



Pre- & post-accident alert system

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Motivational factors

- With the development of technology and the living standard of people, the road accident is the main concern of today's world.
- With reference to the data collected from traffic police & Av news TV, around 25782 road accident takes place every 3 years time.
- 5440 people died on the spot, 11520 people are badly injured, and 23690 people are simply injured.
- This project basically focuses to convey the authentic information about accidents .
- Rescue of fatalities as soon as possible.
- People sometimes may need help while travelling in case of minor accident.

Reference article of our project:

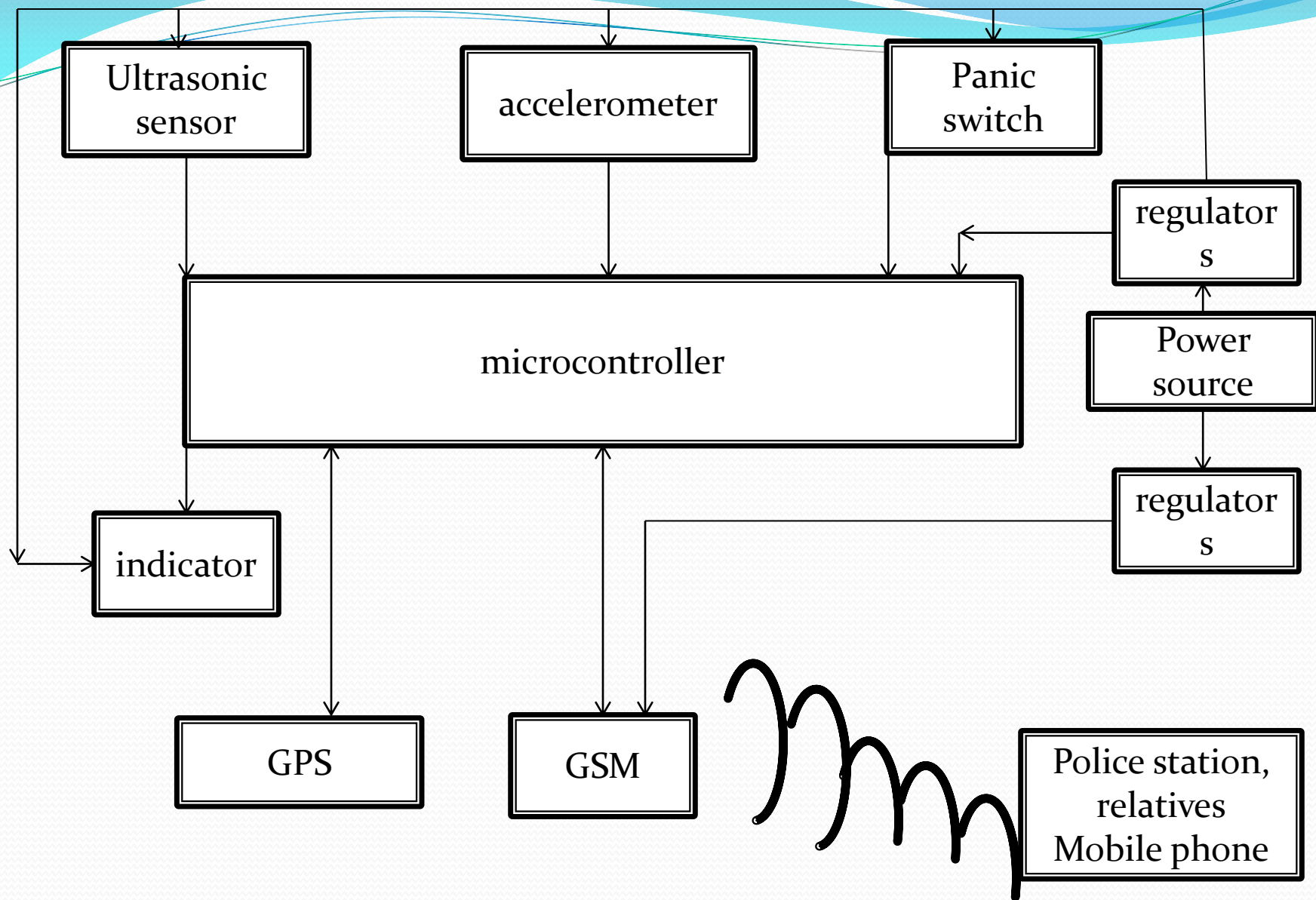
- In May 2014 a research paper named “**microcontroller based collision detecting & warning system**” was published in International Journal of Advanced Research for Electrical, Electronics & Instrumentation Engineering.
- In Jan. 6, 2014 a research based on “**automatic accident alert & safety system**” was published in International Journal of Computer Application.
- Suzuki & Tata-motors have implemented some portion of avoiding accidents in their new models.
- “A fully integrated accident management in vehicular system using smart phones” was published by department of computer engineering of Abdullah Gul University, Bahcesehir University jointly
- In 2013-14 another **research paper** named “**Accident detection and Alert systems for immediate emergency services**”, was published in International Journal of Science and Research (IJSR).
- In November and December 2013 another paper entitled “Prevention of train Accidents using wireless sensor network” by department of Electronics and Communication Engineering of Gudlavalleru Engineering College, Gudlavalleru, A.P India

