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GPS Tracker for Public Convenience Using Node MCU and Blynk Application

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Abstract

IoT can be simply understood as anything in this world which is connected to internet. IoT basically needs an IoT platform for its implementation. In the upcoming days people will see almost everything under the sun which will be working with IoT technology. Vehicles and transportation has become a major part in our daily life and keeping a track of them is also essential. Likewise, safety of children is an important area of concern for parents. The children are naïve and vulnerable to child trafficking. For the safety of the children, the paper proposes a GPS system to track children. GPS helps in getting the latitude and longitude values of device on which they lie. A technology combining IoT and GPS for our application is made. The IoT platform does not support mapping of ordinates of an object. So implementation of maps using Blynk Application is carried out on that platform.

Keywords: *NodeMCU, IoT platform, GPS, Blynk Application*

1. Introduction

The Internet of things (IoT) is a quite popular buzzword right now. It is a system of interrelated computing devices or mechanical devices or digital machines provided with distinctive identifiers called UIDs (unique identifiers).

It has the ability to transfer data over a network without requiring a third hand that is a human-to-human or human-to-internetinteraction. An internet connection is a wonderful thing, it gives all sorts of benefits that just weren't possiblebefore. Connecting things to the internet yields many amazing benefits. We have all seen these benefits with oursmartphones, laptops, and tablets, but this is true for everything else too. Internet of things basically takes all thethings in the world and connects them to the internet.

One can send information or receive information or do the both if they are connected to the internet. Thus, internet connection is an amazing thing, it makes things smart, and smart is good.

The internet of things can be put into three categories, where all the things are connected to the internet:

a. Things collecting the information and then sending it
b. Things receiving the information and then acting on it.
c. Things that do both.

IoT technology increases GPS devices to transmit data remotely and connect to other systems and sensors.

Modern-day tracking devices can gather and transmit extensive vehicle data, including fuel monitoring, remote temperature monitoring and driver identification.

GPS makes use of the satellites to get the positions of the objects with the help of a GPS tracking chip, comprising of vehicle, human beings, and pets. It also works in any weather conditions and produce real-time positional data. At the minimum three satellites are positioned to be in the sky over any area at any given period of time – are used to triangulate the position of a tracking system. These satellites use microwaves to gather the information in three dimensions and compute the positions from their intersecting spheres. These satellites update the data regularly to permit the tracking of the objects that are in motion.

This paper is organized as follows. Section II gives an overview about a blend of IoT and GPS, Section III says about our literature survey, Section IV describes the hardware and Section V explains blynk platform, Section VI gives the proposed solution and Section VII is our systems methodology. Section VIII shows the results SectionIX ends with the conclusion of our whole proposed system.

2. IoT and GPS: The Best Match

Internet of things (IoT), is increasing the power of the internet over computers and smartphones to a whole range of other things. IoT is a simple concept, it interconnects the things in the world to the internet.

GPS tracking is helpful to provide information about the location of the objects. GPS is influenced by the IoT

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technologies. IoT collects and quantifies huge amount of data for each and everything.IoTand GPS complement each other to form more complete set of interconnected data.

IoT directs the objects and hardware to give out real - time information, while GPS gives the physical coordinates of the hardware objects.

As one of the first methods to track and catalogue digital data of the physical world, GPS has had an essential influence on IoT technologies. IoT can collect and quantify large amounts of data for everything from personal health to public vehicles; GPS tracking is needed to provide location details for these objects.

GPS and IoT complement each other to form a more complete, usable set of interconnected data. IoT monitors objects and hardware to give real-time information and data about a device's operations, while GPS provides the physical coordinates of the hardware or object. With these systems working in tandem, they form the foundation of asset tracking systems, smarter cities, innovative products such as self-driving cars and health-related wearable technologies, and a vast, interconnected ecosystem that allows for smart devices to interact with sophisticated locating capabilities to achieve goals previously thought impossible.They form the foundation of asset tracking systems with the help of these systems working in tandem. Thus, IoT and GPS is the best match.

In this project, the hardware used is Node MCU as a processor which is integrated with the GPS module(ublox Neo GM GPS). The software used is Arduino IDE which includes Arduino libraries so that when using the Node MCU, the connection to the platform becomes easier.

