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# IOT Approach to Vehicle Accident Detection and Live Location Tracking

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**ABSTRACT:** In Today's Daily Life Vehicle Holds An Important Place In Everyone's Life. Each Day Millions Of Peoples Uses Personal And Public Transport System To Reach Their Location On Time. Among These, Roadways Transport Is One Of The Major Transport Systems Used By Commuters. Roadways Transport System Not Only Allows The Commuters To Reach Their Destination But Also Allows Tons Of Goods To Reach Their Destination. This Roadways Transport System Gets Effected When It Met With An Accident. Reasons Behind It May Vary But Most Of The Cases Comes From Drink And Drive Habits. Using The Help Of Various Sensors, Gps, Gsm And Iot, To Detect Accident And Exact Location Of The Vehicle. Gps Fetches The Geo-Coordinates Of The Vehicle And With The Help Of Google Maps Api, The Location Of Vehicle Which Had An Accident Can Be Tracked. It Will Help The Ambulance To Reach The Location With Fastest Route And Save Precious Lives. Using The Alcohol Sensor, The Ignition Of Engine Can Also Be Controlled To Prevent Accidents.

## I. INTRODUCTION

The Development In Technology Is Increasing Everyday And It Is Solving Our Problems Of Daily Life With Minimum Effort And Short Span Of Time. As The Access To Internet Is Getting Easier, Number Of Internet- Based Devices Are Also Increasing Exponentially. These Developments Are Converting Our World Into A Smart And Better World. In This Era, All Beings Are Somehow Dependent On The Internet To Fulfill Our Daily Necessities. Using Maps To Reach Our Destination Faster, To Order Food Online, To Purchase Medicines Online, Every Platform Is Now Connected With Internet. Thus, Area Acquired By Internet In Our Daily Life In Increasing Day By Day.

In Developing Countries Where Everything Is Changing At A Very Fast Rate, Chance Of Meeting An Accident Is Very High. Every Developing Sector Is Prone Area Of Accident. The Accident Graph Is Increasing Day By Day And One Of The Major Contributions In The Graph Is Of Road Accidents. In A Survey, 1.25 Million Peoples Died Due To Road Accident And Where 15% Is Only From Drink And Driving. These Statistics Are Very Disheartening For A Nation Which Is On The Path Of Becoming A Developed Nation. Road Accidents Which Took Place In Remote Areas Are Very Hard To Get Traced. It Is Due To The Fact That In A Developing Nation, Neither Every Corner Is Covered With High Speed Internet Nor Every Part Is Covered With Cellular Connectivity. Hence To Find The Location Where Accident Occurred Is A Major Challenge For The Hospital And Police Authority Which Results In Loss Of Valuable Lives.

## II. METHODOLOGY

This Study Includes The Implementations Of Iot In The Field Of Automotive Sector. It Is Developed On Iot Platform Using The Help Of Existing Embedded System Of Vehicles. Sensors And Actuators Are Used To Get The Data And Controller Is Used To Perform The Instructions Based On The Data Received From The Sensors. Benefits Of Implementing This Concept Are: Safety Of Passengers Can Be Achieved By Locking The Ignition System Of The Vehicle If The Driver Is Drunk. If An Accident Took Place, The Location Of Accident Can Be Easily Found Using The Geo- Coordinates. Gps Module Will Send The Data To Server Where The Location Can Be Tracked Using Google Maps. Gsm Module Will Send A Text Alert To Relatives Of The Passengers And Concerned Authorities Along With The Co- Ordinates.



### III. RELATED WORK AND DISCUSSION

In This Research Paper, Gps Module Is Used To Provide The Location Of Vehicle If It Meet An Accident. Gsm Modem Is Used To Send The Latitude And Longitude Of The Vehicle So That It Will Get Traced On The Google Maps. Location Provided On The Mobile Via Sms And By Clicking The Link It Will Be Directed To The Server Where Google Maps Will Show The Tracking Details.