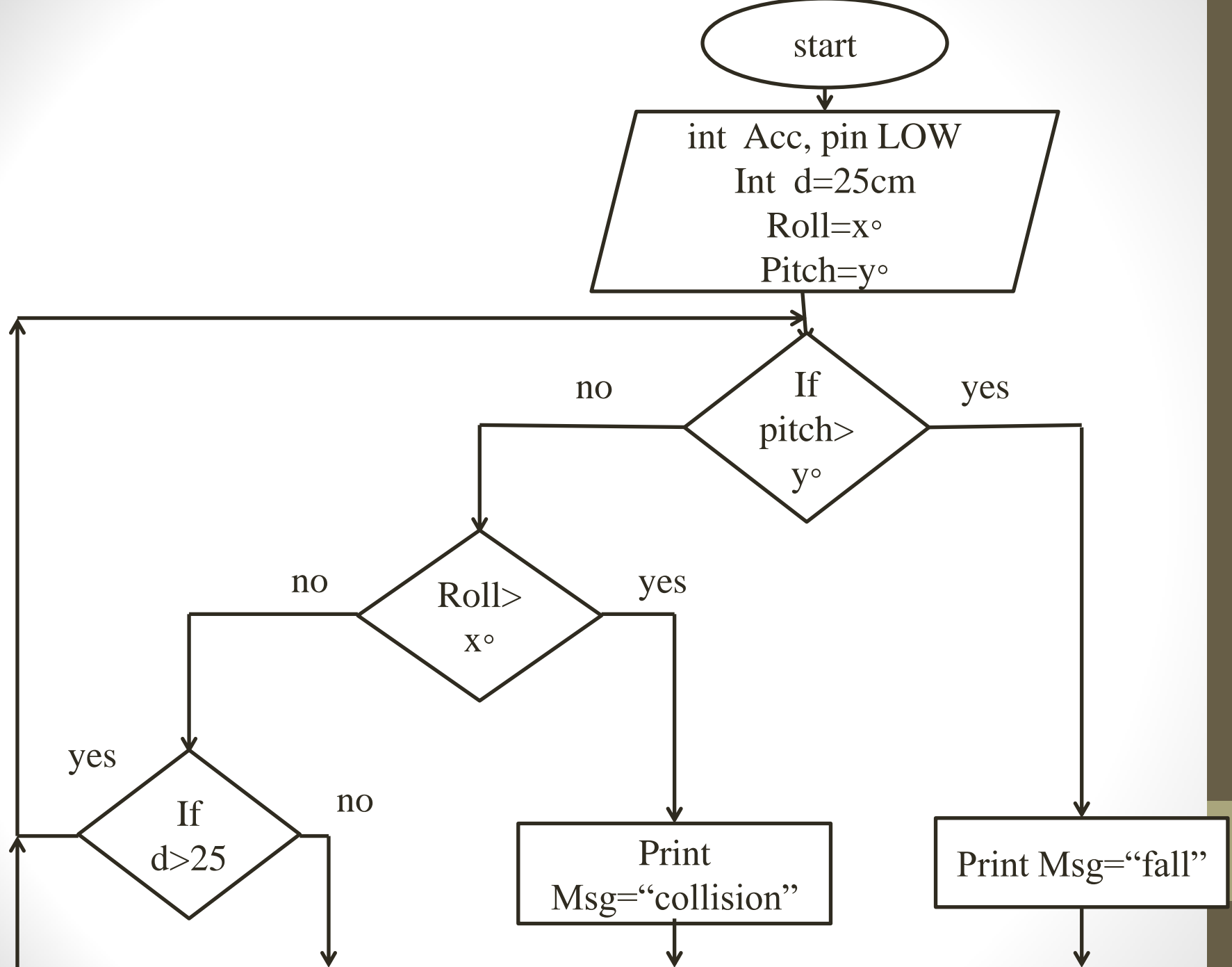
Objective

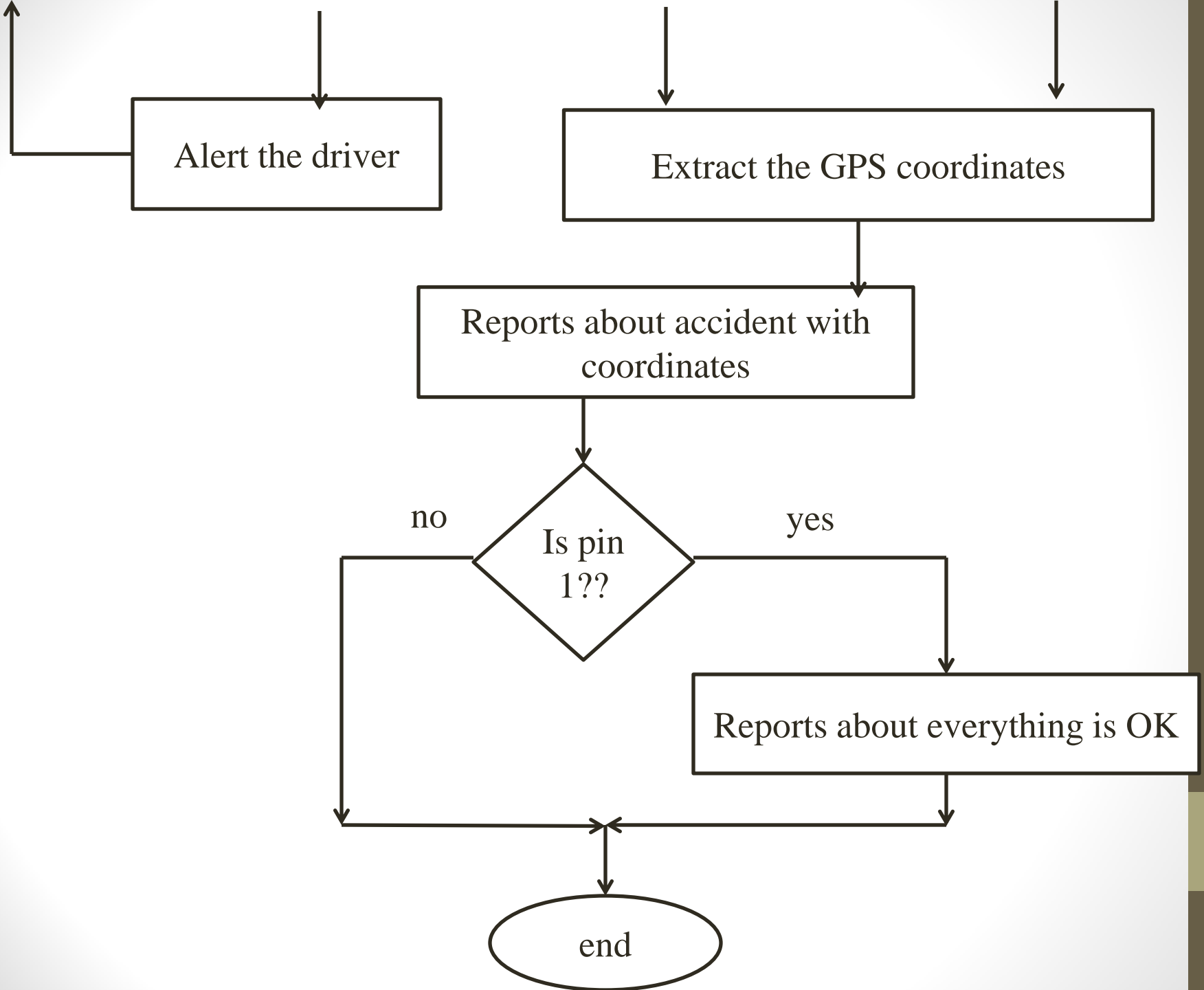
- To design and develop the automatic system for the pre-alert and post accident detection system..
- To design a panic switch.
- To track the geographical location of vehicles through GPS and relay the information through GSM module.

