

Airline Baggage Tracking System using IoT

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Abstract—The loss or mishandling of baggage is growing these days, surprisingly elevating its associated prices. Bags management is one of the biggest nightmares for each airport government in addition to aircraft companies with a view to ultimately passengers need to suffer for. This ends in an excessive blunders costs, consequently resulting in misplaced baggage and misrouted deliveries. Luggage dealing with is not completely automatic even in one of the most contemporary airports, luggage motion includes lot of human invention at diverse factor which sluggish down the overall manner and increase scope of errors. It's far predicted that the constant monitoring detects possible errors in a timely manner, permitting a proactive mind-set whilst correcting this sort of conditions. There are numerous devices in the marketplace however all have some troubles together with energy intake, vicinity, portability, and so forth. A trivial solution to this will be automating the procedure that goes into transporting a bag from factor A to point B cost-correctly and accurately at the same time as giving the user an actual time remarks and region replace. The proposed system will increase the tracking element whilst as compared to modern day tracking structures because it allows the individual tracking of luggage by using QR codes and sensors. It has also a web utility to understand about region of baggage.

1. INTRODUCTION

The modern society is evolving to IOT based hyper- connected society which is possible to control and manage to diverse resources in real time. In this environment, the luggage is effectively controlled using a system approving sensors and camera at domestic and foreign airports. However, air-baggage tracking service for passengers is still not being provided, and passengers will wait a long time to find for their baggage.

The most common problem experienced in Aviation industry for Baggage Handling are mislaid baggage and lost baggage. Discovering that your suitcase is delayed or lost might just be the worst start for your holiday. Every time you travel, there's a chance your luggage can get lost in airports' baggage handling labyrinths, go missing during transfer or can be stolen.

There can't be too many experiences more disheartening than waiting at an airport baggage carousel after a long flight- only to realize that your suitcase is missing. The airport carousel has always kept every traveler in suspense. Will my bags arrive? Will they be intact? There's always a sigh of relief when you see your baggage appear after along journey. Such incidents are depressingly frequent. According to aviation IT provider SITA, there were more than 24.8 million mishandled bags in 2018, accounting for, roughly, 40 bags disappearing every minute.

Passengers had causing delay in departure of flights. Passengers must wait long, against the standard waiting time of 20-25 minutes, to reclaim their baggage from the conveyor belts, which get stuck every now and then. This leaves passengers furious as they must wait for about an hour to get their baggage after de-boarding the plane.

Lost or mishandled baggage is still one of the biggest areas of complaint about air travelers. Problems with travel bags cause inconvenience, frustration, and very often - unforeseen expenses. These issues are mainly caused by dysfunction systems, which have direct consequences for many travelers at the same time. However, most of the problems apparently, remain underexposed.

The good news is that the airport systems are improving and, little by little, introduce new luggage tracking technologies. The new rules by the International Air Transport Association (IATA) will require airports to share tracking information of all baggage to improve customer service and luggage protection.

At this scenario, for providing a better and secure system to the passengers, we have introduced a design of baggage tracing and handling system using QR code, sensors and camera which is based on IOT. better tracking is also helping airlines notify customers of baggage status through their mobile phone. The proposed system will increase the tracking element whilst as compared to modern day tracking structures because it allows the individual tracking of luggage by using QR codes and sensors. It has also a web utility to understand about region of baggage.

2. LITERATURE SURVEY

[1] This 'Smart Baggage in Aviation' paper is proposed by Farid Abedan Kondori and Shahrouz Yousefi from the Department of Applied Physics and Electronics of Umea University Sweden.

The explosion of internet in recent past and its growth reflects that, it connects different objects to users through smart phones and computers is no longer considered as a dream. Aviation is one of the industrial areas which have a strong potential to benefit from the Internet of Things (IOT). Having many Issues related to air travel, delayed and mishandling of luggage are the most common and irritating among those. It shows the result that one-third of passengers suffer from mishandled, delayed, lost, and stolen luggage.

