VIRTUAL DESIGN OF TWO WHEELER COLLISION ALERT SYSTEM

Abhinandan Sarkar[1], Suryashree Pandey[2]

[1]*Department of Computer Science & Technology, Luthfaa Polytechnic Institute, Durgapur (W.B), India*
[2]*Department of Electronics, Rajendranath College of Polytechnic, Durgapur (W.B), India*

Abstract – *One in three households owns a motorcycle. In the fast moving world and the busy schedule of our daily life, we have moved emotionally apart from our nearest and dearest ones waiting for us in tension and stress , not knowing about our present status or our location. Seeing to the economic issues of salaried and newly employed youngsters, maximum of them travels to their workplace or different places by two wheelers. This system involves an automation technique, designed on Arduino microcontroller that informs of any accident taken place or can be used to trace out the location of the vehicle at any time with ease of just dialing a call.*

Key Words :– Collision alert system, Arduino UNO R3, Servo motors SG90, Ultrasonic sensor PING, two wheeler safety, SIM800.

1. INTRODUCTION

Automation has entered in every corners of our life and has been influencing our daily activities to a great extent. We all use different gadgets which make our livelihood easier and comfortable. The well being of our social life is very much eased with the advancement of automation. In India around 300 – 400 people die of road crashes every day[1]. Many did not get proper treatment or precisely timely treatment. Many families come to know about the mishap vey late, and many families could not reach to see the victim. On the other hand people work very hard day and night to earn for their living and after a whole lot of stress and strain faced everyday they go out and try to get relieve from their daily stressful journey by buying a two wheeler. Keeping a whole lot of stress of reaching the workplace on time and reaching home on time, either the rider faces some mishap or forgets to lock the two wheeler and rushes to the workplace. It takes few seconds for a miscreant to fly away with someone's relief. This design comes as a savior for all those working hard everyday for the development of the country and society. The circuit is designed taking in consideration of the mental stress our family members take when we or anyone go out with their two wheelers. Few situation we face while we are out with our ride,

a) We come in close distance while we are riding.
b) We may get collided with any other vehicle.
c) While kept in parking the two wheeler may fall down.
d) There may be theft of the vehicle.
e) We may not be available on phone while riding.

For the above mentioned problems, the design provides a simple solution. It not only relieves the mental tension of our close ones but also makes the owner stress free about the vehicle.

A study showed that in Bangladesh maximum number of road crashes takes place for the age group between 16 – 45[2].Chart 1 shows a graph of the data.

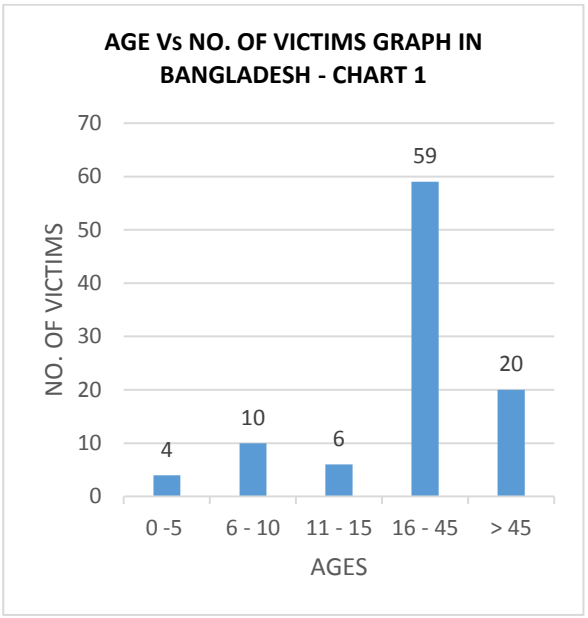

Chart1- Age Vs. No. of victims in Bangladesh

These numbers needs to be decreased for the benefit of the society. Thus, the work has been designed to serve the cause.

2. COMPONENTS NEEDED

We need very few and basic components to establish this basic design of the project.

a) Arduino Uno R3 (1no.)
b) Servo Motor SG90 (4no.)
c) Ultrasonic Range Finder PING (4no.)
d) SIM800 GSM/GPRS module (1no.)
e) Connecting board (1no.)
f) Batteries

These components when connected properly and with a logical programming and adequate power supply will result in proper functioning of the design.

3. PROPOSED DESIGN

The base of the design is the brain of the circuit the microcontroller Arduino Uno R3. The Arduino Uno R3 is made up with 32- bit Atmel ARM or 8-bit Atmel AVR microcontrollers. It has 6 analog pins (A0-A5), a separate section for power pins and 13 digital pins (0 – 13). Figure 1 shows the Arduino Uno R3.