3. Literature Survey

Multiple sensors are used by the author in this system. They communicate with the central hub to transfer the data. The collected data is then arranged according to parameters and is visualized using a web application. Plotting of graphs are used for keeping a track of the ships.This proposed system is advantageous in water transportation as it makes it muchsafer for the ships in Bangladesh. It prevents ship accidents due to excess of loads.It is composed of a water level detector, a GPS tracker,a communication between multiple nodes, and a Web application. Over previous systems, this system is more functional and can also work in crucial conditions. Constant receiving of alarm and notification is not seen here [1].

[2] focuses on the tracking of the location, heart-beat, temperature of the person using sensors. It is done by connecting smart watches through Wi-Fi. The smart band has been connected by an application and installed in smart phones. This band generates signal which is sent to the smartphones. GPS helps in tracking the exact location, GSM does the automatic SMS service, preprogrammed screaming alarm sends messages like "help me & save me". Her location is sent to nearest police stations or crime branches. The details are even sent to the smart phones of the main saved contacts. In [3]a GPS, SMS, Wi-Fi and Beacon Technology is combined by the Author to bring out atracking system. Information is collectedusing a GPS outdoors. Via SMS the location is sent to the users phone. Disadvantages of beacon technology is that they do not work on their own, tracking movement is not simple beacons do not offer a lot of analyzable data.Authors of [4]propose a system which uses Node and GPS for tracking the objects. Node when connected in turn switches on the GPS. The location details of GPS is collected and is sent to the Node. This then sends the data to the android device connected. A mapping of the location is done on Google Maps. The results are noted on an average delay of 0.326s. In [5] a system is proposed where a TMC system is developed to track, monitor and control It contains the following components: Atmega328 MC, Neo GPS, SIM 800. The components areconnected to the vehicle battery and ignition tocontrol the engine. It has three modes: Locked mode, Tracked mode, Monitored mode, and controlled mode. The advantage of this system is the locking mode. That is even when the vehicle is locked it works to prevent future theft.A smart flood monitoring system is proposed in [6]. It uses Blynk platform for the transmission of data. This system uses two NodeMCU which is connected to the blynk application. It is available on both android and IOS. Node is kept at the places of flood. It will detect the water level at the time of floods. The sensors are responsible for detecting the data and sending them to the application in use. It is also collected and stored in the database for future references. [7] uses three sensors: to detect the soil wetness, to detect the temperature and one to detect the humidity. These are mounted at the roots of the plants. The valuesare given to the base station. User gives a default values for the three parameters.When a lesser value than the proposed value is detected it notifies the user. The results are shown on the Blynk App.At abnormal times a message is passed between NodeMCU and Blynk App and it starts the motor in home gardening automatically.

4. Hardware

NodeMCU:

NodeMCU is composed of a microprocessor, a memory which can either be a secondary memory or main memory, and an input/output. It also is programmed to work with timers and counters. The two of them (ROM and RAM) stores the previous programs which are created. Timer/Counterfunctions to schedule the time. Microprocessor is the control hub for the whole system. Hence, it is also called the CPU. In the background it can be said as a combination of 3 parts which are the ALU, CU and registers.

Arithmetic Logic Unit (ALU) is to perform all the mathematical operations and logical operations like addition, subtraction, OR, XOR etc... The Control Unit (CU) takes in the input instructions and executes them. The data from memory before being processed is temporarily stored. This is done by the Registers.

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NodeMCU board works with Arduino whose main purpose of design is IoT. It is made to handle IoT based systems. WIFI Soc ESP8266 is used for this purpose. It is therefore programmed using the Arduino IDE software, using proper syntax. Arduino has an inbuilt NodeMCU library in it to support all functions of Node.

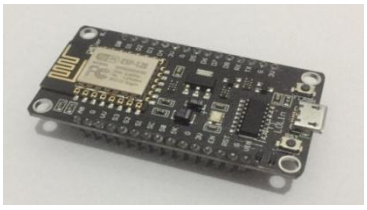

Figure 1: NodeMCU

Neo 6M GPS:

The Global Positioning System (GPS) is a navigation system or location determination. GPS does not depend on a specific type of whether conditions or time. It works irrespective of these physical parameters and delivers an accurate result. These results may be the speed of a system or height of an object or its location. The location on the GPS itself is expressed in a coordinate point which is used to give out the locations. Here in our system we use GPS NEO-6M. This is a popular model of GPS which is currently in use. The advantages which is seen in this model is that it can also be functioned as a navigation system, to track devices under motion, and can be used as a speed detector.

