ARCHITECTURAL OPTIMIZATION OF LUGGAGE TRACKING SYSTEM

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Abstract - *The problem developed with the loss or mishandling of luggage at any customer baggage oriented place is a huge matter of consent. Despite the fact that every year 1% of the luggage is lost in Airline travel itself, which is huge in stats. It's a constant source of stress for passengers and customers plus the waiting time at the Baggage claim wondering if the bag got on the right place on time or not can be very demanding. This project works for satisfying the demands of all the consumers, helping with providing a unique identity to the baggage with the help of NFC tags. The proper system comprises of a luggage tracking device that tracks the luggage using an assisted GPS module, the assisted GPS module gives the location details to the GSM module with the help of Arduino UNO. This information of location is sent to the AWS cloud where it is stored in the database, whenever user wants to check for the bag status he/she can log in to the cloud and check for the bag location, in addition to this the GSM module sends a text message to the user's mobile specifying the location of the misplaced luggage.*

Key Words: *Bag tracking; NFC; Arduino UNO; Alert System; GSM module; GPRS.*

1. INTRODUCTION

Air transportation is currently in an era of quick expansion. For sustainable development, certain issues need to be urgently rectified. In particular, loss of luggage is pervasive. Anyone can lose their luggage, irrespective of the circumstances and conditions. Bags with important transcripts or valuable things and can be lost or theft and people can lose their important stuff. It is important to efficiently manage baggage and travellers and assuring the secure operation of the services provided at the airport. Usually, it is seen that people get robbed in the areas like railway and bus stations and various other public and private areas. Also, people even forget their luggage which can have useful things. So it is highly necessary to track the bags which got lost or theft. There are a number of reports on traveller expectations and its fulfilment on the services provided at airport terminals. As a result, issues regarding luggage, such as management of luggage, control of luggage, and auto labelling of the same, have been pointed out as general dissatisfaction among travellers. To tackle such issues our proposal explains a technique that aids airport users manage their luggage, focusing on increased control, and provides the possibility of real-time luggage monitoring.

The main objective of our proposal is to provide a mechanism for luggage labelling via tags NFC for identification of the owner of luggage and its tracking throughout the airport, having security, privacy, and data integrity as a priority . Regarding related proposals, permanent labelling is used by the British Airways system, with automatically labelling configuration and electronically saved. However, the objective of our system is luggage tracking.

In the proposed system, the present position of the luggage is tracked at all times by the airport with the aid of NFC tags. Since smart phones have now started adopting this technology, travellers will also be able to check their luggage online via GPS. Travellers with no access to NFC will be offered the to access check-in desk added with NFC technology. Thus, with the availability of online check-in, travellers can get prompt luggage check-in process.

With the use of RFID, a significant decrease in the number of mishandled luggage can be observed. There are various kinds of RFID tags available and every tag has a unique identification number and that's why they are one of the main components of this system. The tag can be put in an active and passive mode with an internal power supply.

However, NFC tags are passive they draw power from the device transfer the data. The read-only types of tags are utilized in this system. In order to match the tag, the database is used regarding the name, address, phone number, flight number etc.

2. RELATED WORK

In recent years lot has been done in order to track the lost bags, one or the other technologies used have its own way and significance of doing its task. On the contrary to this bag missing and loosing has also increased in many ways, for example, suspicious bags robbing activities are also trending topic these days.

Also, some of the bag monitoring techniques have been used 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:

2.1 Konas Bags

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 a few hours later, then it can be a possibility that may have transported or traveled far away and a lot of distance.

2.2 Trackable Bag Tags

• 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 like dynotag, LugLoc, and Robot Check.

Disadvantage

• Again the tags don't notify you as soon as the bag is theft or loss, instead of 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.

2.3 Track dot Luggage Tracker

Track dot is a luggage tracker device which is placed inside the bag when a person is traveling. 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.

Disadvantage

• It is very costly approx. $56.

• 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

3. PROPOSED SYSTEM MODEL

The customer urge to deal with baggage, the assigned bag/parcel are sent for adding tracking devices to it, the whole tracking and monitoring system comprises of NFC tags, GSM module, assisted GPS, and Arduino UNO as a microcontroller. The ease of this project is increased by the use of NFC tag, NFC tags complete the identification

task of the bag within just snap of the fingers also using NFC tags only assigned authority can collect the bag which increases the security and certainty of the baggage. Unlike other projects use of NFC is better in terms of technologies and time-saving. GSM module and GPS are used for tracking exactly linked with the assignment, a unique id and password is assigned to the customer through which he can login to the cloud and get update for the location of the baggage time to time whenever he wish to.

4. SYSTEM ARCHITECTURE
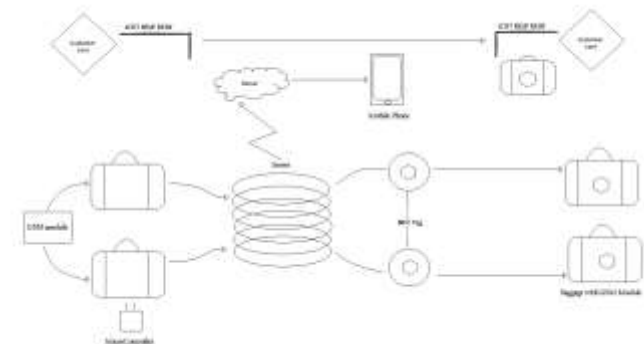
Figure 1: Flow chart of System Architecture

The model as shown in Figure 1 captures the flow of the system and have been described using the following points

• As and when the consignment is booked, it is attached with a pack of NFC tag, GSM module, assisted GPS, and Arduino UNO.