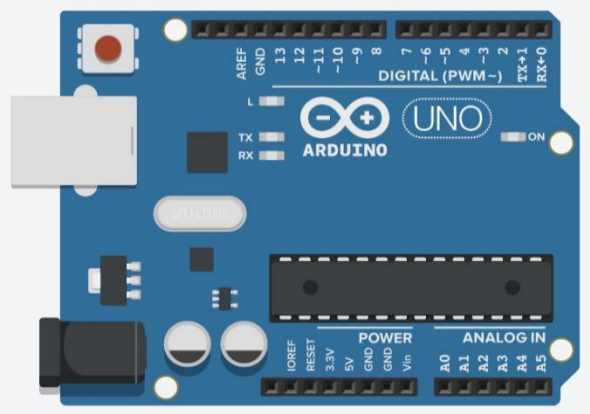

Fig- 1: Arduino Uno R3

The ultrasonic range finder PING finds object distance within a range of 3cm – 400cm [3]. Figure 2 shows a PING ultrasonic range finder.

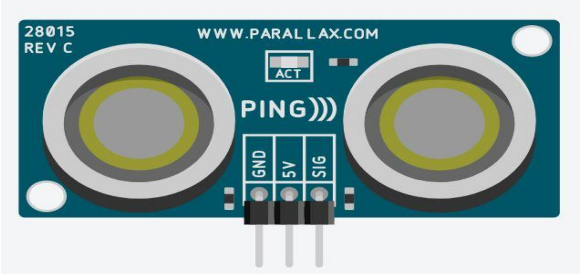

Fig- 2: PING ultrasonic distance finder

The servo motor SG90 is a programmable motor that has a working range of 0°- 180°. Figure 3 shows a servo motor SG90.

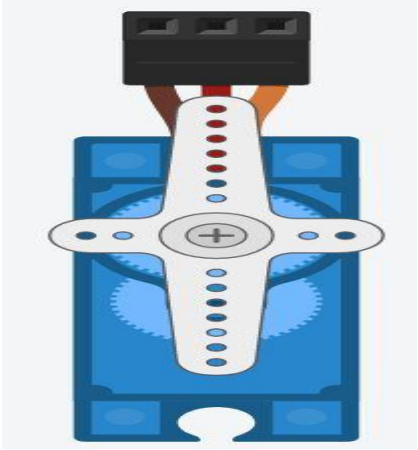

Fig-3: Servo motor SG90

The SIM 800 GSM/GPRS module is a quad band module that works on frequencies of 850, 900, 1800, 1900 MHz and also has GPRS slots and works on 3.4V -4.4V. Figure 4 shows SIM800 module [4].

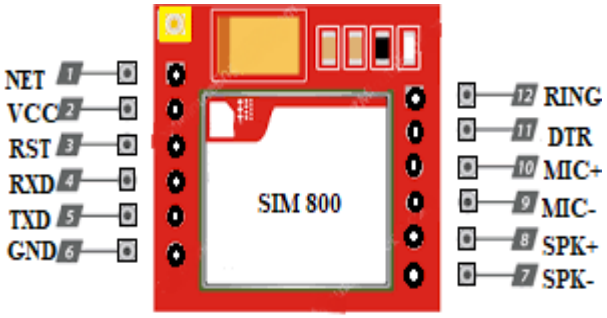

Fig-4: SIM 800 module

The connection is made between different modules as shown in table 1 –

Table 1- Connection between Arduino and different modules

MODULES		ARDUINO BOARD PINS
SIGNAL PINS OF SG 90	S1	7
	S2	10
	S3	9
	S4	8
SIGNAL PINS OF PING	P1	3
	P2	11
	P3	2
	P4	12
PINS OF SIM800	4 RXD	5
	5 TXD	6
	2 Vcc	4

The Vcc (power) and ground pins of all the modules are connected to the +5V and GND pin of Arduino board respectively via the connecting board or the bread board used in this circuit design, except the Vcc pin of SIM800 which is attached to pin 4 of Arduino to minimize the power usage. On proper sensing condition from the other modules the pin 4 of the Arduino board get HIGH or LOW to give power to the SIM800 module. The designed circuit is shown below in figure 5.