Application

- The system can be used in security of vehicle.
- The system can be used for crash detection.
- This system can be used to locate the vehicle using GPS.
- The system can be used for the immediate rescue of the victims.
- Can be implemented in the health department



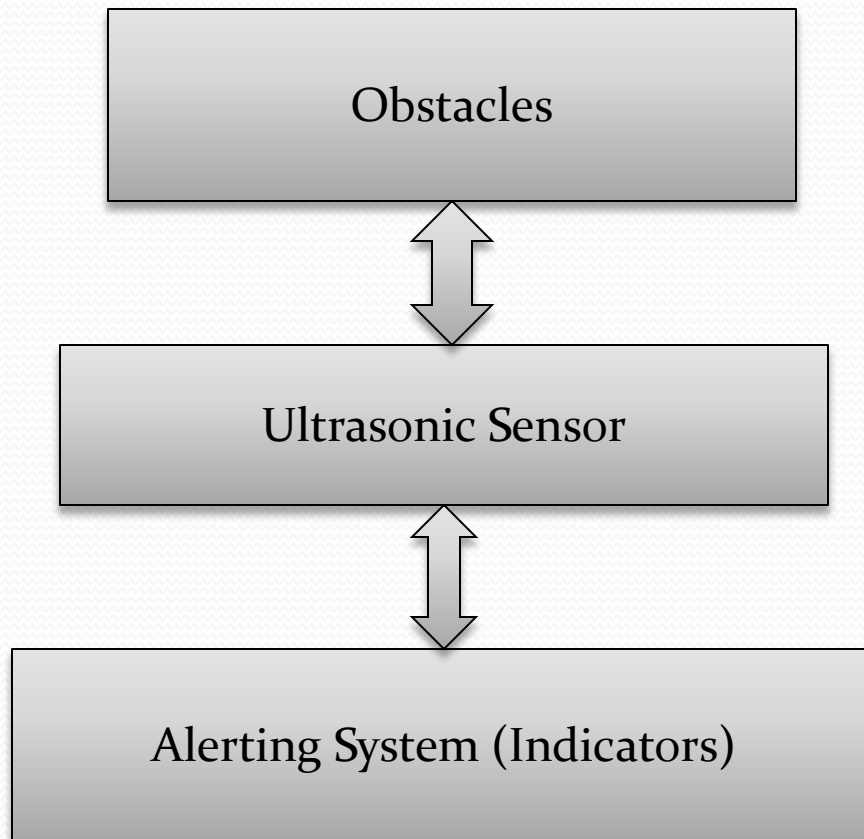




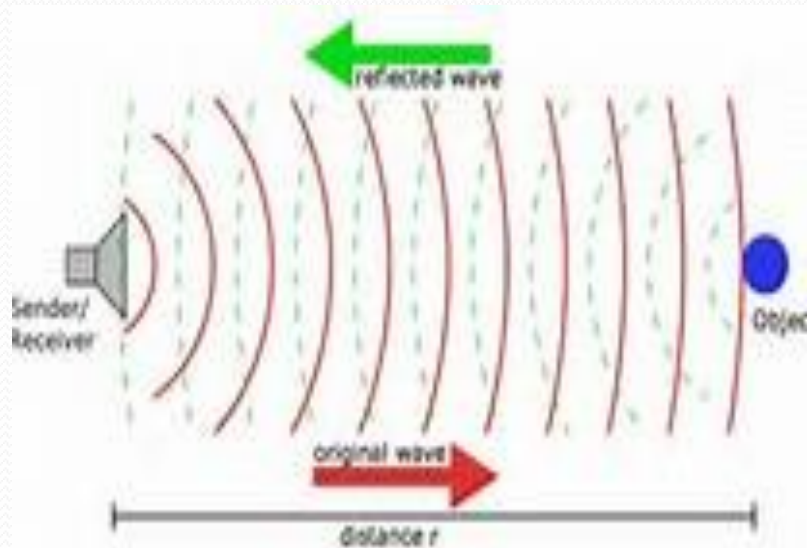
Works Completed

- Ultrasonic's sensor data parsing and obstacles detection.
- Accelerometer data parsing.
- GPS data extracting and analyzing.
- Uploading & relaying the message of accident and its GPS coordinates in cell phone.
- Panic switch implementation
- integration