- The System Is Based On The Concept Of Iot Where Device Will Share The Data To The Web Servers So That It Can Be Available Through-Out The Globe And Anyone Which Have The Proper Credentials Can Access The Data.
- The Asad System Is Inbuilt With The Vehicle Along With The Controlling Units Of Vehicle. It Is Interfaced With The Ecu Of Cars Which Have The Proper Protocols Access On Which Sensors Are Interfaced.
- Tilt Sensor[1] Is Interfaced With The Controller Which Gives The Information About The Accident. Once The Vehicle Had An Accident, It Will Send The Command To The Controller To Execute The Instruction Written In The Program.
- Once The Accident Is Confirmed By Sensing Vibration Sensor[2], The Much-Needed Information Latitude And Longitude From Gps Modem[3] Are Shared With The Local Authorities And The Nearby Hospitals And Police Stations So That Valuable Lives Can Be Saved.
- As Per-Safety Measure, Alcohol Sensor[4][5] Is Attached Along With Air-Blow Fan Nearby Driver Area. Any Consumption Of Alcohol By The Driver Will Led To Seize The Ignition Of Engine And Passengers Are Alarmed Via Lcd Display[6].
- Accident Detection And Tracking Algorithm Is Used By Author Is Dependent On The Platform Of Iot And Arduino Programming[7]. Data Sent To The Server Can Be Viewed

And Used By The Authorized People And Proper Credentials Will Shared.

- Wi-Fi Connectivity Is Required Every Time To Put The Data On The Server From Device. If Wi-Fi Is Not Available Data From Device Is Sent To Mobile Using Sms Using Gsm Modem[8][9] Along With The Latitude And Longitude Details.
- Threshold Value Is Defined For The Tilt Sensor, So That False Reading Can't Be Used To Trigger The Alarm Of Accident. That Threshold Value Is Collected From The Standard Impact Force Calculator Panel. Based On The Data, Threshold Value Is Calculated.
- This Is Not Useful In Those Areas Which Have Low Cellular Connectivity And Gprs Connectivity. As Device Will Put The Data To The Server Which Require Internet Connectivity Throughout The Device. System Will Also Send Sms To The User's Mobile Hence For This Purpose Cellular Connectivity Is Required.
- Mobile Should Be Present At The User's Side So That Information About The Accident Can Be Shared And Necessary Actions Can Take Place.

### IV. PROPOSED SYSTEM

On The Basis Of Above Survey And Description, Our System Includes Tilt Sensor, Alcohol Sensor, Vibration Sensor And Different Communication Modules Like Gsm, Gps[10] To Find Out The Exact

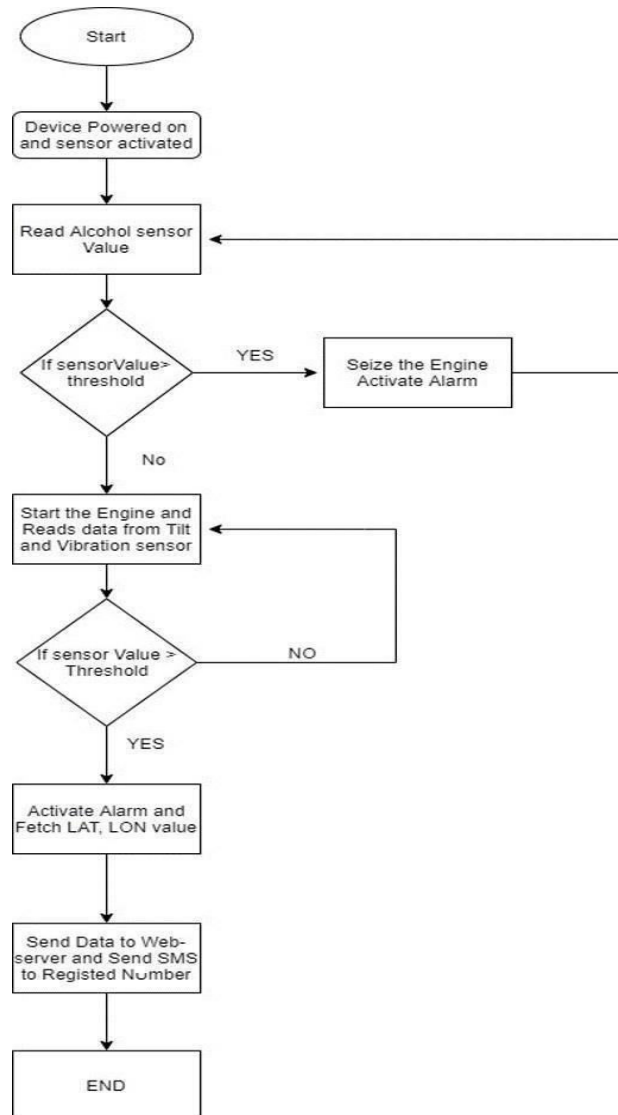
Location Of The Device. Once The Location Is Fetched, Latitude And Longitude Data Is Submitted To Web Server Where Google Map Api Comes Into Picture And Locate The Place Using Geo- Coordinates.