Therefore, this paper proposes a new baggage control system, where users can easily track their baggage at the airport to avoid losing or mishandling them. This proposed system connects passengers in airline, airport, and aircraft, they will be informed whenever their baggage arrives to a checkpoint. The first checkpoint is kept at the check-in gate where travelers hand over their baggage to the airline staff. By detecting the selected tag in this checkpoint, a notification message will be sent to travelers' mobile phones. This guarantee that the system has started monitoring the baggage. As well as passengers will get final message when their baggage arrives. This system has been implemented in the aviation industry using RFID.

Travelers will benefit from this system as they are provided a full trip monitoring. And, they get the full tracking of the baggage through video surveillance systems by the airline.

[2] 'Smart bag tracking and alert system using RFID' is introduced by Shubham Sarkar, Suvojit Manna and Subhadeep Datta from various department of Jalpaiguri Government Engineering College.

This paper considering the problem which current system faces, that the existing system depending too much on manual action. And the current system uses bar code scanning which needs a manual scanning. This paper proposed to eliminate this error from the system and to make it automating.

This solution makes use of RFID tags which depends upon electromagnetic fields to automatically identify and track tags attached to objects. This system processes the large distancing baggage transferring. The architecture made of reusable passive RFID tags for the postal service. Each postal node having a RFID reader and microcontroller to send the data to the backend. This technology tracks out the accidental points which considered as where bag goes missing.

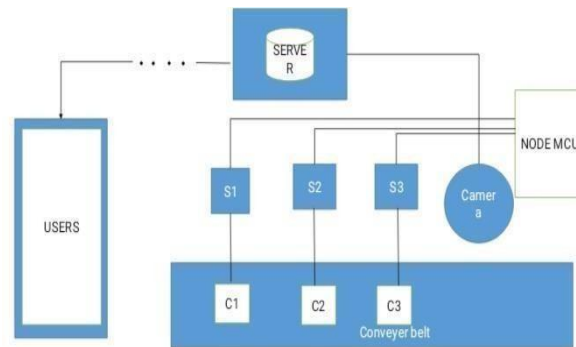
[3] The use of Radio Frequency Identification (RFID) Innovation luggage tracking has come to solve the problem. The RFID has been evaluated and implemented in some of the airports over the world, for example, Heathrow Airport in London, Kansai International Airport in Japan, and Hong Kong International Airport in Hong Kong, among others. The use of RFID in the airports facilitates the monitoring of luggage flow, minimizes luggage mishandling, and assists identifying and tracking the lost luggage. Al-Alietal [4] assessed the feasibility of using RFID technology for baggage handling in airports. Mishra and Mishra [5] carried out an exploratory review on the applications of RFID in the aviation industry. DeVries [6] evaluated the state of RFID to solve the tracking of luggage in airports and airlines. The study reviewed the benefits and drawbacks on the use of RFID DeVries reflected the importance of the development of the RFID infrastructure in order to achieve a successful track and trace of luggage. He revealed that cost is one of the major drawbacks to RFID implementation and the major challenge would be the cooperation between airports and airlines on the building of RFID infrastructure.

In this paper luggage tracking device has no RFID. In the proposed system we are going to use the QR codes. Along with the QR codes, in hardware side we are using Camera and sensors

3. METHODOLOGY

Several airlines have adopted RFID baggage tracking systems that let them find any bag in a haystack of bags by using RFID sensors. Delta Air Lines was an early adopter of an RFID baggage tracking system that has served as an example for others.

But considering the cost of RFID tag and sensors, we are proposing a new design of luggage tracking using the help of QR code, sensors, camera, and Node MCU.



The user first must register to the luggage tracking system using his/her email id and password, while registering the system will ask for the information's like Passport ID, Gender, Birthdate, and phone number. After the registration phase an OTP will be generated and send to the mail where the user must confirm his/her mail ID by typing the OTP on the page where it will ask for the OTP in the User end.