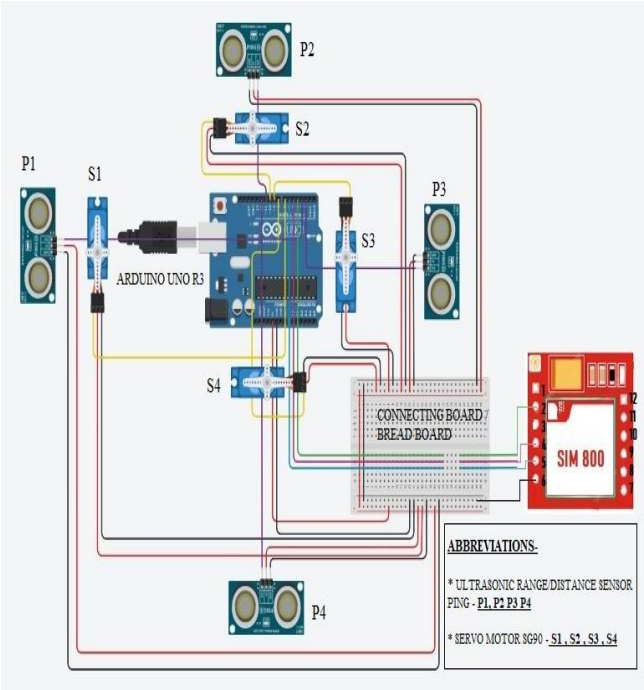

Fig-5: Circuit design

4. METHODOLOGY

The working process is divided mainly in three basic objectives:-

a) If another vehicle come very close to the system installed two wheeler.
b) If the two wheeler gets collided with another vehicle or any how falls down or skids.
c) If the owner or any close family member wants to know the position of the two wheeler.

Figure 6 shows some of the possibilities that may occur.

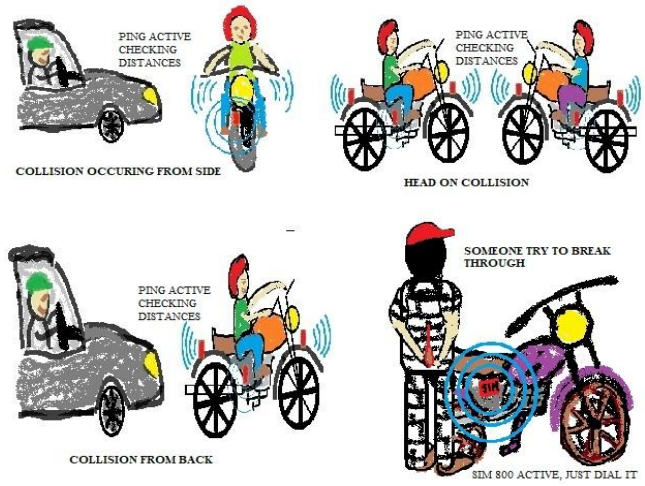

Fig-6: Possible situations

The ultrasonic sensors are mounted on the respective servo motors (S1-P1,S2-P2,S3-P3,S4-P4). The servo motors are fitted on the two wheeler in a way so that it rotates for 180°.

a) The ultrasonic sensor/s continuously detects the range from the nearby obstacle, if it detects the distance between the two wheeler and another vehicle is less than 50 cm or as set value given by the user, switches on SIM800 module and sends a text message to the registered number for an alert.
b) If the system installed two wheeler collides with another vehicle or skids while riding , we take the distance which is less than 30 cm, if the ultrasonic sensor/s detects the range is less than 30cm it sends a text message to the registered number through SIM800 with the location of the rider.
c) If the owner or any close one wants to know the location of the system installed vehicle, the person can ring the SIM800 module which automatically hangs up the call and sends a text message with the location of the vehicle.

Locations are given by sharing latitude and longitude of the sim card installed in SIM800 module. Some program statements of SIM800 that can be used to achieve the system operation :-

SIM.println("AT+CIPGSMLOC=1,1");→Request for location data

respo= SIM_send("ATH");→Hangs up the incoming call

SIM.println("AT+CMGF=1");→Set the module in SMS mode

SIM.println("AT+CMGS=\"XXXXXXXXXX\"");→Send SMS to this number

respo=SIM_send("AT+SAPBR=3,1,\"CONTYPE\",\"GPRS\" ");→Activate Bearer profile

respo=SIM_send("AT+SAPBR=3,1,\"APN\",\"RCMNET\" ");→Set VPN

respo=SIM_send("AT+SAPBR=1,1");→Open bearer Profile

respo= SIM_send("AT+SAPBR=2,1");→Get the IP address of the bearer profile

Link = Link + Latitude + "," + Longitude; →Update the Link with latitude and Longitude values.