Alcohol Sensor Will Detect If Driver Of The Vehicle Is Under The Influence Of Alcohol Or Not. It Is Done When Driver Of Vehicle Is Instructed To Blow Breathing Air Using Air-Blow Fan Incorporated Near Driver Seat. Mouth Air Is Blown With Proper Pressure And With Proper Speed, If He Is Drunk Command To Seize The Ignition Of Engine Is Sent To The Ecu Of Vehicle Otherwise Engine Will Start. If Vehicle Met With An Accident During Its Journey Then Sensor Values Are Captured And Sent To The Web Server Indicating That Accident Of The Vehicle Has Been Occurred.

That Data Consists Of Latitude And Longitude Of The Location Including The Date And Time Of The Accident. Once The Web Portal Is Opened, There Is An Option To Track The Location Using Google Maps. Accident Alert Sms Is Also Sent To The Registered Mobile Number Informing The Location And Time Of Accident. To Interface



Gsm And Gps, Serial Communication Uart Protocol Is Used. Other Sensors Are Interfaced With The Help Of Adc Present On The Arduino. Data Is Collected And Compared With Threshold Value Written In Program. The Flow Chart Of The Proposed System Has Been Shown In Figure 1.



**Figure 1.**Flow Chart Of The Proposed System

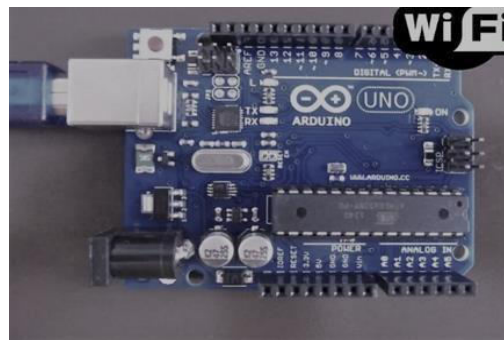
### 1. Arduino Uno

This Is The Controlling Unit In Device Which In Incorporated With The Ecu Of Vehicle. This Controller Is From Avr Family Of Micro-Controller[11][12]. Avr Stands For Advance Virtual Risc. Risc Is Reduced Instruction Set Computing. This Controller Has Architecture Which Is Of 8-Bit; It Means Data Flow on Its Data Lines Are Of 8-Bit. It Can Also Be Demonstrated As The Size Of Data Carried By The Data Bus Is Of 8-Bit. This Controller Has Inbuilt Crystal Oscillator, So In Hardware Module No Need To Connect Crystal



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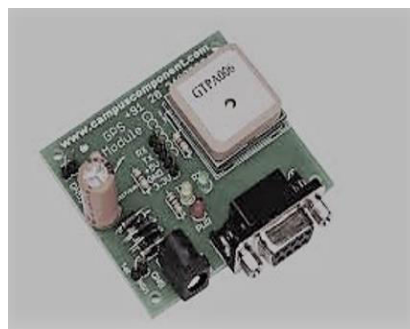
**Figure 2.** Arduino Uno

Oscillator As Clock Pulse Is Provided By Internal Source. Arduino Is The General- Purpose Development Board Developed By Arduino Corporation To Increase The Knowledge Of Robotics In Programming World. This Is Open Source Development Board So That No Need To Purchase Any Library Or Ide For Itsdevelopment. Arduino Family Of Development Boards Has Various Variants In It, A Model Picture Is Shown Below In Figure 2. Here The Focusis On Arduino Uno, One Of Its Variants Which Used Atmega328p Controller As Its Computing Unit.

