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Smart Lost Baggage Tracking Using Android and IoT Environment

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***Abstract*—**People who travel very often have a fear of losing their baggage during connecting flights, trains, Bus or any transport vehicle. Although the occurrence of such a case is found to be about 5%, it is important to note that the regular air traffic is in millions. This IoT device can be installed in every baggage through which the users can always keep track of their baggage whenever it has misplaced or lost etc., In this paper the lost bags are easily tracked with low cost and efficiently we can search our bags through android application and IoT device this helps them locate the lost baggage easily. The IoT device communicates with the mobile device to give real-time location.

***Keywords*—**Node MCU, Neo 6m, Thingspeak, Dyno Tag, Trackdot, Konas Bags,Android and IoT.

I. INTRODUCTION

Loss of baggage is not uncommon in todays world. Bags may contain important documents or precious items and can be lost or theft. Generally, it is seen that people get robbed in public areas like railway stations, bus stands and other public and private areas. People may even forget their luggage and bags which can have important and precious things. So it is very necessary to track down the bags in case of loss and theft. A lot of other tracking systems and devices are already present like car tracking systems and shoe tracking systems.

The Internet of Things (IoT) is a network of objects like buildings, vehicles, etc which are embedded with sensors, electronics and other network related things which helps these objects to collect and exchange information. IOT allows the objects to be sensed and controlled from a remote access point, which does the integration of computers with the physical world which improves financial benefit, accuracy and efficiency. When IoT is connected with sensors, it encompasses technologies such as smart homes, vehicle tracking, monitoring and controlling home appliances and ultimately smart cities.
In this project a luggage tracking system would be created in order to track the bags which are lost. In this, the luggage bag would contain the hardware of the tracking system or simply we can say the tracking device through which we would be able to track the bag. With this an alarm could also be connected to the device which would ring whenever the bags get away from the owner
and gets out of a particular range and area. For this purpose, a map is also created using google geolocation API, in which the area has been set and predefined through which we can track the bag once it gets away from the owner. On the map we can see the location of the bag where it is as the markers are being dropped which gives us the location of the bag as it moves away from the owner. Also certain range flags have been set which will notify the owner on the map timely that what is the distance between the owner and his bag like "under 20m", "under 30m".

II. LITERATURE SURVEY

In recent years not much has been done in order to track the lost bags, instead video monitoring is a way through which the areas are monitored by human beings and the suspicious bags or robbed activities are monitored. Also some of the bag monitoring techniques has been implemented in order to check the things which are present inside the bag so that they don't pose a threat to the security. Some of the techniques present are:

In [1], Konas bags offers luggage and bag packs that we can track from the smartphone. With the help of the tracking device present in the bag, we can track the device through the application installed in the smartphone.
Disadvantage

- In this we can only track the bags once they have been lost and not when they are theft, so this doesn't provide the feature of providing the surety that whether the bag would ever be recovered or not.
- Also, we won't be knowing when the bag was lost or theft so if we get to know about it few hours later, then it can be a possibility that may have transported or

travelled far away and a lot of distance.

- In [2], A lot of trackable tags are available which can be tied with the bag in order to track the bags when they are lost.
- These tags have inbuilt GPS chip through which the company would track the lost bag. There are a lot of companies in the market who are providing these tags with different features. Some of these are LugLoc and Robot Check.

Disadvantages

- Again the tags don't notify you as soon as the bag is theft or lost, instead when we find out that the bag has been lost then only we try to track them down.
- The tags don't provide you a mobile or computer frontend interface to track and view the location of the bag, instead the company owning the tag would try to track down the location, so the owner is always in dark about what is exactly happening.

In [3], Trackdot is a luggage tracker device which is placed inside the bag when a person is travelling. It works on ground-based cellular technology and microelectronics. When in an airplane during takeoff, it shuts down automatically and enters in an airplane mode and again activates during landing when the pilot applies brakes.

Disadvantages

- It is very costly approx. Rs.1000.
- It is available in western countries
- Does not provide instant notification if the bag is theft or lost which is a major drawback.
- •Not available in India.

