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SMART BAGGAGE TRACKER

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ABSTRACT
This paper provides detailed information about the Smart Baggage Tracker which works on the principle of Internet of Things (IoT). This paper tells us about advantages of IoT and how we can use it to track our lost baggage in a particular way. A baggage tracker is designed to track the baggage that gets lost or robbed from public areas, airports, railway stations etc. As people travel across the world, there are always chances of the baggage to get lost, misplaced or getting robbed which is where this proposed system comes in use. It's a constant stress to the passengers and the waiting time at the baggage claim department can be very high. This project works for satisfying the problem of the consumers. Technology plays an important role in our day to day life, since last few decades we all are depending on it in order to obtain maximum benefit and comfort. The baggage tracker works on the basis of map, where in the map we can track the longitude and latitude of a particular position where our bag is placed. The IOT mainly emphasises on the connectivity of device's system and services, that are beyond machine-machine communication.

Keywords: *IoT, ESP8266, GSM Module, Smart Baggage Tracker App.*

1. INTRODUCTION
The "Internet of things" (IoT) is becoming an increasingly growing topic of conversation both in the workplace and outside of it. The Internet of things (IoT) is the internet-working of physical devices, vehicles (also referred to as "connected devices" and "smart devices"), buildings, and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. The IoT domain leads to the world of technology and communication to a new era where objects can communicate, compute and transform the information as per the requirements. This scenario of communication has already been started but didn't get recognition. The term Internet of Things (IoT) was coined by Kevin Auston, the Executive Director of Auto-ID Labs in MIT in 1999. The concept of IoT first became very popular through the Auto-ID centre in 2003 and in related market analytics and its publications. When the concept of such communication came into existence, different companies focused on it and tried to recognize its significance and began to identify its role and the correlated future aspects, then these firms started investment within the domain of IoT in several periods however at regular intervals of your time.
In 2013 the Global Standards Initiative on the Internet of Things (IoT-GSI) defined the IoT as "the infrastructure of the information society." The IoT allows objects to be sensed or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention. IoT is an advanced automation and analytics system that exploit networking, sensing big data, and artificial intelligence technology to deliver a complete system for a product. The concept of IoT dates back to 1982 when a modified coke machine was connected to the Internet which was able to report whether the drinks were chilled. Later, in 1991, a contemporary vision of IoT in the form of omnipresent computing was first given by Mark Weiser. However, in 1999, Bill Joy gave a clue about Device to Device communication in his research. In the same year, Kevin Ashton proposed the term "Internet of Things" to describe a system of interconnected devices. IoT has also included in the list of six ''Disruptive Civil Technologies". National Informatics Centre foresees that ''by 2025 Internet nodes may reside in everyday things – food packages, furniture, paper documents, and more".
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. For this purpose, a map is also created 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.
The rest of the thesis is organized as follows: chapter-2 includes the relevant work on baggage tracker, Chapter-3 shows the proposed Smart Baggage Tracker, Chapter-4 shows the code. Chapter-5 includes the result and discussion. Chapter-6 concludes the thesis followed by references.

2. LITERATURE SURVEY

Travelling by plane comes with a myriad of potential downsides. You could miss your plane, you could end up with your party split up in terms of seat selection, you could have a turbulent flight, or you could lose your luggage.

Analysis of rate of loss of baggage per year:

It's hard to gauge the extent of the lost-baggage problem. Rail and bus companies don't report statistics on lost luggage. Neither do hotels, which often store bags on behalf of their guests. Airlines are required to report a "mishandled" baggage rate, which includes lost and misplaced bags. For 2013, the most recent year for which numbers are available, that rate was 4.55L bags per 10,000 passenger enplanements, up from 4.15L bags the year before.

While these are worst case scenarios, and probably quite unlikely to happen, it's worthwhile ensuring against any issues before they arise. Although you can't do anything about a turbulent flight, you can certainly do something about the other issues we mentioned.

Lost luggage is probably one of the most worrying things about air travel. If your baggage is lost in transit, then we do get it back at some time but it takes a long time. It could be a few hours, few days, but while you're waiting you're without your belongings, and perhaps even without a few of your important valuables.

How a smart baggage tracker is different from a manual baggage tracker:

There are two types of baggage trackers: the manual one and the smart one.

