OBJECT TRACKING AND RECOGNITION USING GPS

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Abstract- *In this materialistic physical project we make project on the object tracking using GPS with GSM with their respective hardware and software configuration. We know the tracking of the object getting the live location of the person has become a part of the life. We are making the project to track the object and get the live location of the object, and also control our vehicle with the commands and coding to turn on the vehicle and turn off the vehicle .We are using the hardware tracking hardware like GPS neo 6m, GSM SIM 800L, ARDUINO UNO BOARD, 5 V RELAY, step down converter, resistors, battery, wires etc. After the hardware connections setup we are going to upload the code to the ARDUINO UNO board using ARDUINO software. After uploading the code we will insert the 2G SIMCARD in GSM sim800L and give the power to the device then send command messages from to the mobile phone to the SIMCARD inserted in GSM SIM 800L using the phone number we have uploaded in the code.*

KEYWORDS: Object Tracking, GPS Neo 6m, GSM SIM 800l, ARDUINO UNO Board

1. INTRODUCTION

We are using GPS and GSM technology along with ARDUINO UNO for object tracking. For receiving the signal on the earth by the GPS receiver there are 4 Satellite to send the signal. The respective Satellite send the data of the location and time to the GPS receiver. The data or the information send by the satellite to the GPS receiver is then decoded by the device. The GPS signal are radio signal which travel in this physical

world with $3*10^8$ m/sec. We can find the distance between GPS receiver and satellite by finding the time gap in which signal was send and received by our GPS device.

The trilateration process is used to determine the location of the object using GPS from the signal receive by atleast three satellite receiver then we can determine its location. The minimum requirement of the GPS to determine the exact position of the object is three satellites to determine the latitude and longitude of the object. We are assuming that our GPS receiver is located at the sea level, for better accuracy and position

of the object to be tracked we need atleast four satellites that is to determine the exact coordinates of the latitude ,longitude and altitude, the geographical location.

2. RELATED WORK

Many work and researches have done on the object tracking , the tracking devices and technologies are used in mobile phone , cars and smart phones ,work done by the various researchers over the time to upgrade GSM and GPS technologies over the time.

Here we mention the previously related research work on the subject we have choosen : -

1-Sathe Pooja", vehicle tracking system using GPS", international journal of science and research (IJSR), India online ISSN: 2319-7064, 2013.

The research is for tracking the location of the vehicle using the Ublox GPS neo 6m GPS module is used for getting the coordinates the latitude and longitude while SIM 900A GSM module is used for receiving the message and send the SMS to the phone number that is uploaded in the code .

2-Montaser n. Ramadan, Mohammad a. Al-khedher, sharaf a. Al-kheder," intelligent anti-theft and tracking system for automobiles", international journal of machine learning and computing, vol. 2, no. 1, February 2012.

The GPS Information received by the microcontroller which is used like ARDUINO is transmitted to the GSM module with the use of SMS after every 10 minutes .The microcontroller is also used for reading the engine parameters and by fixed interval of time and then signal is send up to the second module. and sends them to the second module in the SMS.

3- Obuhuma, j. I., Moturi, c. A., " use of GPS with road mapping for traffic analysis", international journal of scientific and technology research ,volume 1,issue 10,issn 2277-8616,10 November 2012.

They made a model which has the tracking unit that can be used to track the location of the vehicle and with the

movement of the vehicle the data is send through SMS. Kalman algorithm is used by them to recognize the actual location of the vehicle. The device made will collect the actual location and can be seen through Google map or Google earth. This model provide the the security to the vehicle.

4-devyani Bajaj, Neelesh Gupta," GPS based automatic vehicle tracking using RFID", international journal of engineering and innovative technology (IJEIT) volume 1, issue 1, January 2012.

They work on the AVL Automatic Vehicle Location Technology it is the technology in which the GPS is used to get the location to the hardware that is attached to the device along with the software configurations. This is the good technology to track and monitor the remote vehicle using GPS satellite.

5- m. B. M. Kamel, l. E. George. "remote patient tracking and monitoring system." international journal of computer science and mobile computing 2, no. 12 (2013): 88-94.

