Review On Real-Time Courier Tracking System

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Abstract—

As the E-commerce industry is Booming every year, online shopping has become a norm while purchasing anything. Hence, the significance of the security of our purchased commodity has also grown. Tracking parcel gives us better visibility about where our parcel is and when we can expect to receive it. This is especially helpful in the case of sensitive or expensive deliveries. Therefore, the development of a courier tracking system using the Global Positioning System (GPS) and Global System for Mobile Communications (GSM)/ General Packet Radio Service (GPRS) modem is undertaken to enable users to locate their vehicles with ease and in a convenient manner. A courier tracking system is an electronic device attached to a vehicle to enable the buyer and the seller to track the courier's location. This paper proposed to design a courier tracking system that works using GPS and GSM/GPRS technology, which would be the cheapest source of tracking. The system will provide users with the capability to track their product remotely through the mobile network and internet.

The Tracking system uses a TTGO T-CALL with inbuilt GSM/GPRS SIM800l module, GPS module, to track the courier and send the latitude and longitude of the location using the network. This system is an embedded one. An embedded system is a microprocessor-based computer hardware system with software that is designed to perform a dedicated function. The software used is Blynk Application which is used to control Arduino, raspberry, ESP32 module and gives the accurate position available using the widget provided. The developed courier tracking system demonstrates the feasibility of near real-time tracking of vehicles.

Keywords – GPS module, GSM/GPRS, TTGO T-CALL ESP-32 SIM800L, Real-time Courier tracking.

I. INTRODUCTION

India's e-commerce industry has been on the rise. After a surge in digital adoption during COVID-19, the Indian e-commerce market is estimated to be worth over $55 Billion in Gross Merchandise Value in 2021. Furthermore, this online retail market is estimated at 25% of the total retail market and is expected to reach 37% by 2030. By 2030, it is expected to have an annual gross value of $ 350 bn.

Statistics of young people, growing internet access and smartphones, and better economic performance are some of the key factors in this sector. Each month, India adds about 10 million active internet users - the highest level in the world. According to a survey of 2019 ,about 50% of the online transactions are done by the users using there mobile phones. Around 100% of the pincodes here are under the ecommerce adoption. Among which more than 60% are form the II tier cities and small towns.

97% of postcodes ordered at least 1 item during FY20. The e-commerce trend is gaining major popularity even in tier-2 and tier– 3 cities as they now make up nearly half of all shoppers and contribute three of every five orders for leading e-retail platforms.

The average price (ASP) in 2nd and smaller cities is slightly lower than in tier-1 / metro cities. Electronics and apparel make up nearly 70 percent of the e-commerce market when evaluated against transaction value. [1]

In delivery business management, success and advancement mean the inclusion of an additional number of delivery vehicles, more capable delivery personnel, and an unprecedented or complex running. Here the vehicle tracking system and delivery staff must be up to standard. In this digital age, in order to maximize business efficiency, you need to keep your customers informed at all times. These updates include a visual tracking system where customers can clearly track the shipping process from placement of order to delivery. This will understand the effective management of the organization and will keep your customers satisfied with your business at the same time. The tracking system plays a major role when it comes to doing business at an optimized level. A tracker is needed if your business is a delivery-focused business and you want your customers to be fully satisfied with your services.

There is tremendous demand for object tracking applications for the business process. The real-time tracking information on valuables and assets can solve many problems in the world. GPS is the Global Positioning System which provides location, using offline and offline both in anyatmospheric conditions. There are several types of GPS tracking systems available in the market.

There is a great need for an application for tracking business process items. Real-time tracking information on important assets and assets can solve many of the world's problems. GPS is a Global Positioning System that provides location, uses offline and offline in any weather conditions. There are several types of GPS tracking systems available in the market. [2]

The courier tracking system is a total security and management solution. A courier tracking system is an electronic device attached to a vehicle to enable the buyer and the seller to track the courier's location. Using GPS and other navigation systems. This tracking system functions using GPS/GPRS and GSM technology, which is the cheapest source of vehicle tracking and can also work as an anti-theft system. This design will continuously monitor a moving courier and report the status of the vehicle in real-time. The courier tracking system is with the product delivered that provides effective real-time location and the data can even be stored and downloaded to a computer which can be used for analysis in the future.

