

IOT BASED SMART OBJECT TRACKING SYSTEM

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Abstract - The smart object tracking system implements RFID to improve airport security and hasten the retrieval of luggage belonging to passengers. The system consists of RFID tag and a reader module. The RFID reader reads the tag and sends signals to microcontroller which in turn transmits unique tag ID to the LCD, it also sends the tag details to the admin and the SMS to the passenger about luggage site through GSM module respectively. This system allows the passenger to check if the luggage is loaded into the plane safely. This work concerns mainly on the passenger luggage security.

Key Words: RFID, luggage tracking, LCD display, RFID tags and readers, Microcontroller, GSM.

1. INTRODUCTION

In the light of the increasing number of airline users, the airline needs to keep up high levels of flexibility to face new challenges and to enhance customer's satisfaction. As a result in increase in passenger and luggage volumes, many initiatives have been undertaken to enhance service delivery to customer's satisfaction. These include implementation of RFID luggage tracking system in the airport. The system is still facing some challenges as it does not involve the passenger in the luggage tracking. Consequently, it requires an efficient luggage handling system. The current luggage handling system causes a many mishandled bag. Mishandled luggage generates losses to the passenger and the airline. Implementation of RFID in airports becomes very useful since it enhances luggage tracking ability, and increase customer's satisfaction. This technology replaces the traditional bar code system as it overcomes certain limitations found in bar code applications. Because it is not an optical technology like bar coding, it requires no inherent line of sight between tag and reader and the tagged RFID objects.

Implementation of RFID transmits data wirelessly and is a read or writes technology, so it can update or change the data encoded in the tag during the tracking cycle. This seeks to develop an intelligent RFID luggage tracking system that will involve the customer in the tracking process thus making luggage handling easier and faster as it would decrease the waiting time of the passenger when a mishandling error occurs. It will also involve the customer in the tracking process.

2. EXISTING SYSTEM

There is no proper existing system for luggage checking system, so we propose a new system to tracking the luggage in an airport. Currently, the majority of airlines use simple barcodes for luggage handling. They are cheap, simple to use and a trusted technology. However, they also have distinct disadvantages. They not only require line-of-sight reading, often with a handheld scanner, but also where tested alongside RFID, barcode technologies provide read rates as low as 60 - 70%. The objective of this proposed paper is to design and develop "Airport Luggage System" using GSM technology along with RFID reader.

3. PROPOSED SYSTEM

In the proposed system we are going to use RFID (Radio Frequency Identification) technology. The main factor of RFID technology is Uniqueness which is used everywhere. The unique property is provided to the user by creating a unique number for every RFID Tag. In this RFID Tag we can store certain amount of data which are used in identification. The data in the Tags are read by RFID reader. We are going to implement passive RFID for luggage identification in our proposed system. Every luggage attached with an RFID card with unique number and passenger details in it. That unique number is given to the passenger at the entrance of the airport. This RFID tag makes in communication with the RFID reader at the each stage and informs the luggage details to the user through the message using GSM modem, and the same information was passed to the database.

The objectives of this proposed paper are:

- To study the basic operation of RFID reader and design of the authenticated person accessing system.
- To optimize the luggage tracking.
- To design alert system using GSM system by sending luggage whole information up to date.
- To design SD card storage memory and interfacing with PC.

4. OVERVIEW

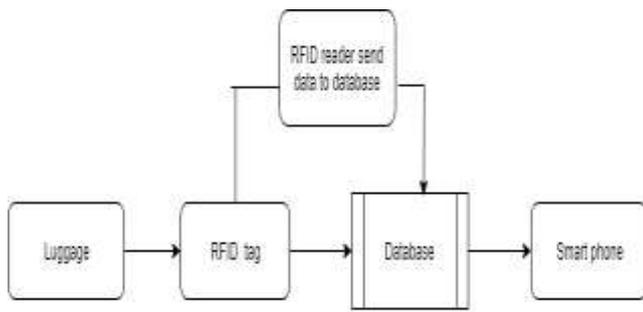


Fig-1: Overview of Smart Object Tracking Process

Due to the expected increase in doubling passenger worldwide travelling by air each year, the most common problems experienced in aviation industry are lost luggage, luggage mishandling and disposable paper adhesive luggage tags. Aviation industries are investing in technological innovations and systems improvements to make sure that fewer bags are mishandled or lost. Most commonly used technique for scanning is using bar code attached to the baggage; that isn't reusable. So, to improve luggage tracking and lower the one-off adhesive luggage paper tags, we have proposed a design of luggage tracking and handling system using smart RFID tags; they are reusable.

RFID referred as Automatic Identification and Data Capture (AIDC). AIDC methods automatically find objects, collect data about them, and write those data directly into computer systems with little or no human intrusion.

RFID uses electromagnetic waves that automatically find and track tags attached to objects. The tags contain electronically stored information. Tag readers sense the information in these tags. These tags are therefore read in different locations and updates the information and often need greater detection distances.

We have designed a prototype for two locations having both check-in and check-out processes. A more secured algorithm is used for generating RFID tags are attached to printed luggage label with the details of the passenger and airline stored in it.

At check-in process, each passenger's information is stored in the database. The information consists of four important items including the name of airline, flight number, bag nature and mobile number of the passenger along with the identification number which is peculiar to each other. The same identification number is sent to passenger through SMS to keep it personal.