The increasing number of patients needing continuous care is an encumbrance for medical staff.
Today patient monitoring system along with wireless medical devices is used to monitor the patients, but still the patients have to stay inside coverage area of wireless devices. The system operation is stable, accurate in monitoring and detecting patient's emergency case

BACKGROUND:

We can find the exact or appropriate location of the object or the person which is to be tracked, either the object or person is lost and lost there way. GPS pins his/her location ,our device can be easily inserted in the vehicle to provide the security and to track the location of the object. The device will help the person to help to find the way . The various commands given to the device will help the user to gain up and boost up his confidence when travelling alone.

AIM:

1. For ease of doing business

For the transport business we can see when the material/goods or products are transported from one state to another state in INDIA or from one country to another country internationally, the traders track their movement of truck which travel thousands of kilometre in india through GPS, which provide them security for their business related activity.

2.FARMING

We know our country majority population is dependent on agriculture and its related product that is processed later on, in the advancement of technology in agricultural field we can introduce the GPS device in the tractors along with sensors and other electronic device to determine the land for cultivation , and how much irrigation and inorganic, organic material needed to maintain the soil fertility to increase the yield of the production.

3. Gives the security to the user while travelling

When somebody is outside and travelling from one distant location to another distant location the person can use the device to send the emergency message to the another person concerned to get the help .

4. For providing the security to the luggage ,gadgets while travelling.

We can connect the GPS tracking with the luggage while traveling if anybody tries to open the bag the message will be sent to our mobile phone, as we are installing the device in the vehicle anybody tries to start our vehicle then the message will be sent to the mobile that is used in the code.

5.For finding the locations and directions to reach the destination.

When the user has limited time and have to find the minimum distance to reach the destination to reduce the journey time, the user can use this GPS tracking device to get the alternative path for journey.

DRAWBACKS:
We can see the technology is changing at the pacer rate and also the hardware configurations, but the basic concept does not change of the GPS AND GSM, however hardware will be upgraded

3. DESIGN AND IMPLEMENTATION

The design and implementation of our project is to track the object and get the live location of the Vehicle, person or the object using the GSM and GPS technology, in further we will control and check our vehicle by giving command messages to the object tracking device.

Step 1- We will arrange all the hardware and software requirements

Step 2- We will do the hardware connection properly by taking care of all the required parameters like voltage, current, errors, etc. we gave power supply to 5 V relay

module and connect it to ARDUNO UNO board to power pins, GND AND POSITIVE TO ARDUINO GND AND 5V respectively , power then goes from battery to voltage step down converter through ARDUINO, we connect voltage step down converter to GSM SIM 800L AND GPS NEO 6Md, and connect the TX, RX PINS OF ARDUINO to 8 and 9 ports of ARDUINO respectively and GSM SIM 800L to 10 and 11 respectively.

Step 3-after making the hardware connection using GPS , modules GSM, ARDUINO ETC we will insert the 2g SIM in GSM SIM 800L and attach ANTTENA to GPS and GSM modules

Step4- we will upload the code in the ARDUINO UNO BOARD, we are using C PROGGRAMING language using ARDUINO software.

Step 5 – After uploading the code we will check our device we will send the various commands in the form of text message from the other phone number to get the live location of the object   etc.

4. DESIGN METHODOLOGY

We make the tracking device with the hardware used as follows

1-GPS Neo 6M

2-GSM SIM 800L

3-ARDUINO UNO Board

4-1 Channel 5V RELAY Module

5-Voltage Step Down Converter

6- Battery, Wires, Resistors etc

Our device can be used to:

1-Track the object to get the live location

2-Control the vehicle using the commands given by mobile phone using GSM AND GPS
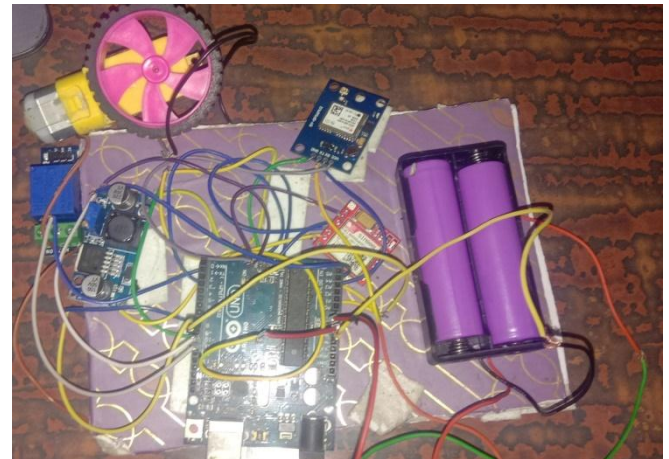

FIGURE 1: WORKING DEVICE

4.1 SOFTWARE REQUIREMENTS IN THE SYSTEM

4.1.1 ARDUINO SOFTWARE

We use ARDUINO software to write the code and upload the code in ARDUINO UNO board using C++ programming.