Block diagram of task that have been done(Pre Part):

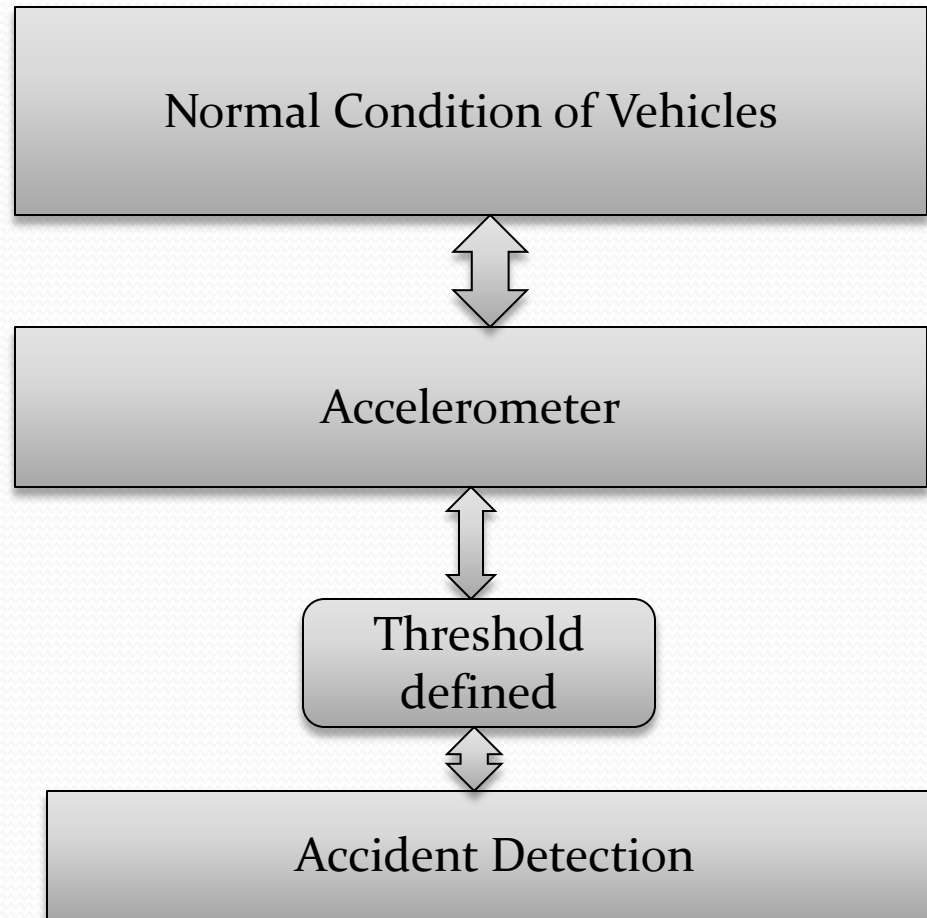


Ultrasonic Sensor(HC-SR04)

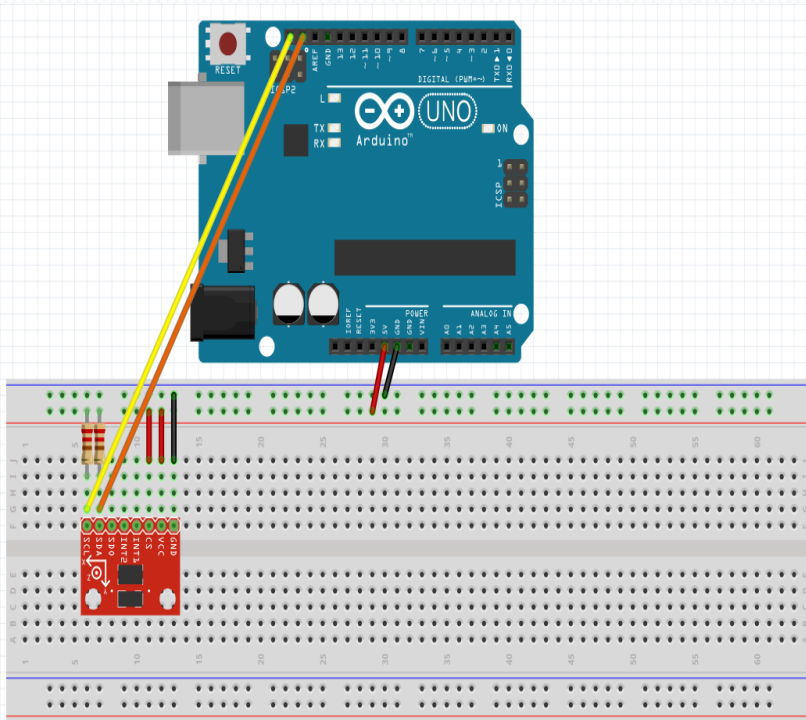


- The HCSR04 takes DC input 5V and operates on 15mA current.
- the working frequency is 40kHz and the maximum range is 4m whereas the minimum range is 2cm whereas the measuring angle is 15 degrees.
- Using IO trigger for at least 10 μ s high level signal.
- The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.
- If the signal is back, through high level, time of high output IO duration is the time from sending ultrasonic to return.
- Test distance = (high level time* velocity of sound (340M/S) / 2

Block diagram of task that have been done (post part-Detecting)



ADXL345



- During the communication between the accelerometer and the arduino, We had connected the following pins.
- Vcc -3.3 v
- GND-GND
- Chip select(CS)-3.3v
- SCL- analog pin 5
- SDA-analog pin 4
- SD0 open
- Two pull down resistor are used from SDA and SCL pins for the power control purpose of accelerometer.
- The output of the accelerometer was obtained in the serial monitor and the values were analyzed and thus the threshold was maintained.