The manual baggage tag is a kind on which you write your name, address, and contact number, and you loop the tag onto our suitcase. So, if it does get lost, the person finding it can reach you, and it will find its way back to you. But the main drawback of a manual baggage tracker is that we cannot track it

Ourselves and the person who finds the bag may end up robbing it instead of returning it.

A smart baggage tracker is a more of high tech. different baggage trackers work in different ways, some extraordinary ones can also store your contact or flight details.

Mainly the smart baggage tracker connects to the app so you can track your baggage easily on the map. It shows the location, mainly the latitude and longitude of the position where the bag is located.

Prerequisites of building a smart baggage tracker:

Most importantly we need to keep in mind the following prerequisites before building a smart baggage tracker:

- Durability
- Its strength and how it gets attached
- How it works
- Cost

***Emergence of new technologies by using IoT for smart baggage tracking*:**

Of course, it's only a matter of time before all this technology becomes integrated with the luggage itself. That's the idea behind two new carry-on bags available later this year. The Bluesmart (starting at $300), which begins shipping in August, will feature tracking technology, a digital lock and the ability to weigh your property and track your trip via a smartphone app. And the Trunkster ($300 and up), which will be available in September, does almost the same thing, but also has an innovative "zipperless" entry design.

"In the near future, every object will be smart and trackable," says futurist Gray Scott. "The idea of lost luggage will disappear from our lexicon."

If travelers embrace this technology, it's not too hard to envision a world in which everything of value is tracked and connected. In that world, lost luggage would be completely preventable.

Until then, you can spend a few extra dollars to tag your luggage, or you can use a tried-and-true method when your airline, hotel or rail operator loses your bag.

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3. PROPOSED BAGGAGE TRACKER

ARCHITECTURE OF NODE RED

In the node-red drag the inject node to the right side of the file then double click on it and enter the payload. Click on done

- Consider another node i.e., drag the debug node and drop it on the file then double click on the debug node and enter the output as msg.payload. Now connect the inject node to the debug node. The msg called successfully injected will appear on the screen now deploy.
- Drag the input IBM IoT node (send events out to the attached IOT Foundation account) to the right side of the screen then double click the node. Now select the API key and enter the required

  information. Now click on the inject node and delete. Connect the output of IBM IoT to the debug node and click on deploy then connected notification appears at the bottom of the IBM IoT block. Now save the changes.
- After completing the above process drag a new function node on to the flow then double click on the function node and enter the required information- name: latitude parsing, function:
  1. msg. payload=msg.payload.d.latitude;
  2.global.set("latitude",msg.payload");
  3.return msg; Then click on done.
  New node called latitude parsing created.

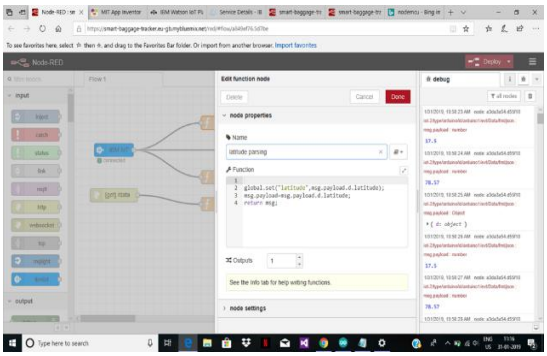


Figure 1. NODE RED Flow 1

- Now again drag a new function node on the flow then double click on the function node and enter the
- required information – name: longitude parsing, function:
  1. Msg.payload =msg.payload.d.longitude
  2. Global. Set("longitude", msg.payload);
  3. return msg; Then click on done. Thus, a
  Node called longitude parsing is created.
  Click on deploy.