## 2. *Gps*

Gps Is An Acronym Of Global Positioning System. This Module Is Used To Locate The Position Of The Device Using The Geo-Coordinates. These Tiny Devices As Shown In Figure 3 Are A Satellite Navigation System That Gives Location And Time Information In All Climatic Conditions. Gps Is Used In Various Application Devices Like Vehicle, Mobile, Airplane, Watches All Have The Same Functionality To Give The Exact Location And Time. It Consists Of Three Main Segments:

- The Space Segment: The Gps Satellite.
- The Control System: Operated By U.S Military,
- The User Segment: Which Includes Both Military And Civilian User And Gps Equipment.

**Figure 3.**Global Positioning System

## 3. *Tilt Sensor*

Tilt Sensor Is Based On Mercury Conductivity Between Two Electrodes. This Module Has 3 Pin Output Which Are 5v Vcc, Output, Gnd. Liquid Mercury Is Present Between Two Electrodes In The Sensor Module. The Model Image Is Shown In Figure 4.

Initially Output Value Of The Sensor Is Low When The Module Is Not Tilted Because The Liquid Mercury Completes The Circuit Between Two Electrodes. Now If The Sensor Is Tilted, Continuity Breaks Between Twoelectrodes Because Of The Liquid Mercury Hence Resulting The Output Value As High.



**Figure 4.** Tilt Sensor

#### 4. *Gsm Modem*

Gsm Is An Acronym For Global System For Mobile Communication. It Is A Standard Protocol Designed And Developed For Mobile Telephones. It Has Second Generation Cellular Network.

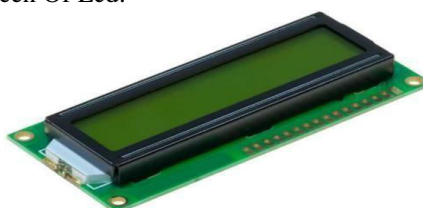
This Modem Is Used To Access The Mobile Communication Using The Sim Card Of Any Telecom Service Provider. This Module Is Used To Access The Internet As Well Using The Gprs Communication On Gsm Modem. This Modem Allows The Use Of Incoming Call, Outgoing



Calls, Send And Receive Sms, Access The Internet On Its Shield. A Module Is Displayed In Figure 5.

#### 5. *Lcd Module*

To Show The Information On The Device Lcd Module Is Incorporated With Arduino. Lcd Is An Acronym of Liquid Crystal Display. This Module As Shown In Figure 6 Has 16 Pin Which Is Used To Interfaced with Arduino. 8 Data Lines And 3 Control Lines Are Connected With Gpio Of Arduino To Receive The Binary Data From Arduino. These Data Is Displayed On The Screen Of Lcd.



**Figure 6.** Liquid Crystal Display



6. *Vibration Sensor*

Vibration Sensor Module Is Used To Sense The Impact When Collision Of Vehicle Happens. It Sends The Voltage Value According To The Impact On The Surface Of Vehicle. Transducer Is Attached With The Sensor Module Which Converts The Force Into Voltage Value. A Working Model Of Sensor Is Shown Here In Figure 7. O-Amp Is Also Inbuilt With The Sensor Module.

Once These Voltage Values Are Present On The Op-Amp, It Compares These Values And If Voltage Of Inverting Is Greater Than Voltage On Non-Inverting, Then Output Is Low And If Voltage On Non-Inverting Is Greater Than Inverting Then Output Is High.

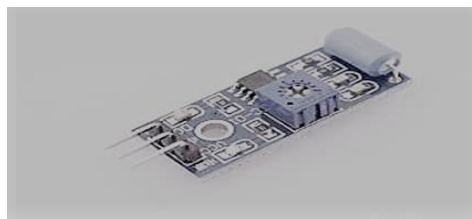


Figure 7. Vibration Sensor

7. *Alcohol Sensor*

In This System Alcohol Sensor Is Incorporated To Detect The Presence Of Alcohol Consumed By The Driver. This Sensor Is Fixed Near By The Seat Of Driver And Before Turning On The Engine, Drivers Have To Blow Breathing Air Inside The Sensor Receiver. An Alcohol Sensor Is Depicted Here In Figure 8. Alcohol Content In The Mouth Air Is Calculated By The Sensor Transducer And That Value Is Converted Into Electrical Voltage Value. This Electrical Voltage Is Now Checked With The Threshold Value Present In The Program Of Arduino.