working

- Data extracted
- Pass them in low pass filter

- $$\text{rollangle} = \arctan \frac{-G_x}{G_z} \quad (1)$$

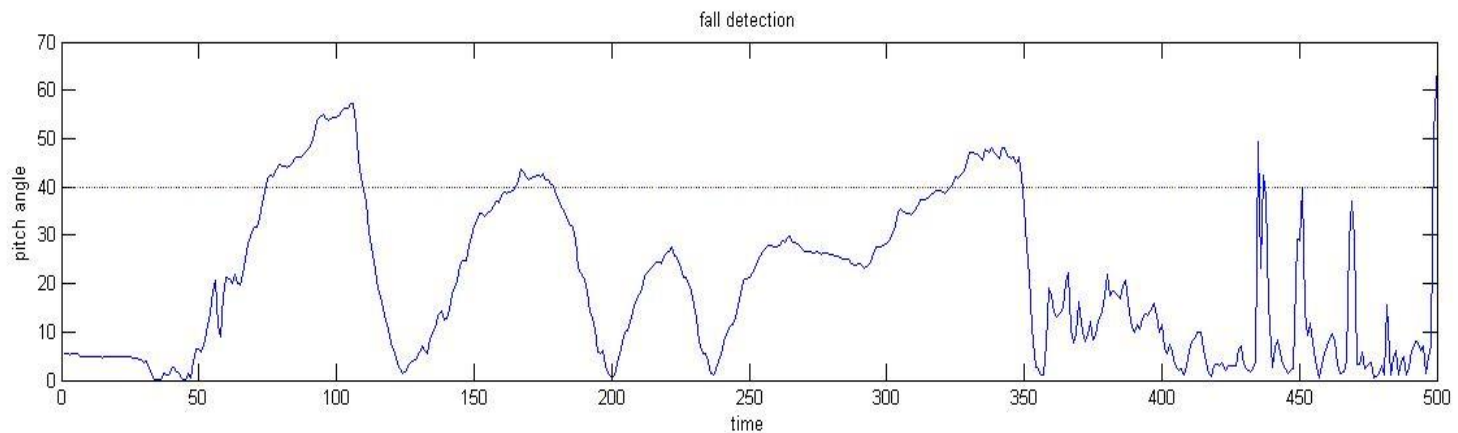
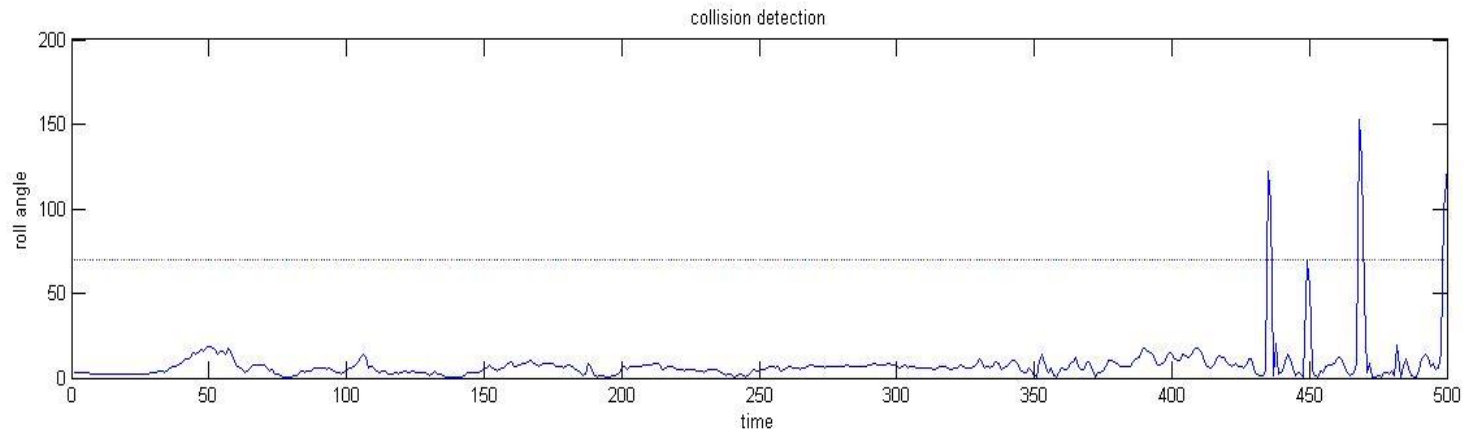
$$\text{pitchangle} = \arctan \frac{G_y}{\sqrt{G_x^2 + G_z^2}} \quad (2)$$