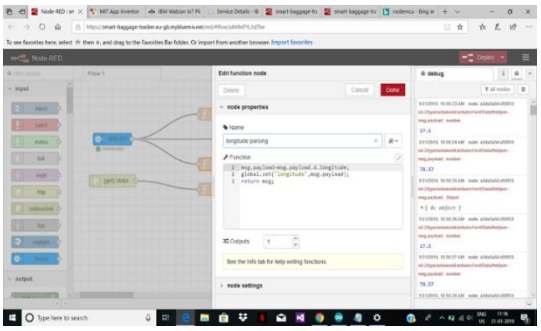
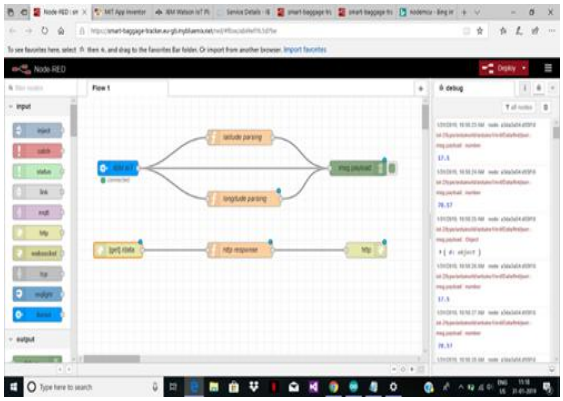
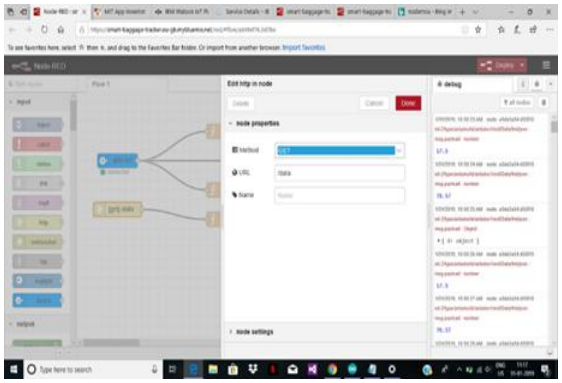


Figure 2. NODE RED Flow 2

Advantage of using smart baggage tracker:





Advantage of using smart baggage tracker:
Scale the airport infrastructure easily and cost effectively accommodate future growth in passenger and checked baggage volumes

- Now connect the output of the IBM IoT to the input of latitude parsing and its output to the msg.payload. And also connect the output of the IBM IoT to the input of longitude parsing and its output to the msg.payload.
- Now, go to deploy and that go to manage palette. After completing the above process go to user settings nodes and select the palette. Now install the node-red dash-board and click on install.
- Drag the http node from the input section and double click on the node and enter the required information- method: GET, URL: /data then click on done.

Figure 3. NODE RED Flow 3

- Now drag a new function node and double click on it and enter the information- name: http response, function:

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1.msg.payload={"latitude":gloabal.get ("latitude"),"longitude":global.get ("longitude");
2.msg.return; http response node created.

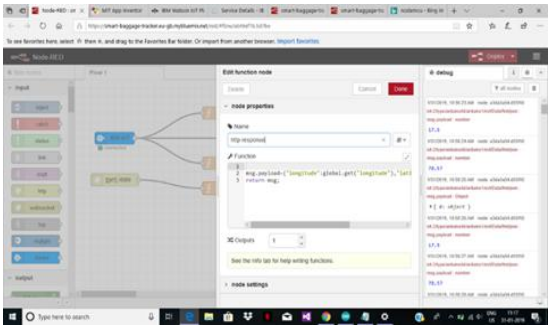

Figure 4. NODE RED Flow 4

- Now connect the get/data node output is connected to the input of http response node and its output is connected to the http node.

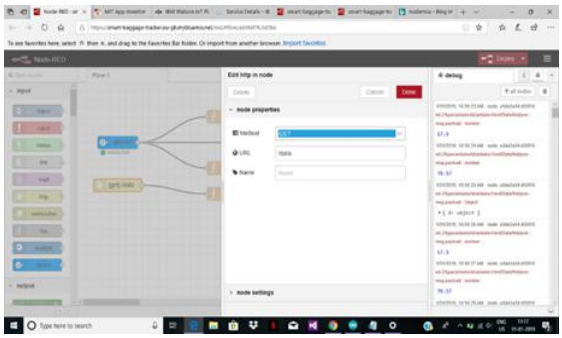

Figure 5. NODE RED Flow 5

Now copy the above URL in the new tab and we get the resultant output from the cloud

Figure 6&7. NODE RED Flow 6&7

To create an app through MIT App inventor we design it by first adjusting and designing the block of our App i.e. Smart Baggage Tracker App.
So firstly, we open the MIT App Inventor and then design the mobile app according to the flexibility of code which is briefly discussed in the above context. After designing the app we click on the button blocks at the right most of the app to function the app.

