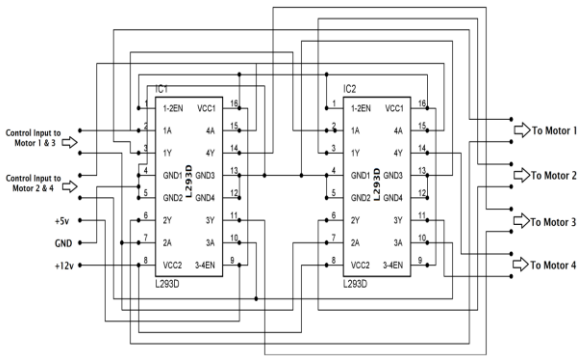

Fig 2. Motor Driving Circuit

B. Motors

NR-DC-ECO is high quality low cost DC geared motor. It contains Brass gears and steel pinions to ensure longer life and better wear and tear properties. The gears are fixed on hardened steel spindles polished to a mirror finish. These spindles rotate between bronze plates which ensures silent running. The output shaft rotates in a sintered bushing. The whole assembly is covered with a plastic ring. All the bearings are permanently lubricated and therefore require no maintenance. The motor is screwed to the gear box from inside.

Fig 3. 12v 3500 rpm DC Geared Motor

C. Force Sensing Resistor (FSR)

A Force Sensitive resistor as shown in fig 4 has a variable resistance as a component of connected weight. In this sense, the expression "power touchy" is deluding – a more proper one would be "pressure sensitive", since the sensor's yield is subject to the range on the sensor's surface to which constrain is connected. These gadgets are manufactured with versatile material in four layers, comprising of:

- A layer of electrically protecting plastic;
- A dynamic range comprising of an example of channels, which is associated with the leads on the tail to be accused of an electrical voltage
- A plastic spacer, which incorporates an opening adjusted to the dynamic range, and in addition an air vent through the tail
- An adaptable substrate covered with a thick polymer conductive film, adjusted to the dynamic territory. This polymer is all the time supplanted by a layer of FSR ink.

At the point when outer pressure is connected to the sensor, the resistive component is disfigured against the substrate. Air from the spacer opening is pushed through the air vent in the tail, and the conductive material on the substrate comes into contact with parts of the dynamic zone. The greater amount of the dynamic zone that touches the conductive component, the lower the resistance. All FSRs display a "switch like reaction", which means some measure of power is important to break the sensor's resistance very still (roughly 1 MW), and push it into the estimation range (starting at around 100 KW).

Operationally, a FSR is fundamentally the same as a strain gauge, the primary contrast being that a strain gauge's support disfigures with the resistive component, while a FSR's does not. This is essential to consider when mounting a FSR against a backing, as talked about beneath.

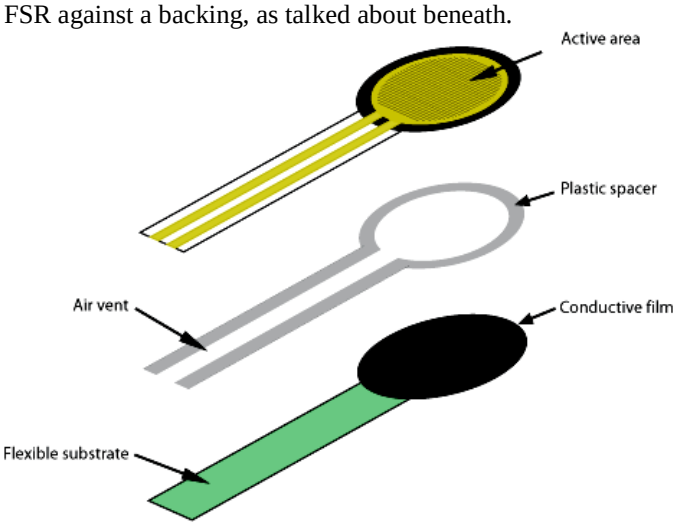

Fig 4. Force Sensing Resistor

The same connected power will bring about a more extensive yield swing in a FSR than a strain gage. Strain gages, nonetheless, have higher precision than a FSR. Contingent on the specific needs of the application, one may pick either. At last, a noteworthy thought in the decision of a sensor is cost; a noteworthy point of interest of FSRs is their ease.

Utilizing a FSR

A standout amongst the most widely recognized circuits actualized to use a FSR's yield is the voltage divider. A voltage (for the most part +5 V) is connected to one of the leads, while the other is grounded. FSRs are not polar, which means it doesn't make a difference which side gets the voltage. One lead from a second resistor (with altered worth) is then associated with the voltage side, while the other lead of the second resistor is additionally associated with ground. Along these lines the FSR can gauge the "voltage drop over a resistor". The resistance estimation of the second resistor decides the yield scope of the sensor. Normally, 100 Kω will yield a sensor yield reasonable for regular ADCs utilized for musical applications.

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III. PROPOSED METHODOLOGY

A. *RF Transmitter*

The RF transmitter and receiver are used both in the control unit as well as in the robotic module. The RF transmitter and receiver in the transmitter and receiver module respectively operate at the frequency of 433MHz and the transmitter and the receiver module in the robotic module and the control unit respectively operate at the frequency of 316MHz.