4.1.2 API CREATED IN THIS RESEARCH

1-void setup( )- Void setup is a function that we create at the top of every program

2-loop( )- The loop() function is used for giving the loop to the program under some conditions ,when we have created a setup() function, which initializes and sets the initial values

3-parse data( )- The parse object contains the key value pairs for JSON- compatible data. The data is stored on the parse inbuilt for the object. Each Parse Object contains key-value pairs of JSON-compatible data.

4-extract sms( )-Used for extract the SMS to send and receive the SMS

5-do action( )- do_ action creates an action hook in the program which we are uploading.

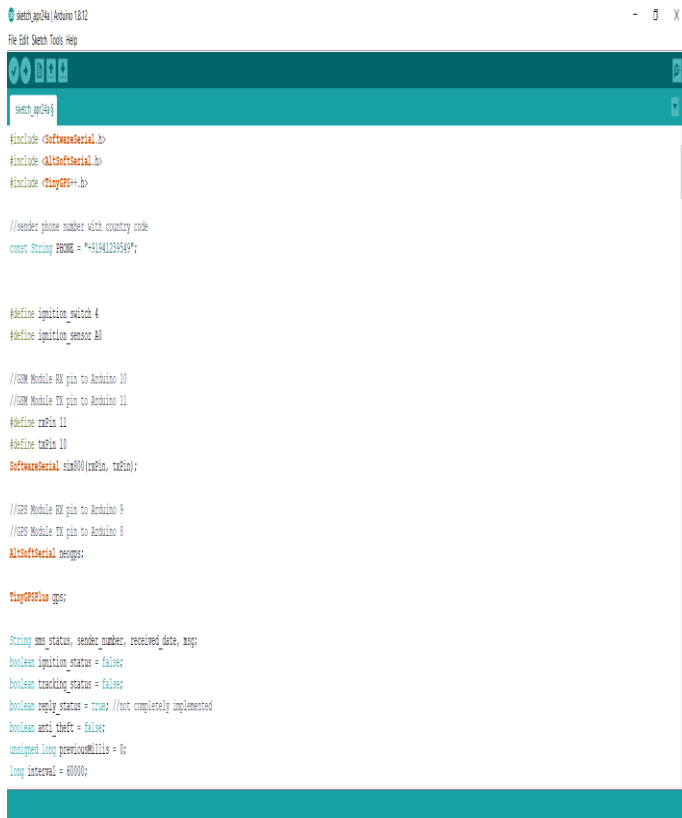**6-delete sms( )**- used in message sending

7-sendsmsgps( )- used to send coordinate or location SMS to the device

8-send sms()- it sends the message to the user

9-get ignition status( )- we can check the ignition status of the vehicle

10-set ignition( )-we can switch on or off the vehicle

4.1.3 SCREENSHOT OF THE CODE USED IN THE ARDUINO SOFTWARE (INTEGRATED DEVELOPMENT ENVIRONMENT)

FIGURE 2 : SCREENSHOT OF CODE

4. 2 HARDWARE USED IN THE PROJECT

4.2.1 GPS NEO 6M

FIGURE 3: GPS NEO 6M

The NEO-6M GPS module is a main device in our project for receiving the GPS signal or act as an receiver and has antenna of length 25 x 25 x 4mm. It has an external ceramic antenna which has 3 mm mounting holes Its, which provides a strong satellite search capability. We can check the status of the device with the help of indicators of light that is inbuilt for signal and power supply, the module can save the data when the battery has gone or power has been cut in the device,.
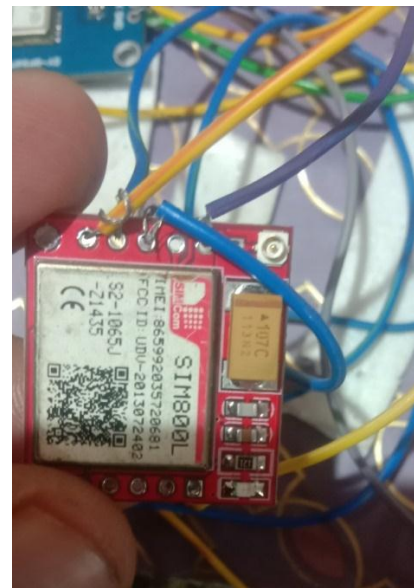
4.2.2 GPS SIM 800L