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Figure 8. Block of Smart Baggage Tracker App

4. CODE

```
#include <ESP8266WiFi.h>
#include <PubSubClient.h>
//-------- Customise these values -----------
const char* ssid = "unknown";
const char* password = "authenticationProblem";
#define ORG "xupgno"
#define DEVICE_TYPE "arduino"
#define DEVICE_ID "arduino1"
#define TOKEN "+Id_MDghfea10-gNS@"
//-------- Customise the above values --------
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";
char topic[] = "iot-2/evt/Data/fmt/json";
char authMethod[] = "use-token-auth";
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;
WiFiClient wifiClient;
PubSubClient client(server, 1883,wifiClient);
void setup() {
Serial.begin(115200);
Serial.println();
Serial.print("Connecting to ");
Serial.print(ssid);
WiFi.begin(ssid, password);
while (WiFi.status() != WL_CONNECTED) {
delay(500);
Serial.print(".");
}
Serial.println("");
 Serial.print("WiFi connected, IP address: ");
Serial.println(WiFi.localIP());
}
void loop() {
double lat = 18.4965855;
double longi = 77.5714025;
PublishData(lat, longi);
delay(1000);
}
void PublishData(double lat, double longi){
if (!!!client.connected()) {
```

```
Serial.print("Reconnecting client to ");
Serial.println(server);
while (!!!client.connect(clientId, authMethod, token)) {
Serial.print(".");
delay(500);
}
Serial.println();
}


String payload = "{\"d\":{\"latitude\":";
  payload += lat;
 payload+="," "\"longitude\":";
 payload += longi;
   payload += "}}";
Serial.print("Sending payload: ");
Serial.println(payload);
 if (client.publish(topic, (char*) payload.c_str())) {
Serial.println("Publish ok");
} else {
Serial.println("Publish failed");
}
}
```

OUTPUT 1:

```
COM4
Sending payload: {"d":{"latitude":17.50,"longitude":78.57}}
Publish ok
Sending payload: {"d":{"latitude":17.50,"longitude":78.57}}
Publish ok
Sending payload: {"d":{"latitude":17.50,"longitude":78.57}}
Publish ok
Sending payload: {"d":{"latitude":17.50,"longitude":78.57}}
Publish ok
Sending payload: {"d":{"latitude":17.50,"longitude":78.57}}
Publish ok
Sending payload: {"d":{"latitude":17.50,"longitude":78.57}}
Publish ok
Sending payload: {"d":{"latitude":17.50,"longitude":78.57}}
Publish ok
```

OUTPUT 2:

```
COM4
Publish ok
Sending payload: {"d":{"latitude":18.50,"longitude":77.57}}
Publish ok
Sending payload: {"d":{"latitude":18.50,"longitude":77.57}}
Publish ok
Sending payload: {"d":{"latitude":18.50,"longitude":77.57}}
Publish ok
Sending payload: {"d":{"latitude":18.50,"longitude":77.57}}
Publish ok
Sending payload: {"d":{"latitude":18.50,"longitude":77.57}}
Publish ok
Sending payload: {"d":{"latitude":18.50,"longitude":77.57}}
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Publish ok
Sending payload: {"d":{"latitude":18.50,"longitude":77.57}}
Publish ok
Sending payload: {"d":{"latitude":18.50,"longitude":77.57}}
```

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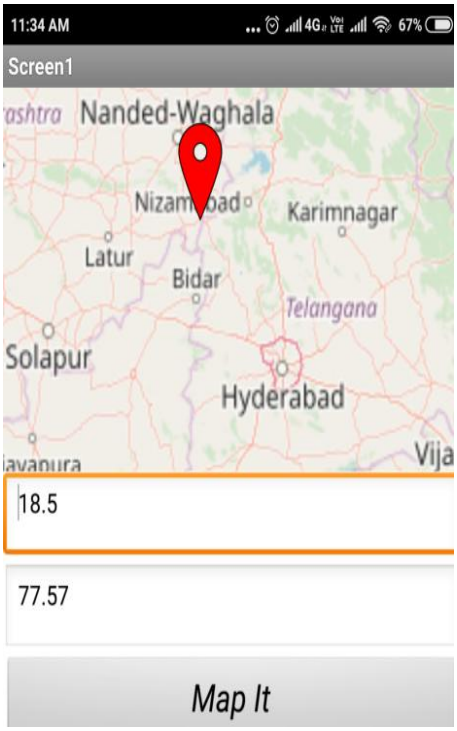

5. RESULT AND DISCUSSION

Whenever we need to track our baggage, we can track it through the smart baggage tracker app which is created by the MIT App Inventor.