A 3D designed view of the system is shown in figure 7 and figure 8 shows the process flow of the system.

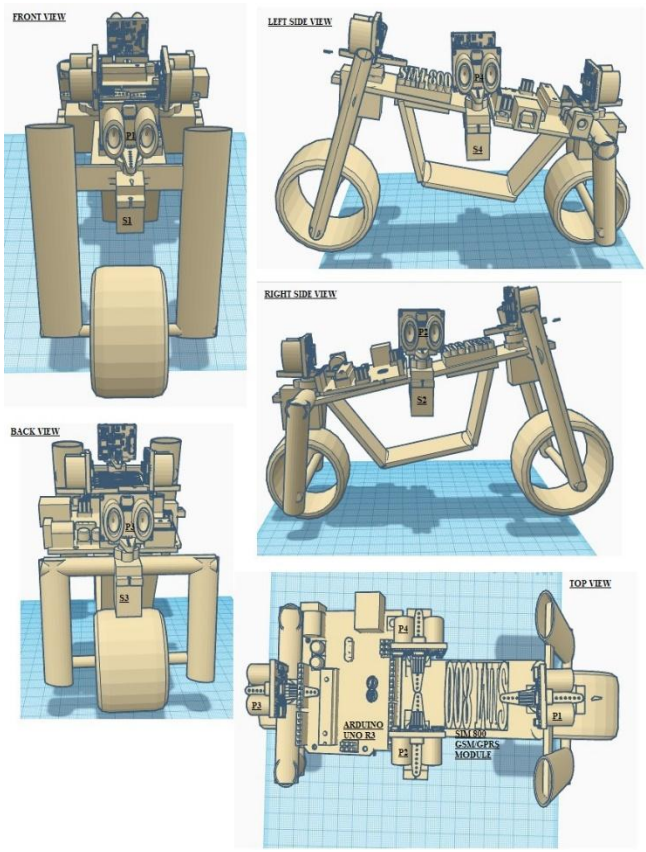

Fig-7: 3D view of the prototype design

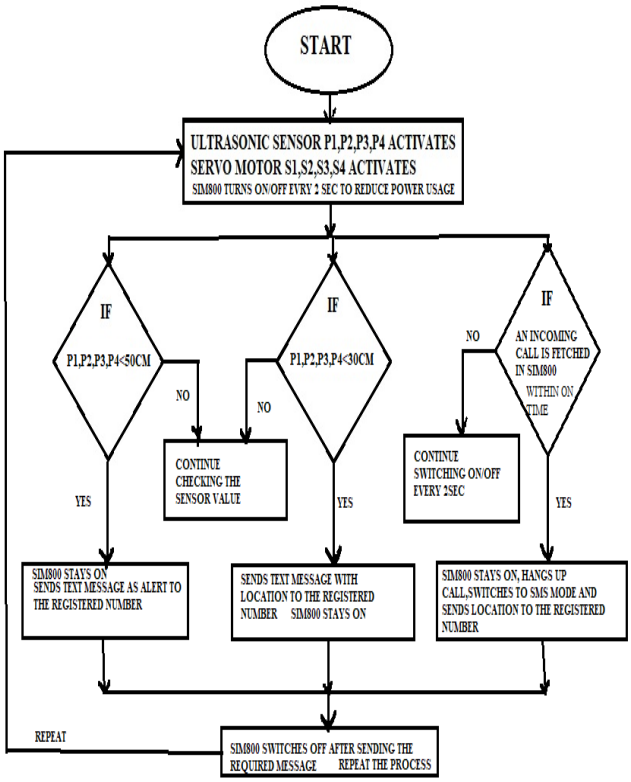

Fig-8: Process flow diagram

5. RESULT & CONCLUSION

Safe driving is essential and safe keeping of the vehicle is also important. But still we get numerous news, we see different articles in print media , social media about the daily mishaps , and empting of numerous families . The design is prototyped keeping in mind the emotion and the stress a family members goes through nowadays when their close one is out for a work with a two wheeler in the daily rush and traffic. Over thousands of accident cases are noted in a day , many theft are lodged in police stations and there is no way to track the vehicle immediately by the owner itself. This design can be easily installed and can be implemented in a large scale by an individual or any company. Security system should be strong and smooth enough so that it can be reached to every corners of the globe.

This design will serve the community with a positive ease for their livelihood.

Power distribution is not considered for the design as it is a basic prototype, for proper power distribution separate modules can be attached or relays can be installed for switching of the different sensors or modules.

The design will bring a responsible effect to the society.

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