In [4], Bag Journey Application, Self-service drop-off luggage is a great time saver and passenger experience enhancement, but no matter who checks the luggage in, success still depends on how it comes out.

The Bag journey software solution by event host SITA can contribute to system-wide improvements; with end-to-end baggage tracking status updates to the systems of airlines and airports, including Smartphone and tablet apps used by operation staff. While a number of firms offer baggage management software solutions, SITA is still at the lead of aviation communications and IT application services.

In [5], Baggage Handling Systems Upgrades, Software and apps are great, but bags still need to be moved from the check-in desk to the aircraft hold and back through the arrival's airport's baggage handling system before they reach their owner again arrivals. Our favorites from the show, for state-of-the-art automation, were systems by the German company Siemans, the French group Alstef Automation, and the Crisplant system by the BeumerGroup from Denmark. In [6], Smart Bag Tags, Hong Kong International (HKIA), SkyTrax's 2014 winner for the best baggage handling system, puts great stock in RFID technology. It as the first airport in the world to introduce RFID luggage tags in 2008. Lyngsoe Systems introduced this RFID solution at HKIA and became world-leaders in RFID solutions. They've also developed a comprehensive network to help the industry further improve baggage handling.

In [10], the android based Student Information System is proposed to keep upto date information about the student information using android app.

In [7], the monitoring of Water Quality in Iot Environment is proposed in order to monitor the quality of water using PH sensor and turbidity of water in IoT environment.

In [8], the automatic water despenser and Monitoring Water Level in IoT and Android Environment is proposed in order to avoid wastage of water unnecessarily.

III. EXISTING SYSTEM

In recent years not much has been done in order to track the lost bags, instead video monitoring is a way through which the areas are monitored by human beings and the suspicious bags or robbed activities are monitored. Also some of the bag monitoring techniques has been implemented in order to check the things which are present inside the bag so that they don't pose a threat to the security. Some of the techniques present are: The Konas bags offers luggage and bag packs that we can track from the smartphone. With the help of the tracking device present in the bag, we can track the device through the application installed in the smartphone.

Disadvantages

- In this we can only track the bags once they have been lost and not when they are theft, so this doesn't provide the feature of providing the surety that whether the bag would ever be recovered or not.
- Also, we won't be knowing when the bag was lost or theft so if we get to know about it few hours later, then it can be a possibility that may have transported or travelled far away and a lot of distance.

A lot of trackable tags are available which can be tied with the bag in order to track the bags when they are lost. These tags have inbuilt GPS chip through which the company would track the lost bag There are a lot of companies in the market who are providing these tags with different features. Some of these are LugLoc and Robot Check.

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Disadvantages

- It is very costly approx. $56.
- It is available in western countries.

IV. REQUIREMENTS

The creation of this work requires a few tools. These tools are combined in a way that they can form a way to connect to the GPS module. These tools are:

NodeMCU: The NodeMCU is a low cost, credit-card sized computer that plugs into a computer, through which we can send commands for it to perform.

GPIO (General Purpose Input Output) Pins: NodeMCU has general purpose input output pins on its board as shown in above pinout diagram. We can make it digital high/low and control things like LED or switch on it. Also, we can generate PWM signal on these GPIO pins.

ADC: Analog to Digital Converter channel (A0) NodeMCU has one ADC channel/pin on its board.

SPI (Serial Peripheral Interface) Pins: NodeMCU based ESP8266 has Hardware SPI (HSPI) with four pins available for SPI communication. It also has SPI pins for Quad-SPI communication. With this SPI interface, we can connect any SPI enabled device with NodeMCU and make communication possible with it.

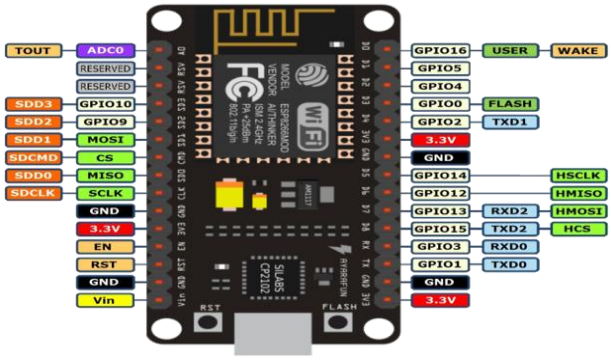

Figure 1. Node MCA

I2C (Inter-Integrated Circuit) Pins: NodeMCU has I2C functionality support on ESP8266 GPIO pins. Due to internal functionality on ESP-12E we cannot use all its GPIOs for I2C functionality. So, do tests before using any GPIO for I2C applications.