FIGURE 4 : GPS SIM 800L

SIM800L is a device which is cellular module which allows for GPRS, GPS transmission, from this device we can send and receive SMS and also receive voice calls. It has low cost and small size and good quad band frequency that is used in the projects and for good range or high range connectivity. When we give power to the module it get booted and searches for connectivity to the network and login to the device. On the device board the LED displays connection state (no network coverage - fast blinking, logged in - slow blinking).
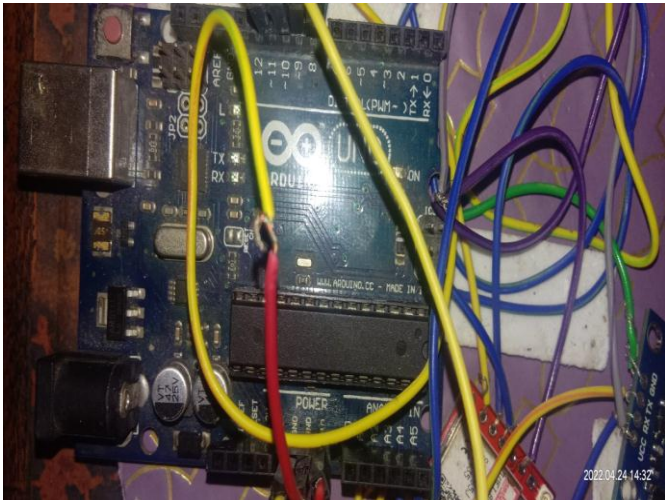
4.2.3 ARDUINO UNO BOARD

FIGURE 5: ARDUINO UNO BOARD

ARDUINO UNO is a microcontroller board based on the ATmega328P. ARDUINO contains everything needed to support the microcontroller simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. ARDUINO has 14 digital input/output pins (of which 6 can be used as PWM outputs), ARDUINO has 6 ANALOG inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button .The efficiency of this microcontroller is good and it is efficient to generate the good and positive results.

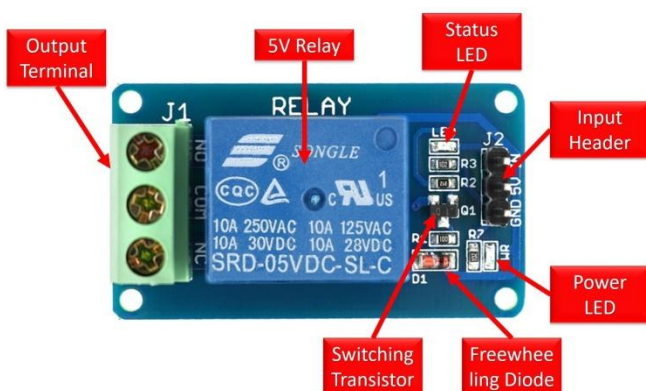### 4.2.4 1 Channel 5V Relay Module without Optocoupler

FIGURE 6 : 1 CHANNEL 5V REALY MODULE

Relay is an ELECTRO-MECHNICAL device which acts as a switch. DC electrical current is used to energize the relay coil which opens or closes the contact switches. Internal circuit of a single channel 5V relay consists of normally open contacts, normally closed contacts and a coil.

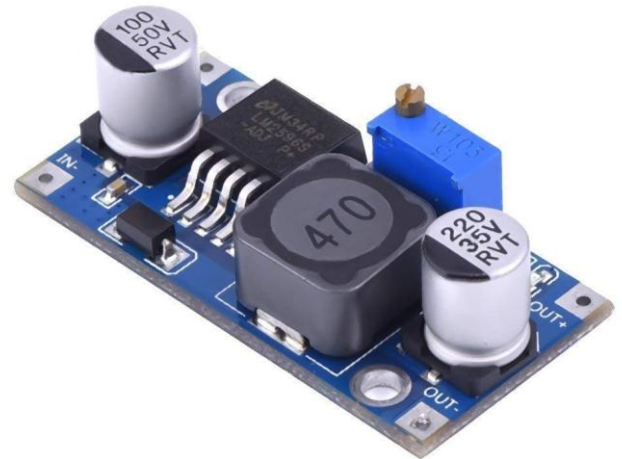### 4.2.5 LM2596 DC-DC Buck Converter Adjustable Step Down Power Supply Module

