Baggage Tracking and Handling by Rfid and Iot in Airports Using Nodemcu

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Abstract

An extremely well-liked pastime among people is travelling. and for long distances, most people choose to use airlines and carry luggage along with them when travelling. This luggage is taken care by the airlines once they've been checked-in at the airport. This segment of baggage handling is one of the vulnerable processes that may leads to missing of baggage. This missing baggage can be handled properly and safely in airports by using RFID and cloud. A baggage handling system is introduced in the airport at two stages i.e., at departure section and destination section of airport. These baggage's pass-through multiple sections in airport on a conveyor. Every section is attached with a RFID reader and every bag is attached with a RFID tag with information of traveler embedded in it. So whenever the bag is passed through any section the RFID receiver senses the information in RFID tag through radio waves and send the captured information to the cloud where the user can monitor the baggage.

Keywords: RFID, Baggage handling, Tags, Cloud, Node MCU, ThingSpeak

INTRODUCTION

At two operational locations with departure and destination processes, we created a prototype. The primary details of the passenger and airline are recorded in tags that are affixed to printed luggage labels using a more secure method. The check-out facilities' RFID readers enable step-tracking of luggage, preventing baggage loss. The real-time location of the luggage is monitored, saved in the cloud using IoT, and its unique ID may be retrieved by the travelers whenever it is required. The same ID will be used to retrieve the luggage at the check-out counters. Since it's a prototype we've used adder within the ThingSpeak cloud where the entry is taken as +1 and when reached exit it reads as –1 in the cloud, which makes it 0 when baggage is collected at destination counter. The offered solution guarantees minimal time consumption, luggage security, and is cost-effective, resulting in customer pleasure.

OVERVIEW OF THE SYSTEM

This section examines the data obtained through study and investigation, which is significant and will significantly affect the value of this paper. The fundamental introduction provided by this study serves as a framework for successfully achieving the key goals. RFID, which has many uses, is one of the technologies that improved wireless data transmission. It is incredibly user-friendly and cost-effective. The employment of RFID technology in the supply chain is one of its primary applications. In the supply chain, the product or package is scanned and moved between many places, however it can be challenging to pinpoint the package's precise location. In this case RFID became very handy and scan the packages, send the information to the user through cloud for live tracking of their product.

The two primary components of the wireless system known as Radio Frequency Identification are tags and readers (RFID). The reader could be a device with one or more antennas that send radio waves and receive signals from RFID tags. Tags are typically passive or active devices that use radio waves to transmit their identity and other information to nearby readers. Passive RFID tags do not require batteries because the reader provides power. Active RFID tags are powered by batteries.

An open source IoT platform is Node MCU. It consists of hardware based on the ESP12 module and firmware that runs on the ESP8266 Wi-Fi SoC. The firmware is automatically referred to as "NodeMCU" rather than the event kits. It has every essential component of a modern computer, including a modernized SDK and software system as well as CPU, RAM, and networking. Because of this, it's a fantastic option for IoT projects of all categories.

An IoT application and API called as ThingSpeak is used to store and retrieve data from hardware and sensor devices. It's a platform with an open source. It communicates using HTTP Protocol over a LAN or the internet. To examine and visualize the data obtained from the hardware or sensor devices, MATLAB analytics is included. Every single sensor data can have a channel created for it. Otherwise, you can publish the material openly using public channels if these channels are not designated as private. Additional features are present in the commercial features. However, because we are using it for educational purposes, we will be using the free version.

RESEARCH ELABORATION

i) *Algorithm:*

This algorithm helps to understand the system architecture in detail. The step-by-step algorithm is mentioned below

Step1: Initialize the tracking by making sure luggage is arrived at departure section.

Step2: Assign the tags to each luggage bag and embed the passenger information into it.

Step3: Make sure that bags are aligned properly on conveyor belt.

Step4: Initialize the count as 0 in the ThingSpeak cloud

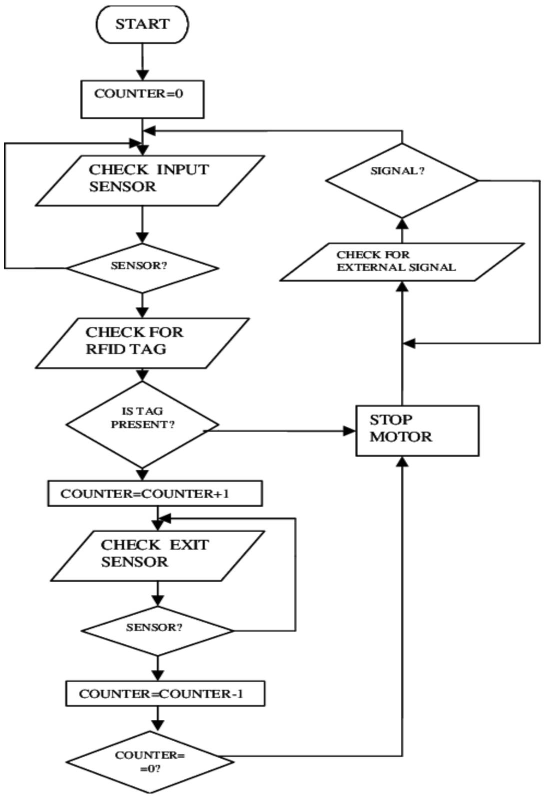
Step5: When the baggage arrives at a section RFID receiver scan for the tag

Step6: If Tag is present, then increment the count value by 1. So, the passenger can track the luggage as it passed the first section.

Step7: When the baggage arrives at the destination, the RFID receiver sensor scans the RFID tag and if present that subtracts 1 from the count.