Where G_x = acceleration in x direction

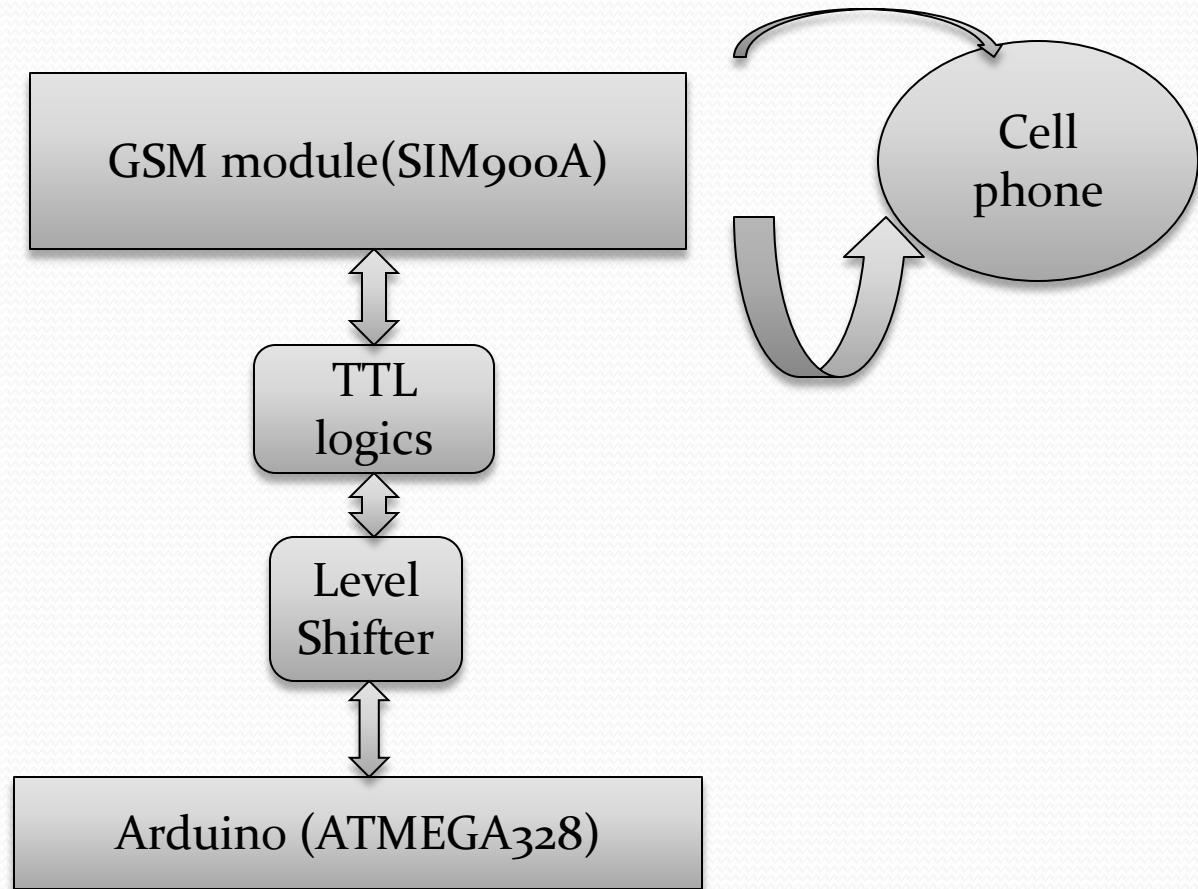
G_y = acceleration in y direction

G_z = acceleration in z direction

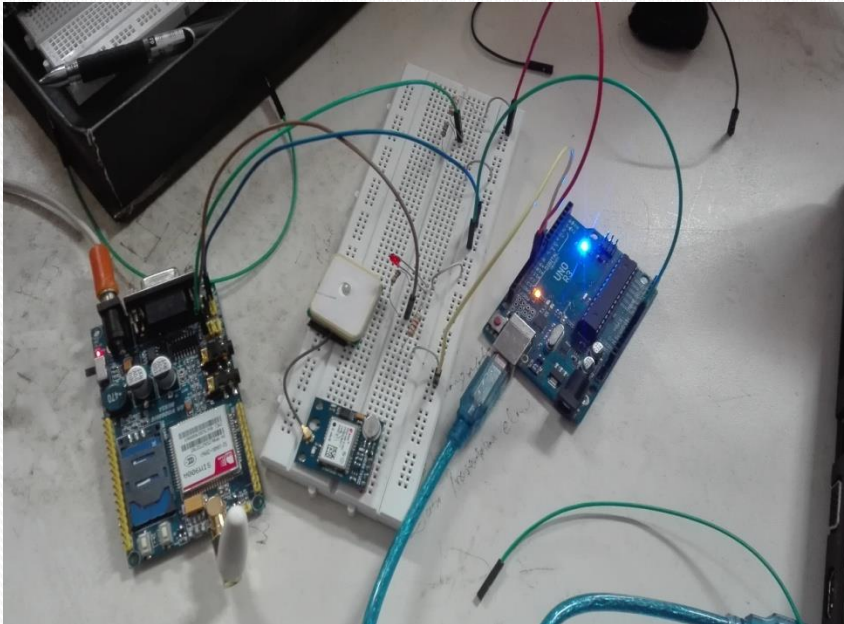
Accelerometer data plotting



GSM Interfacing(reporting part)



GSM(SIM900A)

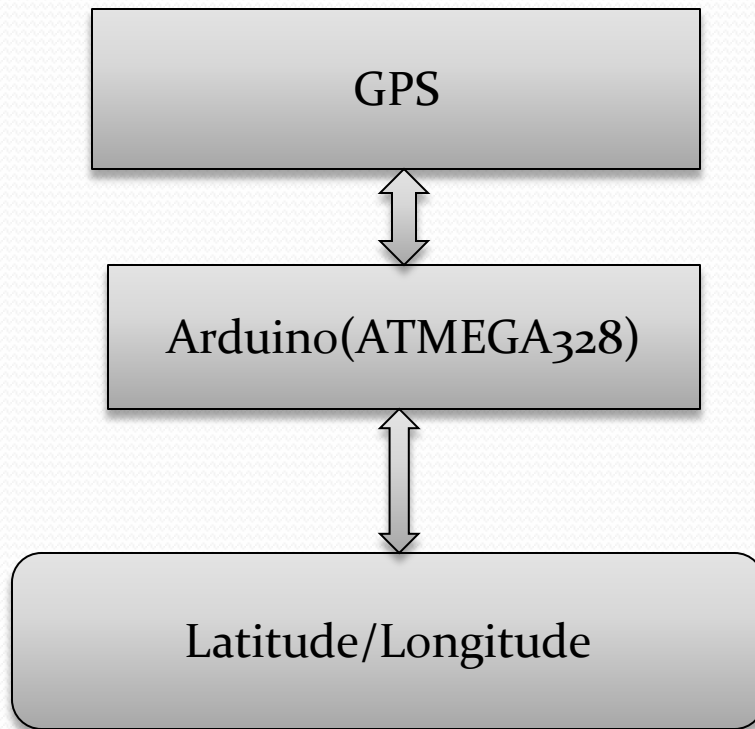


- A GSM modem is used in the data acquisition section of the project for transmitting the measured GPS data to the central server or the logging section via SMS.
- we use the SIM900 module which supports communication in 900 MHz band
- There are two types of interfacing available in SIM900 which are TTL and RS232 respectively among which we preferred the TTL mode.
- baud rate of SIM900 is 9600bits per seconds.
- The modem is given the appropriate AT commands by the microcontroller to which it is interfaced through a serial port.