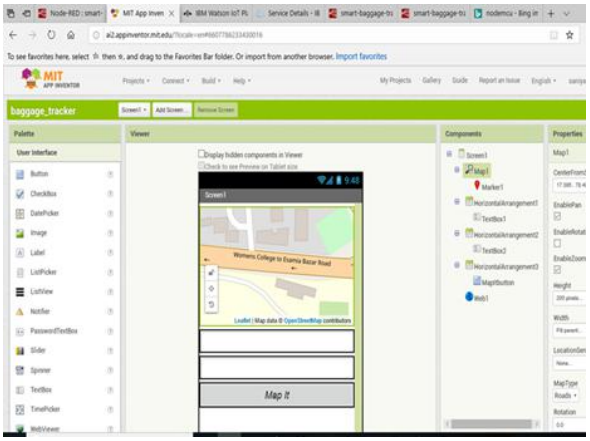

Figure 9. creating App in MIT app inventor

In this Smart Baggage Tracker App, we can track our bag by having a view on the latitude and longitude of the position on the map where the bag is placed.
This app can be checked at any time at different locations of our bag.
The Smart Baggage Tracker App comes in use on a wide scale to track the lost or misplaced baggage or even if the traveller wants to track their luggage at any point of their journey.

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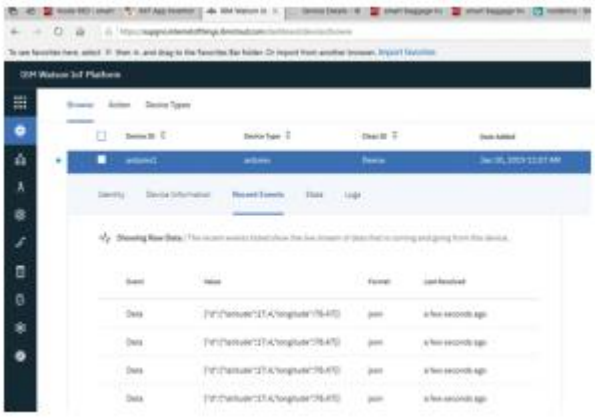

Figure 10. Output of latitude and longitude in IBM Watson Cloud

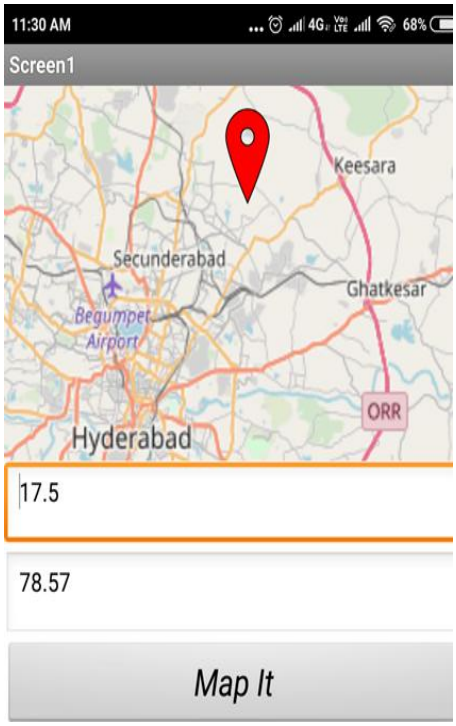

Figure 11. Showing location of a Bag

Figure 12. Showing location of bag

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6. CONCLUSION

This article shows the implementation of tracking the bags which are either lost or stolen using IoT. Certain procedures and techniques have been made and proposed in order to achieve the same. Experimentation has been done and maps have been created in order to track the location of the bags which are misplaced and lost. It concludes that the bags can be easily tracked based upon the hardware installed in them and then by tracking that hardware and tracking the route, directions and location of the bag with the help of a map.

Through this proposed system, passenger could get better security, reduce baggage loss and mishandling to a great extent and can be tracked from any place. The main advantage of the system is that it consumes less time as the passengers don't have to worry about their baggage's misplacement. It is following the current trend as it uses Internet Of Things, as it is hassle-free and the bag can easily be tracked using an app that is available on your phone. With this design we tend to make the travel more customers friendly, less time consuming, hassle free, with less queuing for retrieval of lost baggage and greater security of the passenger.

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