Step8: As the count value becomes 0, it states that the luggage arrived at destination and stops the conveyor and passenger can collect their baggage.

ii *Flowchart:*



The NodeMCU is connected to the laptop using micro-USB cable and in the personal computer, open Arduino and the code in Arduino IDE is dumped into the NodeMCU to perform the required actions. As NodeMCU is connected with RFID kit using jumper cables and they receive power through this.

iii) *Block Diagram:*

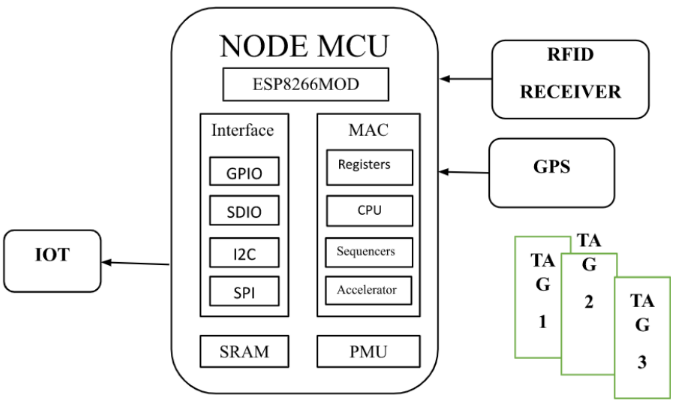


Figure: Block Diagram of Airport departure section

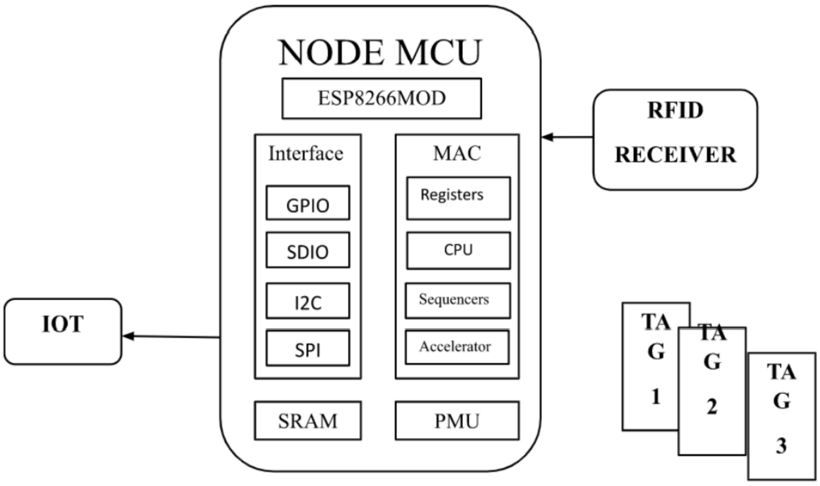


Figure: Block diagram of Airport destination section

CONCLUSION

In order to provide dependable and efficient services to passengers, the airline sector would surely benefit from the introduction of integrated RFID tags and cloud technologies for tracking and processing luggage. As can be observed, the high security of luggage is a major problem for the airline business in the twenty-first century due to frequent instances of lost, delayed, and stolen passenger baggage. The proposed system concentrates on developing a functional prototype of a baggage handling system using an RFID tag and cloud technology, which will track baggage, help locate baggage, notify personnel if baggage is not loaded properly, and modify the flight route on the tag. The main advantage of this system is that it saves time because travelers are guided to various counters that guarantee high security due to the unique number rather than having to wait for their bags to emerge on the conveyor belt.

APPENDIX

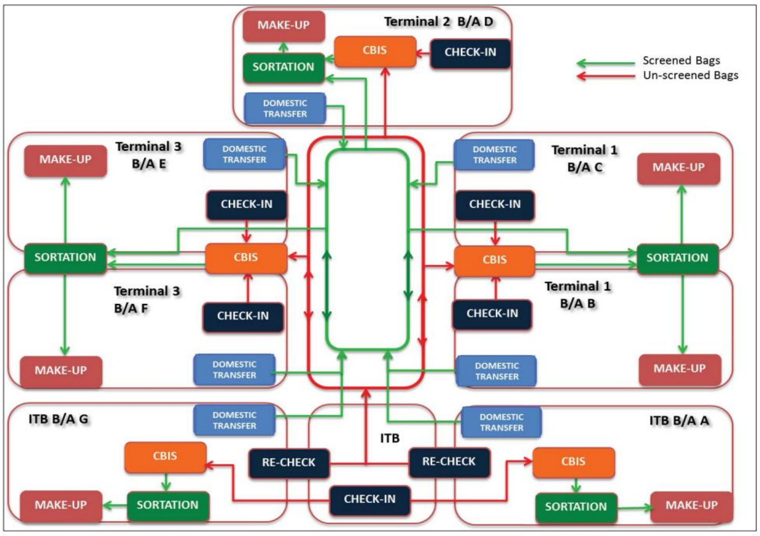


Figure: Functional Diagram of connectivity between different baggage handling systems (BHSs)

Connectivity between as many BHSs as feasible is one of the key goals of the baggage handling system projects, allowing check-in, security screening, and make-up to take place wherever is most convenient for a particular aircraft. With this layout, the airport could handle airline industry variations without having to spend money altering the physical stream.

SEATS	PERCENTAGE AT BAGGAGE CLAIM
Narrowbody Aircraft (<200 seats)	67%
Widebody Aircraft (200-250 seats)	55%
Widebody Aircraft (251-300 seats)	50%
Widebody Aircraft (>300 seats)	45%

Table: Baggage claim utilization rate per aircraft type

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