The RF transmitter in the control unit is used to transmit the signals which control the robotic module's operations. The control signals for the gear motors through the motor drivers, the firing unit and the voice transmission unit through the ground driver circuit and the request to SONAR for the distance measurement is also sent through this transmitter. The transmitter in the robotic module is used to transmit the distance calculated by the SONAR to the controlling unit. The figure below shows the pin out diagram of the RF transmitter.

B. *RF Receiver*

The RF receiver in the transmitter module receives the distance related information transmitted by the robotic module. The microcontroller is used to display the distance on the LCD module. The receiver in the robotic module receives the control signals transmitted by the control unit which are used to control various functions of the robot. The figure below shows the pin out diagram of the RF receiver.

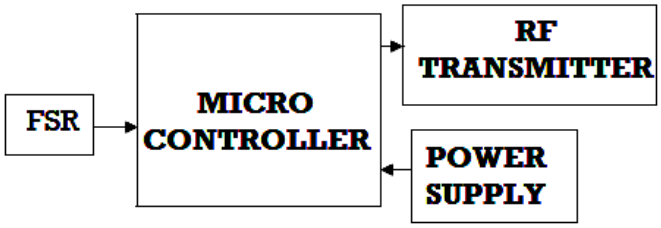

Fig 6. Bike Module

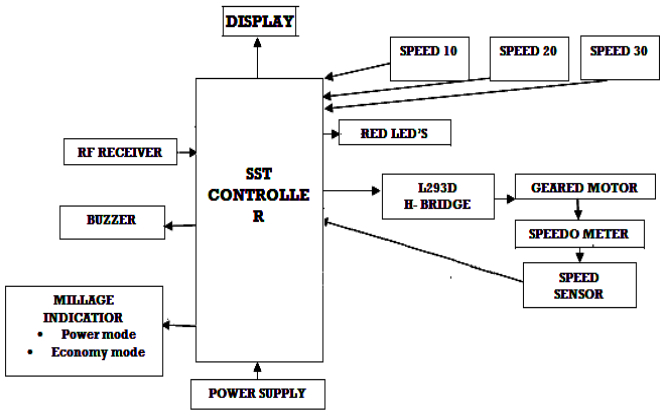

Fig 7. Bike Section.

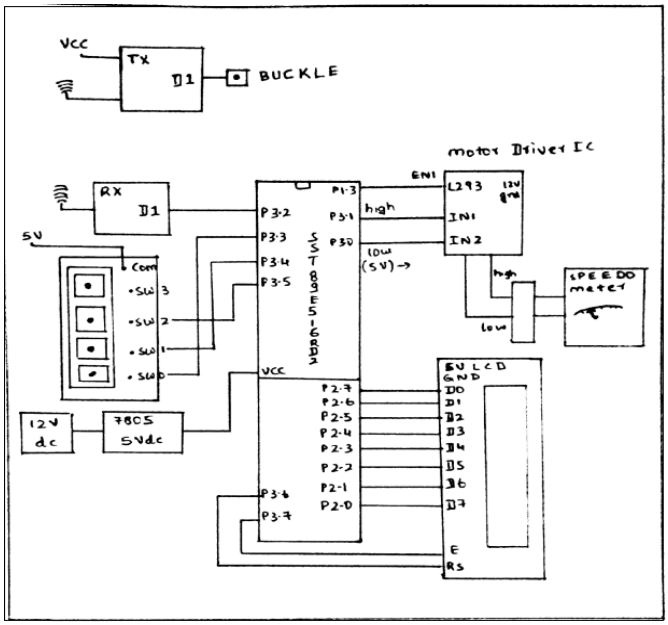

Fig 8. Schematic Diagram of the proposed module

At first, an appropriate microcontroller is utilized to control all the info, for example, sensors. In inserted system, ARM 7 processor is most reasonable as the controller that can read up to four inputs. The capacity of SST8951 processor is to peruse the information like a switch. Accordingly, it is anything but difficult to actualize and interface with all sensors and switch. The extent of SST8951 is little and it is minimal effort as well. Radio Frequency is a remote idea which is utilized to transmit information from helmet to the motor. The signal can be transmitted up to 100 meters in open space and ceaselessly. A 315 MHz recurrence is picked in light of the fact that 315 MHz is in interim of testing band and it is free permit to utilize. This RF Module comprises of Transmitter Module and Receiver Module. Every RF module have its own circuit called the transmitter circuit and is put at the helmet and the receiver circuit is set in the motorcycle. Radio Frequency transmitter circuit comprises of transmitter module, PT2262 as remote encoder and 8-pins DIP-Switch. Radio Frequency receiver circuit comprises of transmitter module, PT2263 as remote decoder and 8-pins DIP-Switch.