UART (Universal Asynchronous Receiver Transmitter) Pins: NodeMCU based ESP8266 has two UART interfaces, UART0 and UART1. Since UART0 (RXD0 & TXD0) is used to upload firmware/codes to board, we can't use them in applications while uploading firmware/codes.

Ublox Neo-6M:
This is a GPS module which is connected to the board which returns the GPS information of its current location.

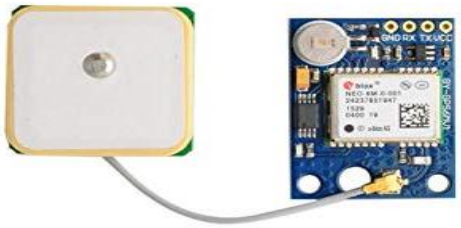

Figure 2. Ublox Neo-6M

Arduino IDE: The Arduino IDE is needed to retrieve the required information from the raw data sent from the GPS module.

Breadboard and connecting wires: Breadboard and connecting wires are used to connect the NodeMCU with the Ublox Neo-6M GPS module.

Keyboard, Mouse, Display: These are the I/O devices which are needed for inputs and output to and from the raspberry pi.

V. RESULTS AND DISCUSSIONS

For implementation of this project, we need to use a Bread Board. We make use of an open source IoT platform, NodeMCU. VCC of Neo-6m is connected to 3.3v of the Node MCU board. Gnd of the GPS module is connected to Gnd of Node MCU board. RX is connected to pin D1 of Node MCU. TX is connected to pin D2 of the Node MCU.

Working Model
The output is received(Figure 3) by the NodeMCU and the Location values are sent to the Thingspeak server. We have created a new account in Thingspeak and added two fields, namely Latitude and Longitude. ThingSpeak.setField(1, latbuf); ThingSpeak.setField(2, lonbuf); ThingSpeak.writeFields(myChannelNumber, myWriteAPIKey);

The above NodeMCU code sends the latitude and longitude values from the device to the Thingspeak account using the Channel ID and the WriteAPIKey.

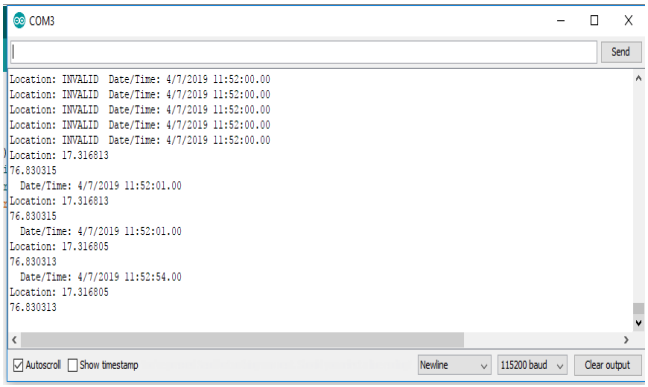

Figure 3. Longitude and Lattitude

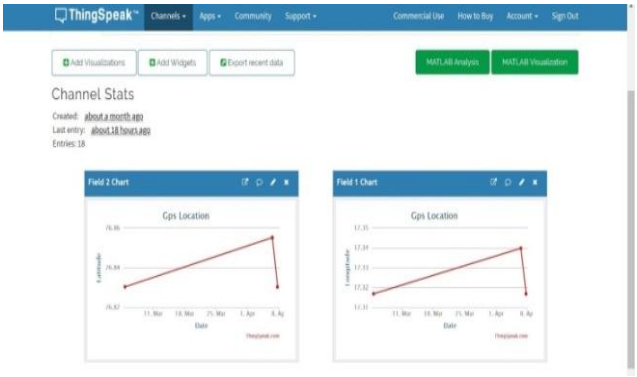

Figure 4. ThinkSpeak Server

There are two field have created two fields in the Thingspeak account.(Figure 4). Field 1 shows the Longitude value in the y axis and the time at which the value was recorded in the x-axis. Field 2 stores the Latitude value in the y-axis and the time recorded in the x-axis. We can also find the Channel ID and the read/write API key from this server to enter into our code to send or receive information to the Thingspeak Account**.**