Whenever a user travel from one airport to another he/she has to login to the account by entering his mail ID and password, If the entered details are incorrect the user can make use the forgot password were, he can reset his password. IF the credentials are correct the user will have to give the Travel info such as the from place and the to place i.e. the airport from where the user is travelling from and to which airport.

The Next phase is off generating QR, The QR will be storing the information of the user such as the from and to Airport his/her mailId and as well as the passport Id. When the user clicks the Generate QR button an QR code will be generated and there will be two options to download QR and Tack option. The Download option is made available so that the user can download the jpg file of the QR take a printout and stick on to the bag so that we can do the live tracking.

The user after sticking the QR on to the bag the bag will have to be placed in the conveyer belt, where we have attached ultrasonic sensors so that we can show the live position of the bags as a simulation in the user side. First the bag will be passing Infront of a camera were the camera scans the details which are stored in the QR code and then the NodeMcu informs the server that the bag is of this particular person having the mail id as stored in QR, After that the ultrasonic sensors will detect the position of the bag when it reaches there and shows it in the webapp as checkpoints. Finally, when the bag arrives at the last check point it will show a notification to the user that you bag has been reaching near the receiving Terminal so that he can go and pick it up. The user can verify his bag by scanning its QR where it will show the details of the Passenger stored in that

A. Ultrasonic sensors

Ultrasonic sensors are very versatile in distance measurement. So, measuring the distance of an object can be done using Ultrasonic Sensor. As the name indicates, ultrasonic sensors measure distance by using ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected from the target. Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception. Sensors are vital components in motion detection technology which must have a high accuracy, precision, robustness, and low cost. In other words, Ultrasonic solutions to measure the distance are one of the cheapest options.

In our technology we have used the same ultrasonic sensors which detects motion of the baggage that moves through the conveyor belt. And we have placed the ultrasonic sensors above the conveyor belt in different places. Once the baggage moves through conveyor belt and at the time it reaches to the sensor, a notification is sent to the passenger. So that the passengers can keep a track of their baggage.

B. NodeMcu

NodeMcu is an open source firmware for which open source prototyping board designs are available. The name "NodeMcu" combines "node" and "MCU" (micro-controller unit). The term "NodeMcu" strictly speaking refers to the firmware rather than the associated development kits. Both the firmware and prototyping board designs are open source. The firmware uses the Lua scripting language. The firmware is based on the Lua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson and SPIFFS. Due to resource constraints, users need to select the modules relevant for their project and build a firmware tailored to their needs. Support for the 32-bit ESP32 has also been implemented. The prototyping hardware typically used is a circuit board functioning as a dual in-line package (DIP) which integrates a USB controller with a smaller surface-mounted board containing the MCU and antenna.

When the baggage moves through the conveyor belt, the distance sensor will measure the distance and update to the database. The NodeMcu is connected to the motor. The motor starts working when the QR is detected. And once the motor starts, the baggage moves through the conveyor belt with a delay with the help of NodeMcu.

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4. CONCLUSIONS

Based on this proposed system the airline industry can reduce the luggage lost and delay as well as mishandling too. So that passengers and airlines are no need to worry about the issues occurs by this current scenario.

In this paper, we specifically analyze the challenges and opportunities of luggage tracking in the airline industry. That big data brings in the context of remote sensing applications. Our focus is to analyze what does exactly issue occurs in airline industry and how to overcome those. In this paper we have highlighted the issues related to delay and mishandling of passenger's luggage after de-boarding the plane. We conclude by clarifying the benefit of the new approach introduced.

In this project NodeMcu is used to control the delay of the belt and to make use of the Wi-Fi module to the mobile users. The Ultrasonic Sensor calculates the distance of the bag and when the distance is less than 10cm it updates the NodeMcu and the database value at that time the Notification is given to the user side that bag has passed the first sensor the same is done for the rest three sensors, and when the bag reaches the third sensor it informs user that bag has arrived in receiving end.

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