A GSM modem is used to send the position (Latitude and Longitude) of the system from a remote place using the cellular network while GPRS is an enhancement to the existing GSM network infrastructure also provides offline packet data service. The main objectives of GPRS are to facilitate communication between mobile and other packet-switching networks, which opens doors in the online world.

The GPS modem (NEO-6M) will continuously give the data i.e. the latitude and longitude indicating the location of the vehicle. The same data is sent to the mobile at the other end from where the position is demanded. When the device is

powered on it gets its location by using the GPS module and the TTGO T-Call Wireless communication and then these latitude and longitude details of the courier are sent to the Blynk server. The Blynk server displays the accurate position of the courier on the Blynk application and also acts as a cloud platform to store the previous records.

II. MOTIVATION

Currently E-commerce companies have their hub in different locations which is where the product is stored while delivering from different states or cities. The current tracking of these products is based on which hub our product is currently on and is not available in real time. Hence, we have designed our project which can provide real time tracking of the couriers.

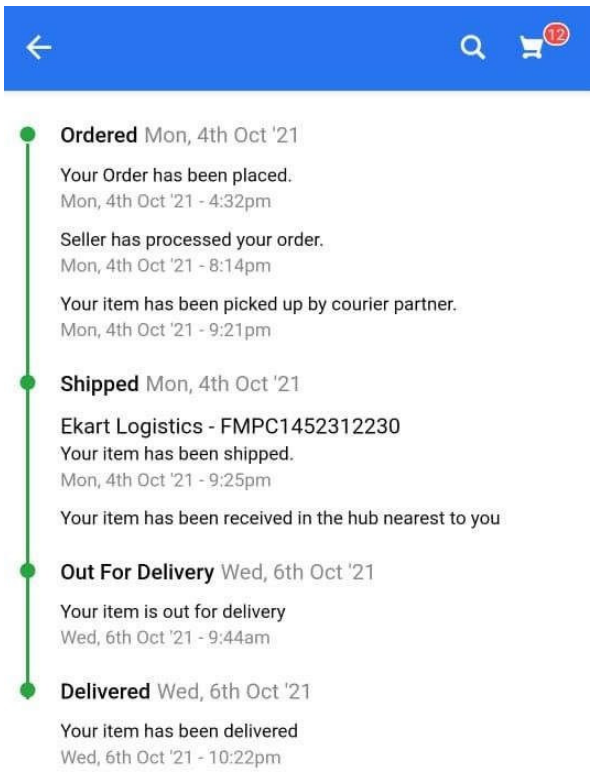

Fig. 1 Current tracking in ecommerce websites

III. LITERATURE SURVEY

The most basic and common uses currently of the real-time tracking system are in the form of cab services and food delivery which mainly track the vehicle from which the service is provided. With the help of GPS, the app helps you get a live update of your car's whereabouts and condition. It can also be further developed with only simple changes and use in different applications like courier tracking, rescue operations & emergency services, rental services as well as can have different functions like fuel management, anti-theft system, traffic update and can also be used for tracking paths.

A tracking system if vehicle or courier can be real-time by using IoT platforms or can be on-demand which provides the location of our system when requested by the user using a GSM SIM module which connects our system with the cellular network with a SIM card. When designing a tracking system like [3] which can also work as an anti-theft system.

When a user request is sent to a modem number, the system automatically sends a response to that mobile phone indicating the location of the vehicle

Security reasons are the major worry which leads to the use of tracking systems. Owners of vehicles or couriers are always looking for new and improved safety systems. Based on major technological advances, we have been able to track vehicles and monitor them closely in real-time, which helps increase vehicle safety. This development requires that we be grateful for this technology, which helps to monitor and track vehicles in order to protect themselves from theft or being lost. [4]

TTGO T-Call is the new ESP32 Development board that integrates the SIM800L GSM / GPRS module. Used to send SMS via GSM to the registered mobile number and Io module to optimize location on the web page.TTGO T-Call ESP32 SIM800L board to the Internet using a SIM card with data plan and then publish the data to the cloud without using Wi-Fi and can be programmed using Arduino IDE.

