# Foreign Parcel Address Recognition & Tracking System

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## Declaration

I declare that this thesis is my own work and this does not incorporate without acknowledgement any material previously published submitted for a Degree or Diploma in any other university or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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# Abstract

A parcel is a simple way to transport anything from one place to another. The high price of the express package delivery services, people move to domestic postal service to send the package to a recipient. Postal service has excellent coverage of post office operated all the rural and non-rural area. Growing the Internet and E-Commerce website in the last 20 years, people buy and sell using e-commerce websites. The popularity of the internet in Sri Lanka people using eBay, Amazon and other websites to buy and sell items. As many people do not select express package because of the high price of the shipment. All normal packages send via the Central Mail Exchange 'CME'. Usage of postal packages going to be increased day by day due to the heavy orders. Problem is 'CME' is difficult to handle manually such number of packages when the demand is high. Resulting delay deliveries of postal packages, therefore people try to claim the money back from the e-commerce sites. Currently, most of the websites are not ship to Sri Lanka. Because the department of post has no tracking system for track postal packages at domestic level. In most cases due to delay delivery of packages, customers claimed money from the suppliers. But it was observed that items were delivered to the customers by the SL post after customers claim money from suppliers. Therefore there is a necessity of introduce effective delivery and tracking system to overcome issues mentioned above.

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# CHAPTER 01

# Introduction

## 1.1 Prolegomena

A Parcel is a simple way to transport to anything from one place to another. The parcel is a suitable package holding the name and address of the recipient in order to be the path through the services of a postal service or by express package delivery to the recipient. The high price of the express package delivery services, people move to domestic postal service to send the package to a recipient. Sri Lankan postal service is one of the oldest posts in the world. It is established in 1882. Postal service has excellent coverage of Post office operated all the rural and non-rural areas. This is one of the best government networks at the moment in Sri Lanka. Department of Post offer verity of Service for there is customers. As an Example Registered post, non-Registered post, foreign and domestic parcel delivery service, money order, utility bill payments.

Growing the Internet and E-Commerce website in the last 20 years, people buy and sell using e-commerce websites. Companies and individual sellers send Items using postal packages & express packages. The popularity of the internet in Sri Lanka people using eBay, Amazon, Alibaba and other websites to buy and sell items. Because of the low price and variety of product range. As a third world country, many people do not select express package because of the high price of the shipment. All normal packages coming via the Central Mail Exchange in the Department of Post Sri Lanka. The usage of postal packages going to be increased day by day due to the heavy orders of people in Sri Lanka. Problem is Central Mail Exchange cannot handle this much of packages in last years. Because of the postal package delay, people claim the money back from the e-commerce websites. Currently, Most of the websites do not ship to Sri Lanka. Because the Department of the post has no tracking system for Track postal packages at a domestic level. The reason for the delay, customers claim money from the item suppliers.

Most of the time, the item was delivered to the customers by the department of post. Department of post fails to provide the delivery details to item suppliers online. Then item suppliers should have returned the money. As a company that is the big loss, that's why they do not ship to Sri Lanka.

Postal automation address tracking Systems implemented in the USA, UK and Australia, India and many other countries in the last decades. Automation really important fact to people and the business world to succeed. But no application is available for addresses reading in Sri Lankan Postal System.

### 1.2. Background and Motivation

Currently, Most of the websites do not ship to Sri Lanka. The department of the post has no tracking system for tracking postal packages at a domestic level. In most cases due to delay delivery of packages, customers claimed money from the item suppliers. But it was observed that the item was delivered to the customers by the SL post after customers claim money from suppliers. Suppliers of packages became completely loss situation package to package.

Department of post loose postal charges, because they cannot verify and properly communicate the delivery status of the packages to the package senders in the outside of the country. Because payment received only for the completed delivery status.

Another main problem is all Foreign Packages come directly to the 'CME' (central mail exchange). Huge traffic generated because of parcels. Postal staff cannot handle that bulk of packages at a short time of period. Officers manually write the barcode name and destination post office only on the papers, there is no tracking mechanism to see the status of the package. Officers didn't have time to type the address and the destination post office to any online system.

The normal Package tracking system didn't work for the Postal Officers at 'CME'. Because they don't have much time to type the address to the system. My solution is recognize the address using image processing and sorts the destination post office

automatically. Users not need to type the address into the system. All the address recognitions are done by the system. The solution is only provided for Foreign Packages.

### 1.3 Aim and Objectives

Introducing the online Mail Address Recognition system to track the location of the foreign parcel for the Department of Post in Sri Lanka.

Based on the research aim, this research identified following as objectives.

- Implement the system to identify address using image processing.
- Improve the parcel sorting method for sorting the parcel in the real world.
- Evaluate the system output with the requirement.
- Prepare the final report.
- Implement this system to reduce the delay of package delivery.
- Create the facility to track the location of the parcel and delivery status of the package.

