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# "Baggage Locating System"


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## Abstract

The baggage handling and claiming system is one of the most complex system in the airport. Where the passengers are waiting for long time to find out their baggage in the conveyor belt. Hence, we try to design a system to make it simple, where the passenger will be informed through SMS and Display Screen when their baggage arrived on the conveyor belt. Hence the passenger can access the baggage easily. This will be done by collecting the database of the passenger and access it through a specialized RFID chip which will be placed on the baggage. Then constructing the model that consists of conveyor belt, RFID rfc522 chip, RFID chip reader, ARDUINO MEGA 2560 REV3, Wi-Fi module and display screen. The baggage RFID chip will be scanned using the RFID reader when the baggage arrives at the conveyor belt and the Arduino system interface scans the data and send an SMS to the baggage owner and display the data on a monitor screen.

## Acknowledgement

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# Chapter 1

# Introduction

## 1.1 Project Theme:

for the past few years the service within the airports have dramatically improved which is necessary as airports are what give the first impressions of a countries tourism and culture, and the technical development within an airport usually reflects the technical development of the country as a whole, but sadly one specific sector that has been denied any development is the baggage claim system even though it's one of the if not the most important and frustrating thing in the travelling experience. The main aim and theme of this project is to build a system that will be very useful to reduce crowds and ease the service for passengers in baggage claim area. We thought of a system to make it simple, where the passenger will be informed through SMS and Display Screen when their baggage is available in the conveyor belt or Baggage Carousel.

## 1.2. Literature Review

### 1.2.1 Passenger Terminal

The Passenger Terminal is typically the first point of contact with foreign country for the passenger. Passengers, airlines and other terminal customers have their own ideas about comfort , convenience, cost and atmosphere.

### 1.2.2 Level of service Evaluation for Airport Passenger Terminals

A joint research effort between the FAA – Federal Aviation Administration and the TRB – Transportation Research Board(TRB, 1987) enumerated some key indicators that influence the level of service and capacity of baggage claim areas, including: staff behaviour (inspection of luggage at customs), the amount of luggage per flight (number of bags per passenger, the percentage of passengers with luggage, time of arrival of luggage).

According to Pagani et al. (2002), some airport organizations known worldwide, such as BAA (British Airport Authority), IATA (the International Air Transport Association), and

ADP (Aeroports de Paris) suggest some design and layout patterns for the space and time for the baggage claim area.

## 1.3 Objective:

Our main objective behind this project is to make the process of baggage claiming to be less frustrating and disturbing and to make the travelling experience just that much more comforting for the passengers, while maintaining a low cost but keeping its technological edge and make the passengers feel like it's a more luxurious experience

## 1.4 Methodology

The methodology used for the purpose of easing the baggage claiming process is an advanced RFID system using microcontroller (Arduino). The data of the passenger will be collected and entered into a passenger database that will store all the necessary information, which will in turn be saved onto each individual RFID chip on each bag. The chip is then scanned as it passes into the claiming terminal by a RFID chip reader and the information will be displayed on a lcd screen and also an SMS will be sent to the passengers number that is registered in the database, and maybe in the future a notification will be sent to the airport app.

# Chapter 2

# Theoretical Analysis

## 2.1 Consideration

In the air transport it is customary to separate passenger from checked baggage and reunite in the arrival terminal. Almost all airport provides mechanical delivery and display system, where the passenger must claim the baggage manually. Several operational indicators should be considered to offer quality and efficiency in baggage claiming to the passengers.

The below list provides a summary of factors to be considered when evaluating baggage claim.

| Factor | Description |
|---|---|
| Equipment configuration and claim area | Type, layout, feeding mechanism and baggage display rate; space available for waiting passengers; relationship of waiting area to front display; access to and quantity of available feed belt |
| Staffing practices | Carrier availability and baggage inspection at exit; baggage load / unload rate from cart to feed belt |
| Baggage load | Number of bags per passenger, fraction of passengers with baggage, arrival time from aircraft |
| Passenger characteristics | Arrival rate from the entrance, capacity to handle the luggage, carts, number of visitors |

*Table 2.1 Airport baggage claim operational indicators.*

## 2.2 Project Theory

We have gone through lots of methodology and procedure, finally we choose to do it using the Arduino microcontroller. Along with the microcontroller, an RFID Scanner was used to obtain data about the passenger with the help of an RFID chips in the baggage. The procedure used as follows where the Database of all the passengers will be collected and saved in the system , a RFID chip will be set for each baggage and attached or placed within the baggage. Once the Baggage arrives to the conveyor belt the RFID reader will scan the chip and transfer its information to the microcontroller and get the data of the passenger to be displayed on the screen and send an SMS to the passenger about the arrival of the baggage.

The details about all the components. Equipment used in the methodology will be explained in the next chapter Experimental Setup.