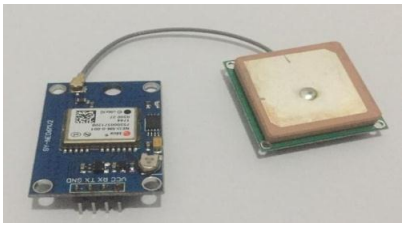

Figure 2: Neo 6M GPS

5. Blynk Platform

Few features of blynk:

a. Blynk is very easy to use and comfortable to work with for ranges of people.
b. Blynk can be easily connected to the cloud for storing or accessing data. This can be through USB or Wi-Fi etc..
c. It is very easy to edit the functionalities which Blynk possess.
d. Blynk uses a similar application programming interface for all the hardware it is mapped with
e. Blynk supports two main widgets: Bridge Widget and SuperChart widget.
f. Bridge widget is for device to device communication and SuperChart widget is for monitoring the history of data.
g. Blynk makes it very handy to send notifications such as through mails or pop up notifications.

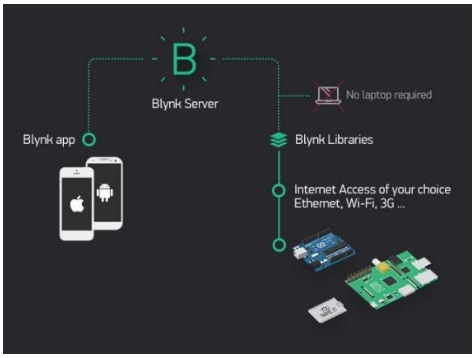

Figure 3: Blynk platform components

6. Proposed Solution

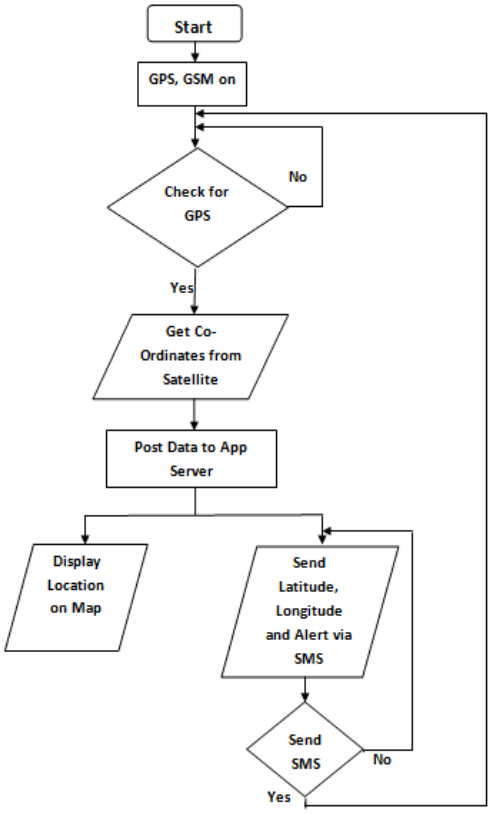

Figure 4: Flowchart of proposed model

In this project we are using Arduino IDE as microcontroller unit for reading and sending the data, We have GPS for getting the current location of module and this is interfaced to Arduino IDE. As we are familiar GPS helps in tracing out the location, speed, heights, date and time of a particular device it is embedded with. GPS will send the serial data in NMEA format to Arduino In this project we connect GPS module with Node MCU. When the code is fed to the circuit, the output is obtained. The

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location details are seen on the Arduino software with accuracy. The location is also tracked on the Blynk application which automatically points out to that location on the Maps which is its well-known feature.

7. Methodology

a. Configure Arduino IDE to Program NodeMCU ESP8266.
b. Make the circuit connections
c. Programming NodeMCU with Arduino IDE to send GPS data to local server

Following shows the circuit connection between the NodeMCU and GPS module.