### 1.4 Research Scope

1. This research only consider about the Foreign Parcels which are come from outside of the Sri Lanka.
2. Local Parcels and Letters are not included in the scope of research. Because most of the addresses are written on the Sinhala language. The characters of Sinhala language are difficult to recognized using the OCR.
3. Since the development of the application would be based on PHP and JavaScript and Interface design by the HTML and CSS.
4. This proposes system run on web base and it can be access on any OS platforms.
5. This research priority will be given for support only the main key post office which is given from the department of post.

6. Image capture OCR method is used by the JavaScript library.
7. Post officer can upload the image to the system and system will identify the address and sort to the destination post office.

## 1.5 Structure of the Thesis

The thesis is containing as follows. Chapter 2 contains of literature review, chapter 3 explains the technologies adopted for the research, chapter 4 describes regarding the analysis and design process of research. Chapter 5 demonstrates the implementation process of the research. The last chapter describes of conclusion and future works of the thesis.

# CHAPTER 02

# Literature Review

## 2.1 Chapter Introduction

Chapters 02 consider the research concept and methods about the image processing and address recognition of existing projects. This chapter expresses the solutions that can be output and problem in the relevant research.

## 2.2 Literature Review

Postal address recognition and tracking is the very attractive topics of research in last few years. Numbers of packages are increasing day by day due to boom with e-commerce industry. At the moment postal sorting machines are available in many countries ex. United Status of America, United Kingdom, Australia and Canada. Few other countries like Sri Lanka no postal sorting machines used to sort the packages and letters. In this chapter shows, how other researches have done as a way of research and similar projects.

Absence of the human interaction, automatic sorting function is not an easy task to do. The main problem faced at the past research was difficult to identify the location of the postal code and characters of the address. Initial part of the address that include redundant information such as the street names, building no etc. Analysis depicts that accuracy of recognized address depends; if the address consists of over 95% for separate numbers which can be easily recognized. However if the sender write address at the personal style, it directly influence to the accuracy of the recognition of identify the postal code and city names. The handwriting characters recognition task is quiet difficult due to the variation of handwriting styles and address formats, and incomplete characters, spelling mistakes. The problem leads errors when recognize the postal address in database. The problem expands beyond the capabilities of handwriting recognition algorithms. These errors are leads to delay services and costly output and sorting

methods. Maximum correct sorting and minimum error is the key requirement of an automatic sorting system [1].

System of postal automation based on the recognition of pin code and city names of the postal packages. In the system at first, non-text blocks ex: postal stamp, postal seal etc. are detected and destination address block is identified from the document. Next, lines and words of the DAB are segmented. Since Sri Lanka is multi-lingual and multi-script country, the address part may be written by combination of two scripts. To identify the script by which a word is written, we propose a water reservoir based technique. It is very difficult to identify the script by which the pin-code portion is written. So we have to use two-stage artificial Neural Network (NN) based general classifiers for the recognition of pin-code digits written in English. For recognition of city names we propose an NSHP-HMM (Non-Symmetric Half Plane Hidden Markov Model) based technique [2].

Under three-language formula, the destination address block of postal document of a state is generally written English, and the state official language. From the statistical analysis we found that 76.32% and 10.21% postal documents are written in English and script, respectively. Because of inter-mixing of these scripts in postal address writings, it is very difficult to identify the script by which a city name is written. To avoid such script identification difficulties, in this research we proposed a lexicon-driven method for English city name recognition for postal automation. In the proposed scheme, at first, to take care of slanted handwriting of different individuals a slant correction technique is performed. Next, a water reservoir concept is applied to pre-segment the slant corrected city names into possible primitive components (characters or its parts). Pre-segmented components of a city name are then merged into possible characters to get the best city name using the lexicon information. In order to merge these primitive components into characters and to find optimum character segmentation, dynamic programming (DP) is applied using total likelihood of the characters of a city name as an objective function. We tested our system on 16132 trilingual city names and 92.25% overall recognition accuracy was obtained [3].

### 2.2.1 Tesseract

Tesseract was developed as proprietary software by Hewlett Packard Labs. In 2005, it was open sourced by HP in collaboration with the University of Nevada, Las Vegas. Since 2006 it has been actively developed by Google and many open source contributors. Tesseract acquired maturity with version 3.x when it started supporting many image formats and gradually added a large number of scripts (languages). Tesseract 3.x is based on traditional computer vision algorithms. In the past few years, deep learning based methods have surpassed traditional machine learning techniques by a huge margin in terms of accuracy in many areas of Computer Vision. Handwriting recognition is one of the prominent examples. So, it was just a matter of time before Tesseract too had a Deep Learning based recognition engine. In version 4, Tesseract has implemented a Long Short Term Memory (LSTM) based recognition engine. LSTM is a kind of Recurrent Neural Network (RNN).