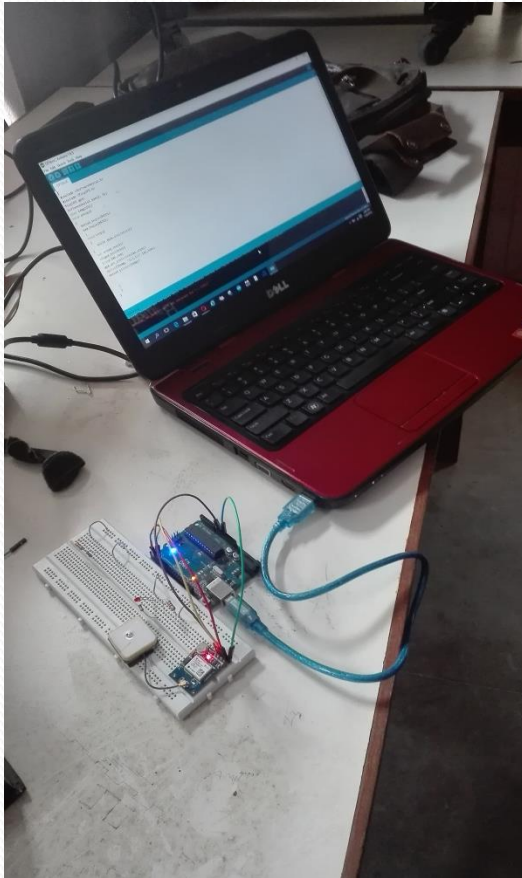
AT Commands

- **AT+CPIN=to check sim**
- **AT+CMGF=1 +carriage return**
- **AT+CMGS=" mobile number" carriage return**
- **Once The AT commands is given'>' prompt will be displayed on the screen.**
- **Type the message to send via SMS. After this, press "ctrl+Z" to send the SMS.**
- **If the SMS sending is successful, "ok" will be displayed along with the message number**

GPS Interfacing(locating part)




GPS (U-blox)





- **The TX pin of GPS is connected to Rx of microcontroller and vice versa.**
- **After GPS extracts the geographical location through satellites, it transmits the data to the microcontroller.**

Message in twitter



prabin Giri
@giri__prabin


 Nepal

 Born on June 21, 1992





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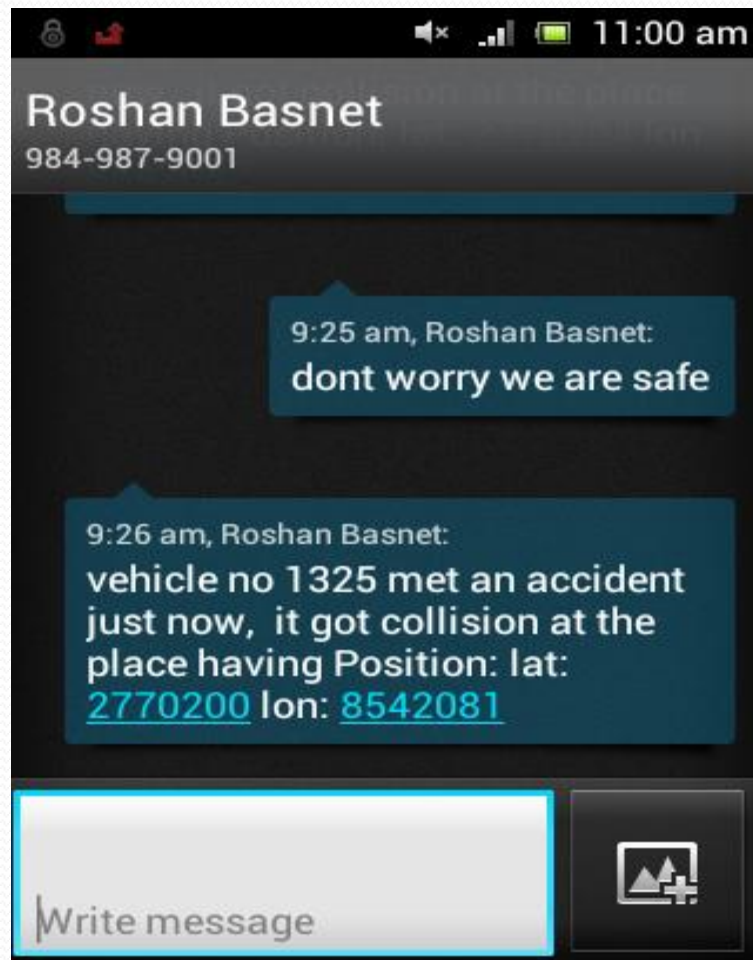


Google Developers @go... 