• All the details of the package are recorded against the tag ID and stored in a Global Database which is linked to the cloud. The NFC tag now becomes the identity of the baggage and the tracking ID of the package is recorded against the NFC tag.

• NCF reading tags are installed at every connected nodal points. (nodal points are all the places through which the baggage will pass and records will be maintained).

• Since GPS is used for tracking the location of the bag, GPS device can retrieve the location and time information of the bag plus in addition to that, it can be used for location, tracking and mapping the product it is used for.

• This location details are given to the GSM module and stored as a backup, GSM module is used to supply internet to the system, the data is manipulated using the Arduino UNO micro-controller and send to the cloud through GSM module.

• Cloud gives a platform to store the data of the bag and it also gives a platform to the customer to login and looks to the updates of the bag. Security and certainty are preserved using the cloud plus it is more secure for any bag since the login details generated for the cloud is shared only with the customer.
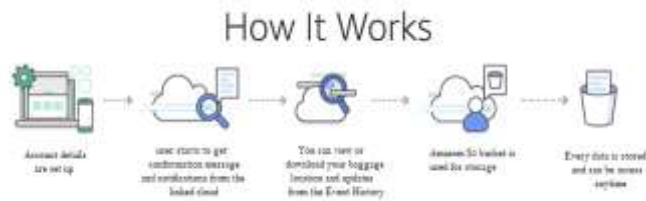
Figure 2: AWS Cloud Services

5. TECHNOLOGIES USED

Mentioned proposed system consists of technologies used for tracking, identification, storing data, manipulating it, and sending it to a user-friendly platform for acknowledgment. Assisted GPS, NFC tag, GSM module, Arduino UNO, and cloud networking is used in this project. Details:

5.1 Assisted GPS:

An Assisted GPS or A-GPS is an abbreviation for the assisted global positioning system. Here we have used A-GPS instead of GPS devices depend completely on the information given from satellites whereas an A-GPS augments that by using a cell tower data for enhancing quality and precision of the location when there are poor satellite signal conditions. Advantages of A-GPS are as follows:

• Faster location acquisition

• Less processing power is required by the device

• Saves battery life

• Location acquisition indoors or in non-optimal environmental settings.

5.2 NFC tag:

These small little NFC tags came like a revolution in identification sector. These tags can store big ranges of information such as, from short lines of text, like a web address or contact details of a customer, which is taken at the time of baggage submission and verified and the time of collection with the customer at the other end of a process.

5.3 GSM module:

GSM is basically a mobile communication modem; it abbreviates for global system for mobile communication (GSM). A GSM digitizes the data and reduces, then sends it down through a channel to the destination where the client data has to reach, each in its own particular time slot. The GSM digital system has a prime ability to carry 64-kbps to 120-Mbps of data in unit rate.

5.4 Arduino UNO :

The Arduino UNO is a basically a widely used open-source microcontroller board it is based on Microchip ATmega328P microcontroller. In this project, Arduino is like a brain it computes the location details into the user-friendly form and gives it to the GSM module to transfer it to the cloud. Also if the location details show some malfunction, it sends the emergency message to the user.

5.5 Cloud:

In our project, we have used AWS Cloud. AWS cloud gives the best platform for a user to access and get updates for the baggage. It is very user-friendly. Using cloud for keeping and storing data is very secure as compared to other technologies, as the user will be given unique identity and password for his consignment.

6. CONCLUSIONS

This document is structured as follows. Section 1 introduces the objectives and requirements of our luggage control system. Section 2 briefly mentions some key aspects of the main components of the existing system. Section 4 describes the complete structure of the system, paying special attention to the internal operations related to data flows. The cryptographic tools that provide reliability for luggage control, as well the authentication and confidentiality protection are described in Section 3. Section 4 briefly explains about the system architecture of the model. The technology used in making the model is described in section 5.And finally in Section 7 the future aspect are mentioned.

The main objective of our proposal is to provide a mechanism for luggage labeling via tags NFC for identification of the owner of luggage and its tracking throughout the world with GPS and microcontroller attached to it, having security, privacy, and data integrity as a priority . Regarding related proposals, permanent labeling is used by the British Airways system, with automatically labeling configuration and electronically saved. However, the objective of our system is luggage tracking.

7. FUTURE POSSIBILITIES

Since NFC is still making its way to the mainstream, third parties have not yet integrated the technology into many products or services. So far, Google Wallet is one of the only services that has invested in building an infrastructure that allows users to replace credit cards with NFC-enabled phones.

The challenge here is that creating such an infrastructure is expensive, takes time, and its success relies on the consumers' awareness of NFC. Even with all of Google's efforts, Wallet is still a niche product, mostly due to the lack of NFC-ready credit card terminals and NFC-ready phones and tablets. Nonetheless, the excitement over NFC

is building. Students, entrepreneurs, and manufacturers are already prototyping (and even selling!) NFC-based solutions that can make our lives easier.

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