Force Sensing Resistor (FSR) is introduced in the helmet. The Force Sensing Resistor (FSR) sensor distinguishes the head of motorcyclist. It associates straightforwardly to the transmitter circuit as a switch. In this way, the transmitter circuit will be consequently ON when the helmet is worn. An IC clock 555 was utilized and put as a part of the transmitter circuit with a buzzer to create a 'beep-beep' sound and this sound will be heard after the transmitter circuit is ON as a sign to the rider for lock in to the helmet belt. As the second security, a SPDT limit switch is introduced on the helmet's clasp to recognize whether the rider is lock in or not. It is straightforwardly associated in arrangement with Force Sensing Resistor (FSR).This SPDT limit switch associated parallel to IC clock 555. In the wake of locking in, there is a short out supply for IC clock 555. In this way, a 'beep-beep' sound vanished and the short out offers contribution to the RF Transmitter module and send signal to the RF receiver module.

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RF receiver module is put at the receiver circuit and the receiver circuit is put under the motorcycles seat. The receiver module is to peruse the signal from the transmitter module. This signal is to be contribution for PIC SST8951 and the yield was associated with IC ULN2803 and to the transfer. The hand-off is in typically shut position is associated in arrangement to the yield wire of the capacitor Discharge Ignition (CDI) motorcycles. A DC motor is introduced before the motorcycle as the speed locator. On the off chance that the speed is over the utmost, then the LED will flash. The LED was introduced adjacent to the speed meter.

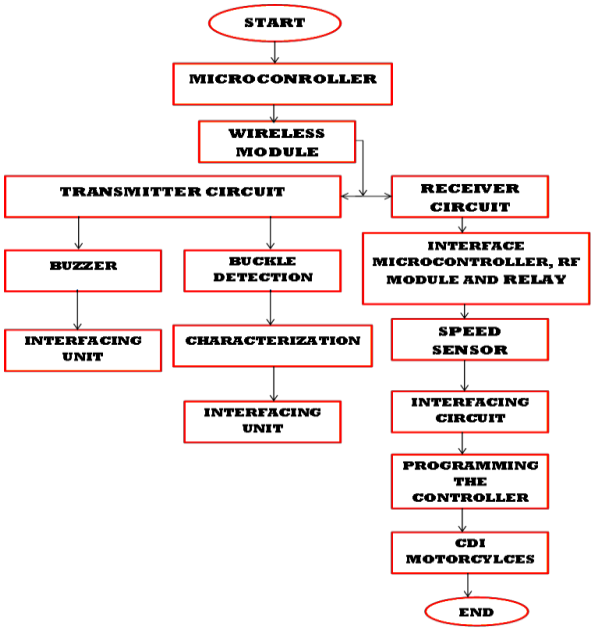

Fig 9. Flowchart of the proposed module.

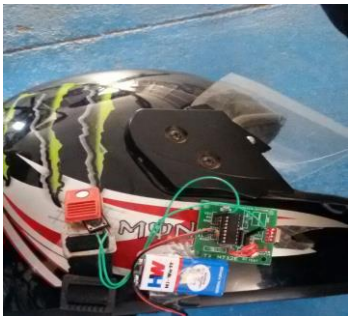

Fig 10. RF Transmitter Module

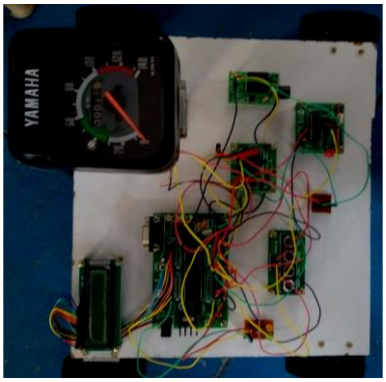

Fig 11. RF receiver Module(Bike Section)

IV. RESULTS AND CONCLUSION

By looking into the table 1 we can conclude that If the vehicle is moving on 10Km/hr then it shows economic mode of driving indicated by a green LED, and it also gives an indication that economic driving will save the fuel and the mileage will be increased or maintained to an extent defined by the vehicle manufacturer, as we know mileage varies among vehicles. If the vehicle is driven for 20Km/hr then the mode of operation is shown as power, and it is indicated with orange LED. When the vehicle moves 30Km/hr then the receiver module displays a message saying the vehicle is driven in an extreme speed, and the mileage of the vehicle is also affected.

TABLE I
MODE OF OPERATION BASED ON SPEED KM/HR

SPEED OF VEHICLE (KMS/HR)	MODE	LED	LED COLOR	BUZZER SOUND	MSG DISPLAY
10Km/Hr	Economic	On	Green	No	No
20Km/Hr	Power	On	Orange	No	No
30Km/Hr	Extreme	Off	Off	Yes	Yes

The results of this work have proved that the motorcycle's engine will only start if the helmet is worn and the belt has been buckled. So, it will reduce the impact from accident and can prevent motorcycles from being stolen. Besides, the LED will flash when the speed exceeds 100km/hour as alarm because over the speed limit signal to alert the rider. Peripheral Interface Controller (PIC) SST8951 is good in controlling all sensors and the system. Implementing the wireless module which is 315 MHz Radio Frequency Module to transmit signal from helmet to the motorcycle improved the capability of transmitting data instead of hardwire. Therefore, a rider would not get disturbed by the wire while riding the Motorcycle.

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