# Chapter 3

## Experimental Setup

The design setup consists of the following,

i. Arduino Mega 2560 rev3

ii. Sim900 Wi-Fi Module

iii. RFID Scanner

iv. RFID Tag

v. Conveyor Belt

vi. LCD Module

## 3.1 Arduino Mega 2560 rev3

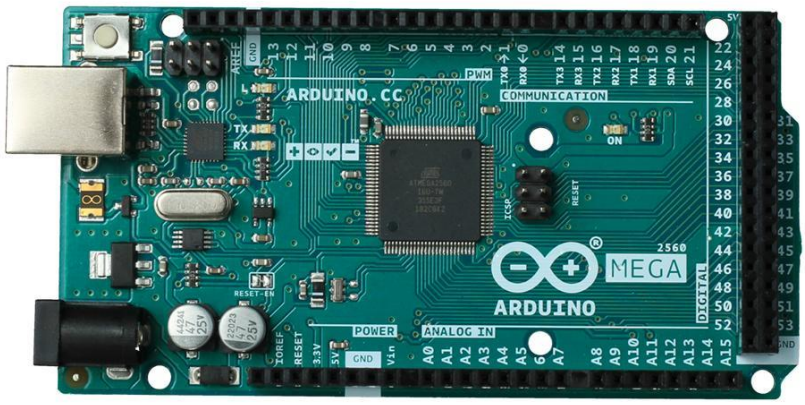



*Fig 3.1 Arduino Mega 2560 rev3*

Arduino is a micro controlling chip that process specific command inputs to a certain outputs .it has a lot of processing power allowing it to withstand multiple tasks at once with a minimum effort. Also it's a rather user friendly device than other microcontrollers in the market

We will use Arduino in our project to achieve :-

- Collect passenger info from the barcode and match it with our system database
- After verifying passengers information it order the sim 900 to send messages to passenger
- Display the output on lcds

## 3.2 SIM900 Wi-Fi Module *(gsm gprs)*

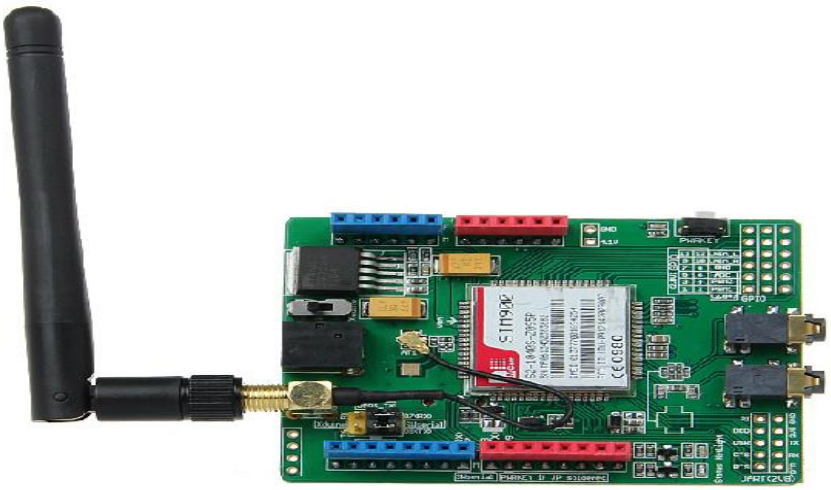


***Fig 3.2 Wi-Fi Module***

The Wi-Fi module will be the device that is connected to our Arduino microcontroller where its responsible for sending SMS messages based on the info in the RFID its capable of doing this thanks to its GSM capabilities (Global System for Mobile communication) and it will be useful for future development of such project as if a mobile application is developed it will be able to send messages via the app thanks to its GPRS (general packet radio service ) which allows it to connect and send messages via the internet

## 3.3 RFID reader


*Fig 3.3 **RFID reader***

the rfid reader purpose is to scan the rfid chips placed in the luggage of passengers and obtain the passengers info from it like their name , phone number and luggage sequential number , it opperates via radio frequency waves as its name entails .

it then sends the info to the arduino microcontroller to be processed and sends an output to both the sim900 module and an lcd screen display simultaneously.

Comsidering that the frequency could affect the range of the reader it can be altered to use a frequency that is both cost efficient and still effective as a scanner

## 3.4 RFID tag


***Fig 3.4 RFID Tag***

RFID tags are the equivalence of a modern smart barcode, it consists of two main components, a radio receiver and a radio transmitter. the receiver is used to detect the electromagnetic radio waves that are transmitted by the RFID reader , when it detects the radio waves it triggers the radio transmitter and sends waves carrying the info stored in the tag to the nearby scanner , passive tags will be used instead of active tags as passive tags are much smaller and don't need to be battery powered as instead its solely activated by the energy carried in the radio waves it receives allowing them to last an approximate 20 years  without needing to be changed as long as they aren't bent or broken .