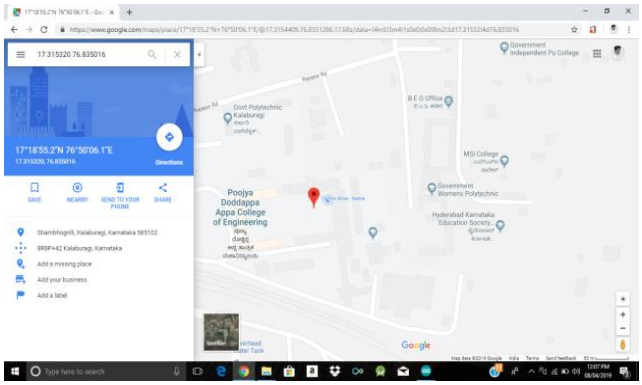

Figure 5. Location in Map

Check the received Latitude and Longitude values on Google Maps to ensure the values received are correct.

Connecting GPS to Node MCU: For implementation of this project, we need to use a Bread Board. We make use of an open source IoT platform, NodeMCU**.** VCC of Neo-6m is connected to 3.3v of the Node MCU board. Gnd of the GPS module is connected to Gnd of Node MCU board. RX is connected to pin D1 of Node MCU**.** TX is connected to pin D2 of the Node MCU.

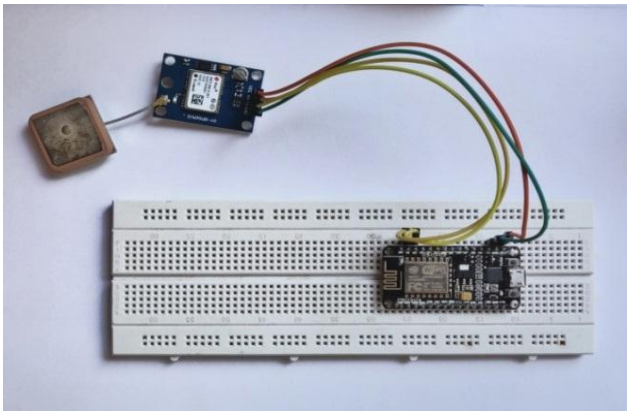

Figure 6. Proposed work showing how to connect

The following outputs are received on the Android app where the username is “user” and password is “pass”.

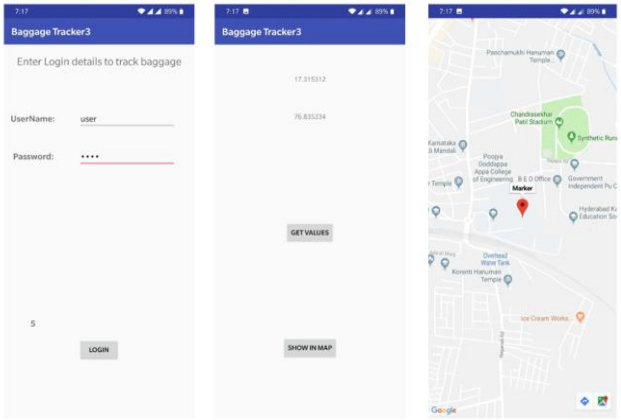

Figure 7. Application Overview

After that the values will be show in the application. By clicking the ‘show in map’ button the location of the device in the map will be shown. (Figure 7).

VI. CONCLUSION AND FUTURE SCOPE

This article shows the implementation of tracking the bags which are either lost or stolen using android and IoT. Certain methods have been shown which help in understanding the basic concepts of the work. Similar works have been shown

with their drawbacks and how they could be overcome. We plan to design and implement the latest traking of bags with very less cost and efficient where a middle class person can also use this if he lost his bag in travelling in the future time.

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