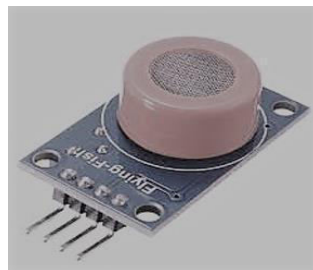


Figure 8. Alcohol Sensor

8. *Web Portal*

To Locate The Vehicle Which Met An Accident, Latitude And Longitude Data Is Sent To Web Server Where These Data Are Stored In Data Base. Form This Database, Data Is Fetched And Displayed In A Table Format On Webpage As Displayed In Screenshot In Figure 9.

There Is A Link From Which That Location Is Traced Using Google Maps Api.

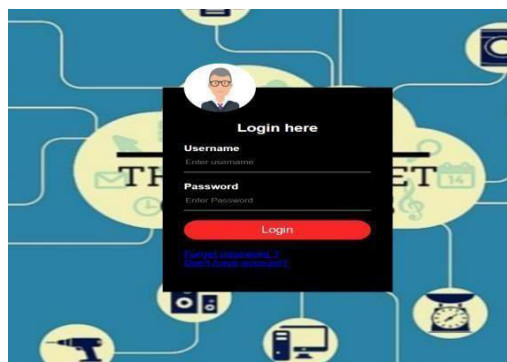


Figure 9. Screenshot Of Web Portal



### V. RESULT

In This System, Vehicle Safety Is Achieved By Using Different Iot Modules And Protocols. This System Is helpful In Reducing And Locating Road Accident Occurred.

As Shown In The Prototype Vehicle Overview In Figure 10, This System Comprises Of Alcohol Sensor, Vibration Sensor And Tilt Sensor Which Gives The Safety To The Driver Of The Vehicle. Along With The Sensing Modules, Gps, Wi-Fi Module, Gsm Are Used To Provide The Connectivity To Web Server And Users Mobile.



**Figure 10.** Vehicle Overview

Google Maps Api Is Also Incorporated With Web Server So That Real Time Tracking Can Be Achieved. When Vehicle Is Turned On, Alcohol Sensor Is Activated And Allows User To Blow Breathing Air Into The blower Fan Which Is Embedded In The System. If Alcohol Is Detected By The Sensor With Proper Air Blown Pressure, The Device Will Seize The Vehicle Ignition System And Display The Information. If Alcohol Is Not detected, The System Will Start Normally.

Now, During The Vehicle Ride, If It Met An Accident It Will Send The Latitude And Longitude Along With The Date And Time To The Web Server As Shown Below In Figure 11. The Data Is Collected From Gps Module, So It Will Be Real Time Data.

Accident Detection System	
Location Details	
Latitude	38.648500
Longitude	-121.070580
Date	11/10/2019
Time	03:35:56AM
Vehicle1 Status	OK
Vehicle2 Status	ALERT

[Click here!](#) To check the location in Google maps.

**Figure 11.** Screenshot Of Web Server

Once Data Is Uploaded To The Web Server, Sms As Displayed In Figure 12 Will Be Sent To The Registered Mobile Number From Gsm Module. This Message Will Have Latitude And Longitude Coordinates Of Vehicle. Now With The Help Of Google Maps The Vehicle Location Can Be Tracked And Necessary Assistance Will Be Provided.