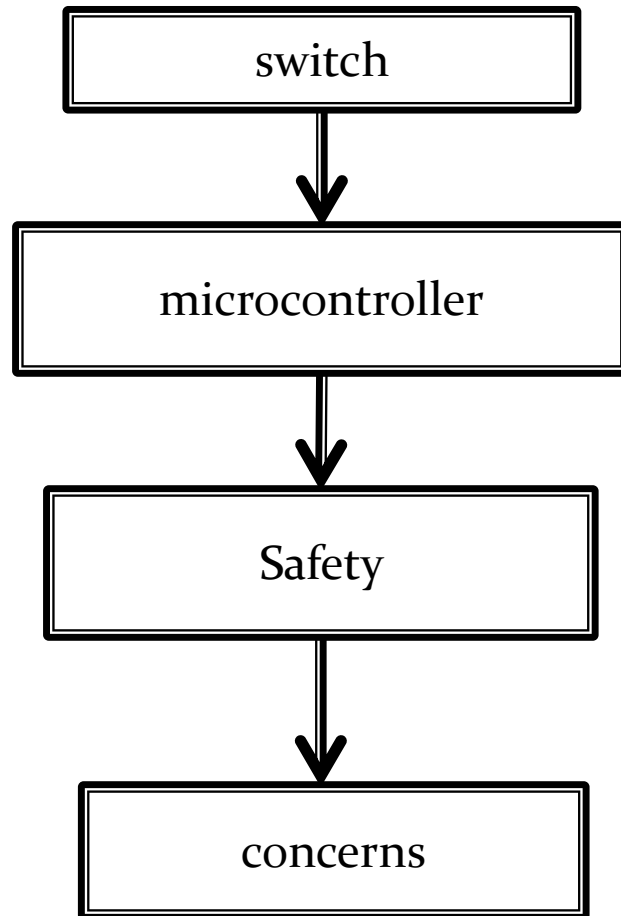
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Panic switch

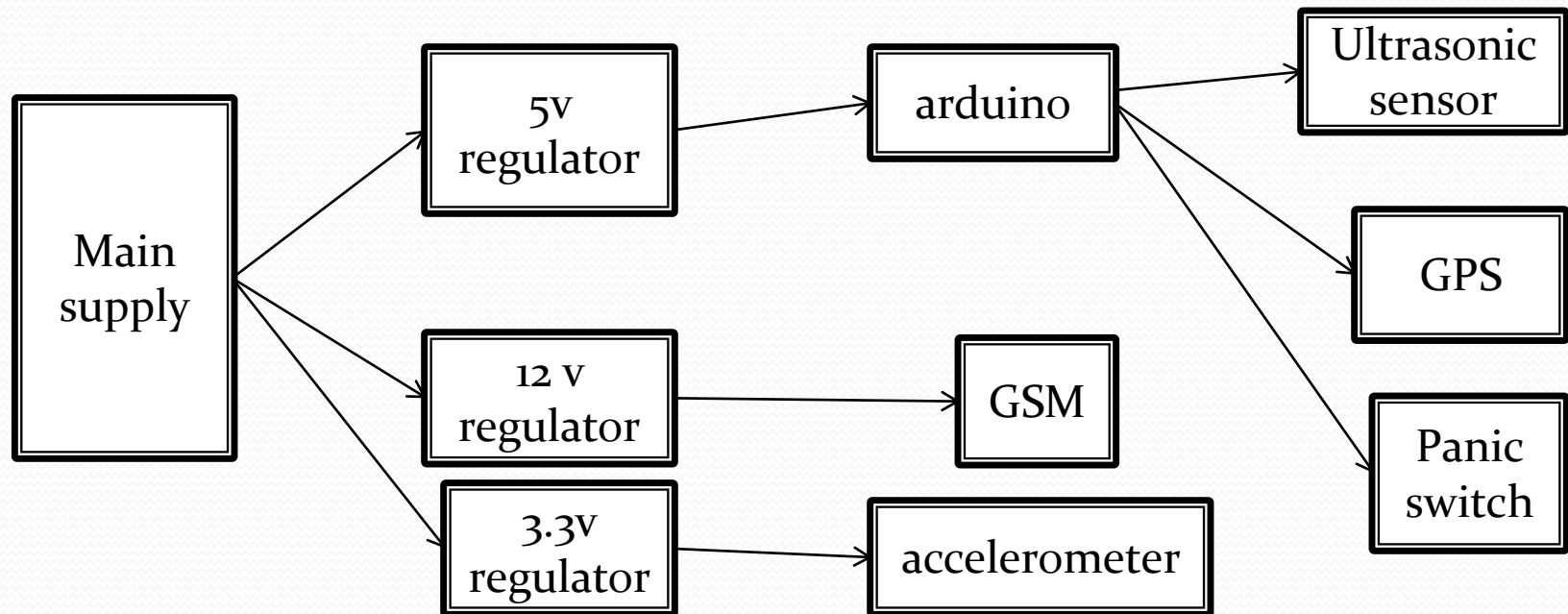


integration and power requirement

Integration was done in breadboard.

Power was managed by using external adapter.

In real field



Future extension

- This system can be extended by using the ARM processor instead of Arduino for the fast and efficient operation.
- **Image processing** for perfect Scenario of accident.
- **Automatic de-acceleration** system can be implemented.
- The system can be designed which automatically shutoff the engine in case of accidents.
- **Auto-map generation** by developing android application.

Conclusion

- Up to this end of final year project , we have integrated the whole system.
- This system basically shows the embedded system design & its effective use in accident cases.

References

- M. C. P. Ms.Kajal Nandaniya, "microcontroller based accident detecting and warning system," *international journal of advanced research for electrical,electronics and instrumentation engineering*, vol. 3, no. 5, pp. 9565-9570, may 2014.
- M. C. P. P. Ms.Kajal Nandaniya, "automatic accident alert and safety system," *international journal of computer application*, vol. 85, pp. 26-30, jan.6 2014.
- B. G. O. o. k. G. Sergi kaya, "a fully integrated accident management system in vehicular system using smartphone," pp. 1-5.



**THANK YOU
EVERYONE.....**