## 3.5 Baggage Conveyor Belt


*Fig 3.4 Conveyor Belt*

The belt will carry bags into the terminal in a single-level gadget from an opening in the wall. The belt usually runs across the wall for a short distance and then becomes the terminal, creating a long oval, it consists of 2 parts

Hidden part – where our RFID readers will RFID tag

In terminal part – after the tag is read by the reader and text message is sent the luggage will be delivered on this part of the belt

## 3.6 LCD Module


***Fig 3.5 LCD Display***

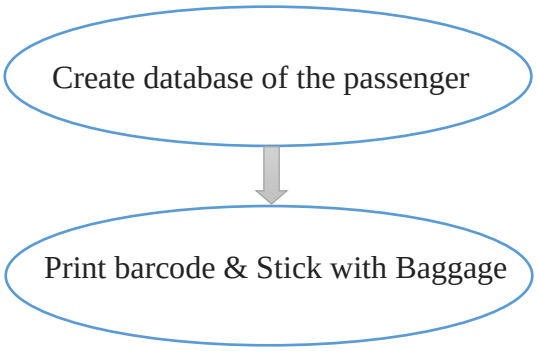
An LCD is an electronic display module which produces a visible image using liquid crystal.

The 16 auxiliary LCD display is a very simple module widely used in DIY and circuitry. In 2

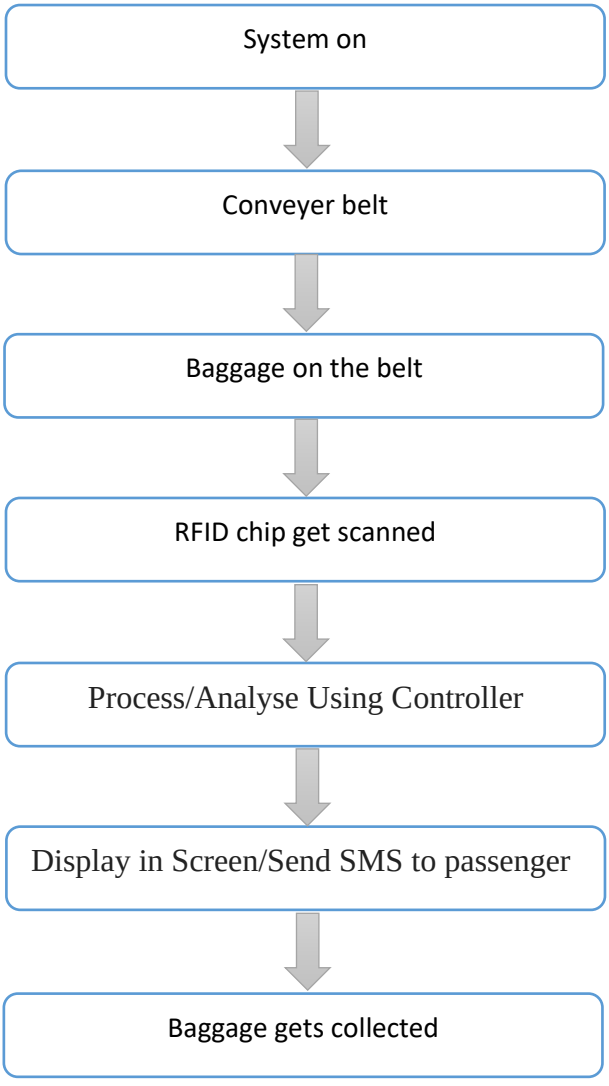
these lines, the 16 LCD shows 16 characters per panel.

## 3.7 Block Diagram of the workflow:

Step I




Step II



# Chapter 4

## Result and Discussions

| LOS | Processing time, calagary (min) |
|---|---|
| A | <1 |
| B | 1-14 |
| C | 14-20 |
| D | 20-26 |
| E | >26 |

***Table 4.1 LOS standards: processing time***

according to LOS table KWI (Kuwait international airport) is C classified after implementing the system it is expected that KWI (Kuwait international airport) will be B classified. by improving the baggage claiming time it will increase the overall rating of the airport and make the arrival more enjoyable

The main output of this project is to reduce the waiting time near the belt and we achieved the result practically. We try to do this project with raseberrypi and came with some garbage that we couldn't handle and hence we choose arduino Which is very fast and efficient. We try to use barcode , but as I said before we couldn't handle the barcode data. We finished entering the data and prepared database for the system. We are trying to workout more on the model preparation.

# Chapter 5

## Conclusion and Recommendation

To conclude we achieved all of our goals till now and achieved our aim in this project. We had some difficulties in microcontroller but we eventually sorted it out. We worked hard to finish our project in time.

In the future, we can implement the same project but add some sort of privately developed app to track the luggage and more advance interface and software. It can be implemented in Kuwait Airport with more accurate and efficient system.

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