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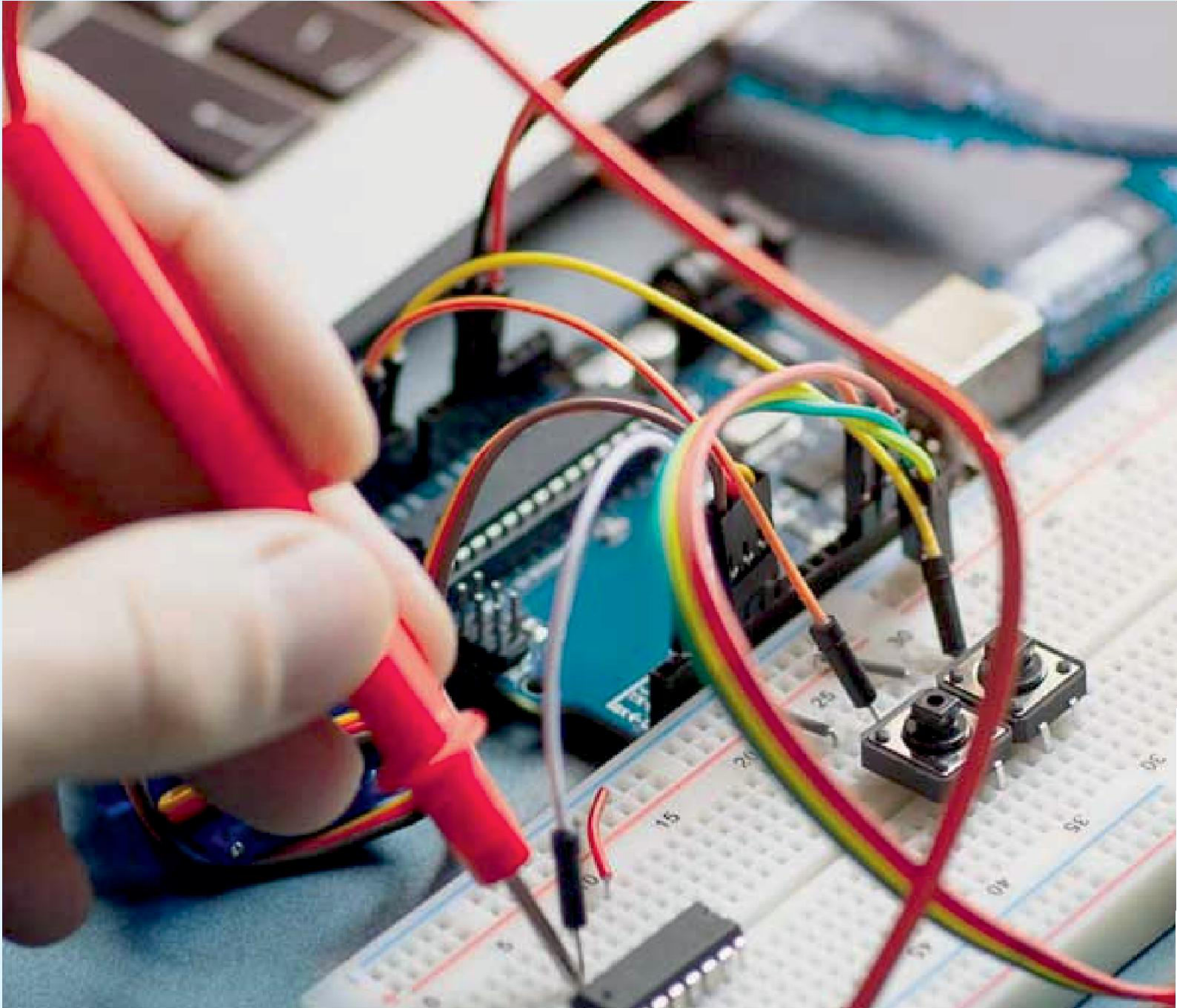
**Figure 12.** Screenshot Of Sms Received On Registered Number

## VI. CONCLUSION

In This Paper Vehicle Detection System Using Iot And Live Coordinates Has Been Proposed Which Can Be Used To Detect Accident Of A Vehicle Occurred In Remote Areas. This Proposed System Uses Tilt Sensor And Ir Sensors To Detect Accident And Gsm, Gps Modules To Locate The Exact Live Location Of The Vehicle So That Rescue Team Will Reach As Soon As Possible. The Live Location Collected From Gps Modem Is Pushed to Web-Server So That Google Map Api Can Track The Location And Guides With Shortest Path Possible. As Per-Safety Feature, Alcohol Sensor Is Used Which Detects Alcohol Presence In Driver's Body. The System Will Seize The Ignition System Of The Vehicle If Alcohol Is Detected. As For Future Aspect this System Can Be Deployed To Different Transportation Vehicles And Detects Accident Of Those Vehicles Which Are Used To Maintain Supply Chain In Our Country And this Vehicle Detection System can Also Be Used In The Field Of women Safety As This System Detects The Live Location Of A Vehicle. So, Women Who Feel Unsafe During A Cab Ride Or In Opting Any Vehicle As A Lift, Could Make Their Travel Easier With The Help Of This System.

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