When the passenger places the luggage on the conveyor, the reader collects the tag data and records from the beginning of the trip. As the bag moves through the conveyor, the RFID keeps track of the luggage to make sure that the luggage would be delivered to the right gate and flight. At the same time, the database processes the data sent by the RFID system and retrieves from it the passenger's information to know the unique identification number and send the proper

message. When the passenger's luggage loads into the plane, the passenger receive a message that "Your luggage is loaded successfully." We can use the same identification number while collecting bag at check-out counters. This ensures less consumption of time, security for luggage and is economical hence provides customer satisfaction.

5. BLOCK DIAGRAM

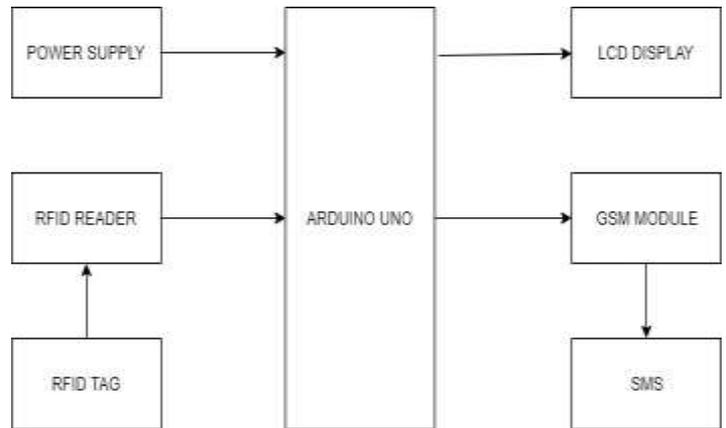


Fig-2: Block diagram

6. HARDWARE DESCRIPTION

6.1 ARDUINO UNO



Fig-3: Arduino

Arduino Uno R3 is a microcontroller board based on a removable, ATmega328 AVR microcontroller. It is a single-board microcontroller meant to make the application more accessible which are interactive objects and its surroundings. It consists of 14 digital I/O pins in which it uses six as PWM outputs, a 16 MHz ceramic resonator, a USB connection, 6 analog inputs pins, a power jack and a reset button.

6.2 GSM MODEM



Fig-4: GSM module

GSM stands for Global System for Mobile communications. It is used for transmitting mobile data and voice services. This GSM modem can accept any SIM card just like a mobile phone with its own unique phone number. These GSM modems are most often used to offer mobile internet connectivity, and used for sending and receiving SMS and MMS messages.

SIM 900 GSM/GPRS MODULE - The SIM900 is a complete GSM/GPRS solution which we can embed in the customer applications. SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, and Data in a small form factor and with low power consumption. It operates at 12 V DC.

6.3 RFID:



Fig-5: RFID reader and tag

The Proposed system uses RFID system to record and track the movement of luggage in the airport through radio frequency communication. It uses electromagnetic fields to automatically track and find tags attached to objects. The tags contain electronically stored information.

Tags: There are two categories of tags:

Passive Tags: battery needed, it collects energy from a nearby RFID reader's interrogating radio waves.

Active Tags: no battery needed, Active tags have a local power source such as a battery and may work at hundreds of meters from the RFID reader.

Benefits of RFID adoption:

- It allows passengers to track luggage in real-time and creates passenger loyalty.
- Unlike bar codes, it does not need line-of-sight reading.
- RFID tags do not tear apart from handling.
- RFID reader can read multiple tags simultaneously, unlike bar codes.
- It can read the bag tags more accurately and efficiently compared to bar codes.
- Readers are easy and cost-effective to deploy.
- Decrease the need for manual processing, which helps us to free up the staff.

6.4 LCD DISPLAY



Fig-6: LCD Display

Liquid Crystal Displays are portable, reliable, lightweight, cheap than the LED. LCD screen uses a thin layer of liquid crystal, a liquid that exhibits crystalline properties. It is sandwiched between two electrically conducting plates.

The top plate has transparent electrodes deposited on it, and the illuminated back plate so that the viewer can view the images on the screen. An image is produced by passing light through selected segment of liquid crystal to the viewer. LCD screen works on the principle of blocking light rather than emitting light.

ADVANTAGES:

- LCD's consumes less amount of power when compared to the LED.
- LCDs are of low-cost.
- LCD's are thinner and lighter when compared to the LED.

DISADVANTAGES:

- Require more light sources
- Low reliability
- Speed is very low.

7. ADVANTAGES

- RFID technology can be used for tracking products or product identification.
- It does not require a line of sight to read the tag.
- Send location of luggage through GSM technique.
- RFID reader has a longer read range than barcode reader.
- RFID Tags can store more data than bar code tags.
- RFID readers can simultaneously communicate with multiple tags.

8. LIMITATIONS

- Turning from adhesive paper tags to digital tags requires training to the workers.
- This system is very complex and complicated to install.
- RFID tags may get damaged physically.
- RFID technology can be dangerous, if not properly managed.

9. CONCLUSION

The design of Smart Object Tracking System based on RFID technology provides an efficient solution for tracking luggage to lower luggage-handling errors and misplacing of luggage in the airports. The main advantage of the system is that it consumes less time and involves passengers in the luggage tracking process. The passengers don't have to wait for their luggage to turn up on the conveyor belt and ensures high security due to the unique identification number. It is after the current trend as it is environment friendly, tags are reusable, as it is paperless, no need of printing and paper which is a very important issue now in the aviation industry. With this design we tend to make the air travel more customers friendly, less time-consuming, hassle free, with less queuing and greater security of the passenger. This will improve passenger security and satisfaction as well as reducing flight delays caused by mishandled luggage.

10. REFERENCE

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