Atul Ghodake1, Shivam Gomase, Omkar Joshi, Mrs. Swati Aswale have proposed a design and implementation of a women's safety system based on IoT technologies which is basically a proposed tracking system for helping women in need of danger so that they can call for help just with the press of a catch on their savvy device. Their self-protection module is a tracking device that uses a TTGO T-CALL ESP32 SIM800 microcontroller and GPS module to track their position with just one press of a button. They have installed different components like a shock generator circuit, buzzer, and vibrating sensor for further help. [5]

Gaurav Mhapne, Shubham Neugi, Sanchit Chodankar, Omkar Malvankar, Shreedatta Sawant, Ashwina Tari Volvoikar have proposed a health tracking and monitoring system for animals that use GPS technology in a very smart and efficient way. They have designed a belt for the pets which has a temperature sensor, pulse sensor and a box containing Microcontroller power source & motion sensor which collects the data on the pets and provide this data to a web application through clod service and store and maintain it in a server for further use.[6]

Hemachandran K, Shubham Tayal, G Sai Kumar, Vamshikrishna Boddu, Swathi Mudigonda, and Muralikrishna Emudapuram have proposed a project in which the application of GPS updates the clients with the present area of the transport as indicated by the source and goal for which the client will make an inquiry, where the client will be associated with a focal server which will have a social database that contains all the records of the transport and their voyaging plans on which they play. This system is straightforward to implement on vehicle noticeable of the ceaseless enhancement of the Bei Dou Navigation Satellite System, the inclusion of the satellite route framework has created from the local framework to the globe.

The system wouldn't like back-end information support. It solely needs low-value hardware prices and portable system SMS charges. [7]

Argha Ghosh has proposed a vehicle tracking system using IoT in which they have gone a step further in GPS tracking system and provided it for Accident Detection Alert system, Soldier Tracking System and many more by just making a few changes

in hardware and software. They have proposed this system using Arduino which connects and controls the GPS and GSM modules. The system constantly watches a moving vehicle and reports the status on demand. In case of any theft, the user sends an SMS to the controller, and the microcontroller emits control signals to stop the engine. An authorized person needs to send the password to the controller to restart the vehicle and open the door. This is more secure, reliable, and low-cost. [8]

Ade Kurniawan1, Dedy Suryadi, Purwoharjono , Redi R. Yacoub , Fitri Imansyah they have proposed a paper on Implementation of a Battery Charge Monitoring System on Internet of Things (IoT) Based Transportable Devices. They have used Blynk app as a Monitoring application which is a service provider in the form of a platform for Mobile OS applications (Android and iOS) useful as part of the connection between microcontrollers and OS Mobile (smartphones and tablets), to create an IoT-enabled visual interface, which can be controlled anywhere without using cables (wireless). [9]

Blynk was designed for the Internet of Things. It can control hardware remotely, can display sensor data, can store data, visualize it, and do many other cool things. There are 3 major components:

- Blynk App - It lets you create amazing links for your projects using the various widgets.
- Blynk Server - this is responsible for all the communications that happen between the smartphone and hardware. There are two options either is to connect to Blynk Cloud or to run a private Blynk server locally. It's open-source software that could easily handle thousands of devices, and can even be launched on a Raspberry Pi.
- Blynk Libraries - This enables communication with the server and processes all the incoming and outcoming commands for all the popular hardware platforms.

Mohd Hakimi Bin Zohari, Mohamad Farid Bin Johari has proposed a weather monitoring system which uses this Blynk application used to collect all the data. This project which attempt to monitor the weather at the city and also important for farmer. This project achieved the objectives where to build weather monitoring system that can check the weather conditions using application, Blynk. Next, the project also able to display the current weather conditions on weather monitoring system. The implementation of a system to monitor the weather using Internet of Things (IoT) is accomplished. [10]

Boddapati Venkata sai Padmaja, Venkata Ratnam Kolluru , Syam Sai Kota has propoed a paper on a project IoT based Implementation of Vehicle Monitoring and Tracking system using Node MCU in this they have used a GPS tracker Node MCU microcontroller vehicle monitoring and tracking systems are implemented using Blynk platform acting as a medium for data transfer and visualization.