FIGURE 7 : VOLTAGE STEP DOWN CONVERTER

1. It operate on the Input voltage of 3-40V
2. It operate of Output voltage 1.5-35V
3. Its Output current rated current is 2A, maximum 3A
4. The Switching Frequency is 150KHz
5. The Operating temperature in Industrial grade from -40 to +85 degree celcius.
6. Conversion efficiency: 92%(highest)

4.3 TECHNOLOGY USED

4.3.1 GPS (GLOBAL POSITIONING SYSTEM)

GPS (Global Positioning System) is based on the technology of a satellite based navigation system. It provide the details of time and location to the user who is using it, located anywhere on or near the earth surface. Working of GPS does not depend on weather conditions it work on every condition provided there is 4 satellite in the line of sight for signal compatibility . GPS is operated by the US Air Force. A GPS works independent from the user's internet connection or cellular signal. However, the presence of internet increases the effectiveness of GPS positioning.

4.3.2 GSM (Global System for Mobile communication)

GSM stands for Global System for Mobile Communication. GSM is an open and digital cellular

technology used for mobile communication. It uses 4 different frequency bands of 850 MHz, 900 MHz, 1800 MHz and 1900 Mhz . It uses the combination of FDMA and TDMA.

4.3.3 ARDUINO UNO

ARDUINO UNO is a microcontroller board based on the ATMEGA 328P, ARDUINO has 14 digital input and output pins of which six can be used as PWM outputs, six ANALOG inputs, a 16 MHz quartz crystal, a USB connection, a power jack through which we can give electricity supply and has an ICSP header and a reset button.

4.3.4 C++ PROGRAMMING

WE USE C++ PROGRAMMING IN ARDUINO SOFTWARE TO UPLOAD THE CODE IN ARDUINO UNO

5. RESULT AND ANALYSIS

We will able to get the location of the person and track the object by this project and it Is easy to use just by giving simple messages to the user, our project is not too much costly and has cheap operational cost, at operational level we only require SIM card which has SMS pack and battery to operate. Our project also help in anti theft measures a, person security, finding the lost device and for many more other applications
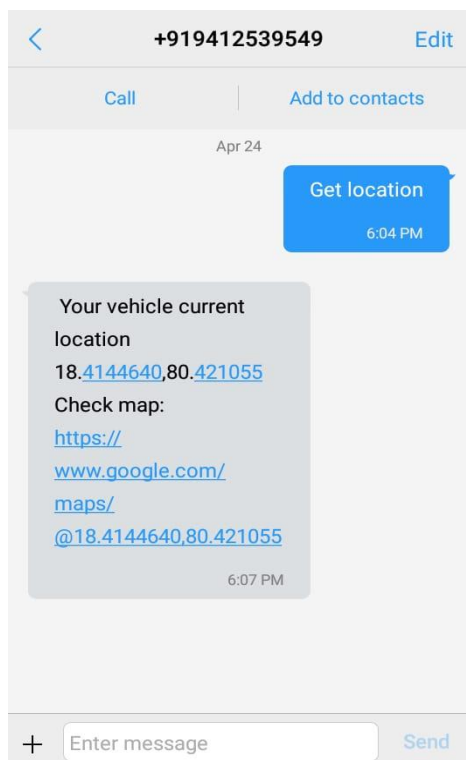
6. CONCLUSION

From the project we can do object tracking, vehicle tracking, we can also control the vehicle by giving the command, our research work can be used for the security of the objects. During the tracking, the built in GPS receiver has to be enabled. The system need an internet connection in order to determine and track the object's location, the location information will be send via GSM network to show the current location of the object, monitoring server needs internet connection to connect to GOOGLE maps and retrieve the map.

7. FUTURE SCOPE

In the future reference we will implement our research work to mobile devices as an additional feature for device security, against the theft of the mobiles that has been rising with the time, during the tracking the built in GPS receiver has to be enabled. GPS and GSM as presented in this project .In the future research work we will work on object recognition using GPS, GPRS and GSM.

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