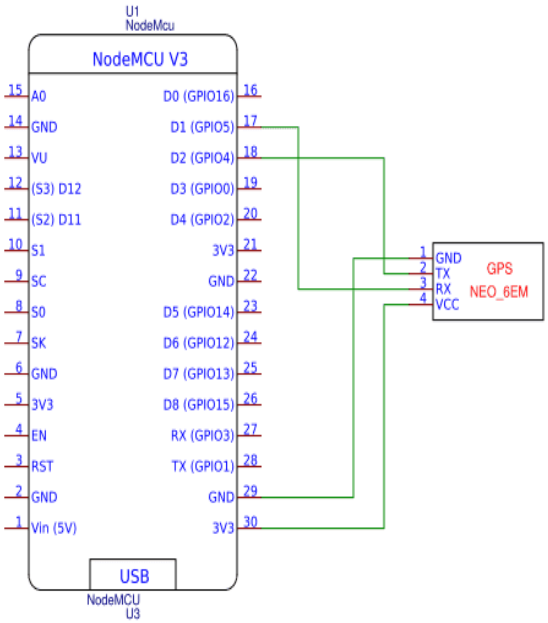

Figure 5: Circuit connection between NodeMCU and GPS

8. Results

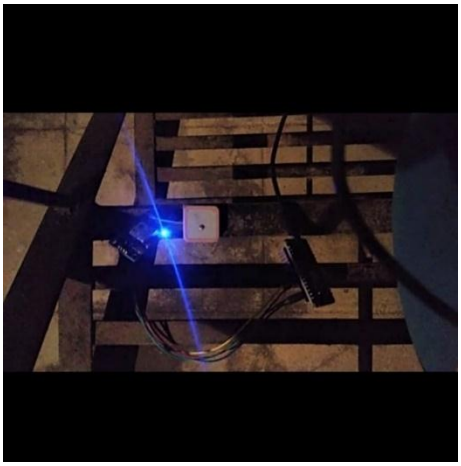

Figure 6: Model in action

Figure 7: Display of the latitude and longitude(coordinates on the computer monitor)

In this project, NodeMCU, GPS module and the Blynk app are used. After all the connections are made accordingly, the code is being compiled and its connected to the NodeMCU. Later the NodeMCU is interfaced with the GPS module, in turn GPS is switched on. The position of the GPS is read and transferred to the output device. The system will read the data at 115200 Baud rate. The GPS sends the data as latitude and longitude coordinate values to the Node which will further be displayed on the screen. Monitor shows the latitude and longitude values. The code is designed in such a way that the location will be directly plotted on the graph of Blynk app.Hence, simultaneously the output is seen on our android device as well as the output device.

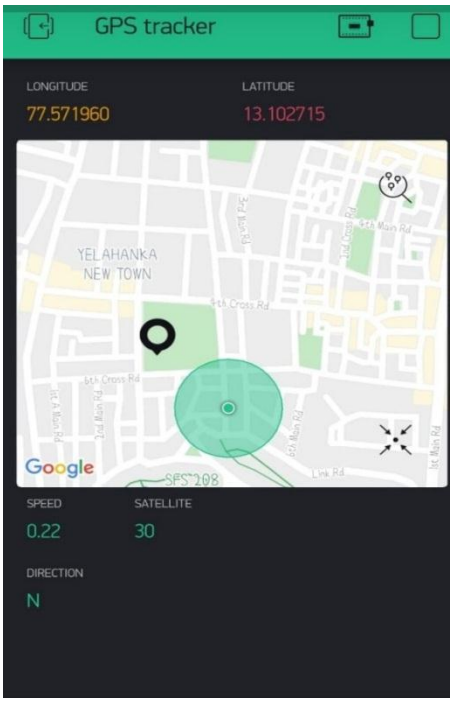

Figure 8: Display of result on the Blynk App

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9. Conclusion

In this paper we proposed to track a person by using the latitude and longitude. A child's watch or hair accessory can be fit with a mini GPS. This gives an accurate address instantly for every square yard on the surface of the planet- a new international standard for locations and distances. Computers of this generation will not understand locations in terms of street numbers or landmarks. They can only get to know in terms of the latitude and longitude values.Our project makes use of Arduino IDE and NodeMCU. Arduino technology is useful because it is considered to be easier for a program to be loaded rather than burning it which was a legacy method. The program is taken and dumped into the circuit without any middle actions. Usage of NodeMCU helps in minimizing the cost, has integrated support for WIFI network and consumes less energy.

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