The system is developed to monitor various driver help parameters like eye blinking, alcohol consumption and vehicle parameters like engine temperature, the distance between the vehicles and tracking of the live location of the Vehicle. The Ultrasonic sensor is placed in the front part of the vehicle, if any two vehicles draw near to one another then an alert message is sent to the mail through Blynk application. The Temperature sensor is placed in the engine part. When the temperature raise's in the engine, caution is sent to the mail. The Eye-blink sensor and the alcohol sensor are used to check the driver's condition if the driver's condition is abnormal and a notice is sent to the post office. The upgraded system takes care of cars and driver safety. [11].

Table-1: The critical review of current problem and justifications

Paper Name	Advantages	Disadvantages
Real Time Vehicle Tracking System using GSM and GPS Technology- An Anti-theft Tracking System [3]	A very simple and straightforward system is designed for tracking and also have an additional benefit of an anti-theft system.	This system don't have any database system provided to store the previous data retrieve by the system.
Real- Time Vehicle Tracking System [4]	A detail analysis on different network providers is done in different locations which give us an overview to select the best provider for our system.	It's stated that GPS can have problems while inside a building or when the climate is not clear and can cause some error in the location transmission.
Design and Implementation of Women Safety System Based On IOT Technology [5]	This system can have many applications like use for wellbeing of youngsters, security for older individuals and can also be used as a lawful proof of wrongdoing with careful arear data for indictment	This can cause problem while tracking if the victim got transported when immediate action is needed as here to send the location a button should be pressed and is not actually real-time.
Health Tracking and Monitoring System for Animals [6]	As it provide not only tracking services for pets but also temperature senor and pulse sensor this can be very helpful for the pet's owners as like human pets can't always convey their problems using speech.	Many studies have shown that radiations from electronic devices can cause harmful effects on animals. Radio waves may interfere with animal body clocks via crypto chromes
Vehicle Tracking System using Iot [8]	This provide a simple tracking system which is effective as well as low cost.	The location provided is not really real time it is provided when a user send the message to GSM sim no through the mobile phone.

Weather Monitoring System using Blynk Application [10]	With weather monitoring it also detect humidity, CO level and also has a rain sensor	The programming done in this project is quite complicated.
IoT based Implementation of Vehicle Monitoring and Tracking system using Node MCU [11]	This system provide real-time tracking and also have additional status of the driver. This system is effective, dynamic and efficient.	This system don't have any camera for sensing the driver in case of monitoring eye blinking of the driver, which indicates drowsiness.

IV. CONCLUSION

In recent years, online delivery services have become popular as more and more people choose to deliver homemade, be it food, electronics, or clothing. GPS technology is a great help in bringing businesses in many ways. Since then, the delivery business is changing rapidly and is expected to grow significantly in the future. Thus the need for a courier tracking system that could let the owner know the whereabouts of his own parcel.
Under this project, we would be designing such a Courier Tracking System which could detect the courier locations easily.

V. LIMITATIONS

While this advanced technology-based tracking system can benefit users, companies, or any organization, there are also some limitations to using this courier tracking device.GPS usually takes some time to connect to the network due to inclement weather. For GPS to work properly, it needs to have a clear view of the sky.
That's less likely to work indoors or have a problem outside when it doesn't have a clear way to transmit and receive signals from satellites. Therefore, because of obstacles such as tall buildings or such infrastructure that block out the view of the sky, it often causes the error of multiple signals to receive a GPS receiver. As this system requires a certain amount to the setup it will be impractical to provide this tracking for every delivery. Hence two solutions are provided by this project.

- Provide a certain price large example products above 15-20 thousand are automatically provided with this service.

- And providing a choice for users in the e-commerce website to choose for this tracking service on lower priced products.

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