## 2.3 Problem Definition

Hard to track the packages are and deliver status about the packages in the local Sri Lankan customers. The boom of the e-commerce web sites, lot of parcel comes to the Sri Lanka through the Central Mail Exchange. Due to the higher number of parcels at the present. ‘CME’ is unable to handle the traditional tracking system to track and add deliver status to the system. The proposed prototype system expresses the solution for the above mentioned problems.

## 2.4 Chapter Summary

This chapter is regarding reviews the short comings and issues in the postal address recognition and sorting field. It also identifies the positive solutions that can be used to overcome the discussed issue.

# CHAPTER 03

# TECHNOLOGY ADAPTED

## 3.1. Introduction

Consider about the image processing there are a lot of methods can be used to capture images. In this research & implementation via using a common method namely optical character recognition (OCR) is the electronic or mechanical converted of images of handwritten or printed text into machine-encoded text, it is a scanned document or a photo of a document, a scene-photo or from subtitle text superimposed on an image. This is the very common techniques to do the text image processing.

OCR method used as a form of data entry of printed paper data records, whether passport documents, computerized receipts, business card, mail, a printout of static data, invoices, bank statements or any suitable documentation it is a common method of digitizing printed texts so that they can be electronically edited, searched, stored more compactly, displayed on-line, and used in machine processes such as machine translation, text-to-speech, key data, and text mining. OCR is a field of research in pattern recognition, artificial intelligence, and computer vision.

## 3.2. MySQL

MySQL is an open source relational database management system used on the web. The management system runs on a server and very fast, reliable, and easy to use. In my application, stored client records which were generated by advanced data generator for MySQL tool and address with package details and user, a post office in the database. Reasons for selecting MySQL database since MySQL is open source and it is familiar with my early works.

### 3.3. PHP

PHP is a popular general server side scripting language. That is especially suited to web development. It is an open-source and commonly uses programming language. It is a very lightweight language and very easy to manage at server levels. If we select the Microsoft language, we have to pay for the license. This language uses to store and retrieve the data with the MySQL database. PHP is supported by default to the MySQL database. It is very commonly use in web application development. PHP language was used to develop the web application due to familiarity of my previous developments.

### 3.4. JavaScript

JavaScript is a lightweight, interpreted, or just in time compiled programming language with first class lot of functions. While it is most well known as the scripting language for Web pages, many non-browser environments also use it. We are mainly faced to do image processing and form validation by JavaScript. This is run on the client browser side scripting language. This language also very familiar with my previous works and that is the main reason which I selected the language.

### 3.5. Visual Studio Code

Visual Studio Code is an IDE for source code editor. It is developed by Microsoft cooperation. It is free to use for Windows, Linux and mac Operating Systems. It includes embedded Git and support for debugging, syntax highlighting, intelligent code completion, snippets, and code refactoring. This IDE support of HTML, CSS, JavaScript. That is the reason, select this IDE for developments.

# CHAPTER 04

# Analysis and Design

## 4.1 Chapter Introduction

In this Chapter contain the analysis and design process to the process of implementation review in chapter 5. The chapter describes the functional requirements, Non-functional requirements, user characteristics and development methodology used in chapter 5.

## 4.2 Functional Requirements

1. System should have facility to upload the address of the image to identify the address.
2. System should be capable of identify the address and match with the database records show the result of the destination post office.
3. System should be capable of sort the selected packages to destination post office.
4. System should have an ability to show the list of packages to one destination office and assign an all packages to the mail bags.
5. System should have an ability search the post office and assign all the packages to one mail bags with barcode number and assign all the packages to that one barcode.
6. System should support to scan the mail bag barcode and show the all packages with that bag send by CME (Central Mail Exchange).
7. System should be capable of give the facility to the postal officer to accept the and reject the parcel when arrival of the mail bags.
8. System should capable of the give the facility to the postmen to accept and reject the parcel and get the delivery list of the postmen.
9. System should provide the facility to update the delivery status to the system.

10. Customer can see the delivery status of the packages accessing the system.

### 4.3 Non Functional Requirements

1. System should have capable of being scalable to support all the mobile and computer devices.
2. System should be maintainable in terms of making modifications to commands if a specific vendor makes a modification to an existing requirement with a new release.
3. System should be user-friendly whereas the end user should feel like doing input to the system is very easy and not time consuming things than manual process.

### 4.4 User Characteristics

1. User should be familiar with online web application.
2. User should have a basic knowledge and familiarity with computers and other related devices.
3. User should have need of the web application with respect and like to use the web application.

## 4.5 Use case Diagram

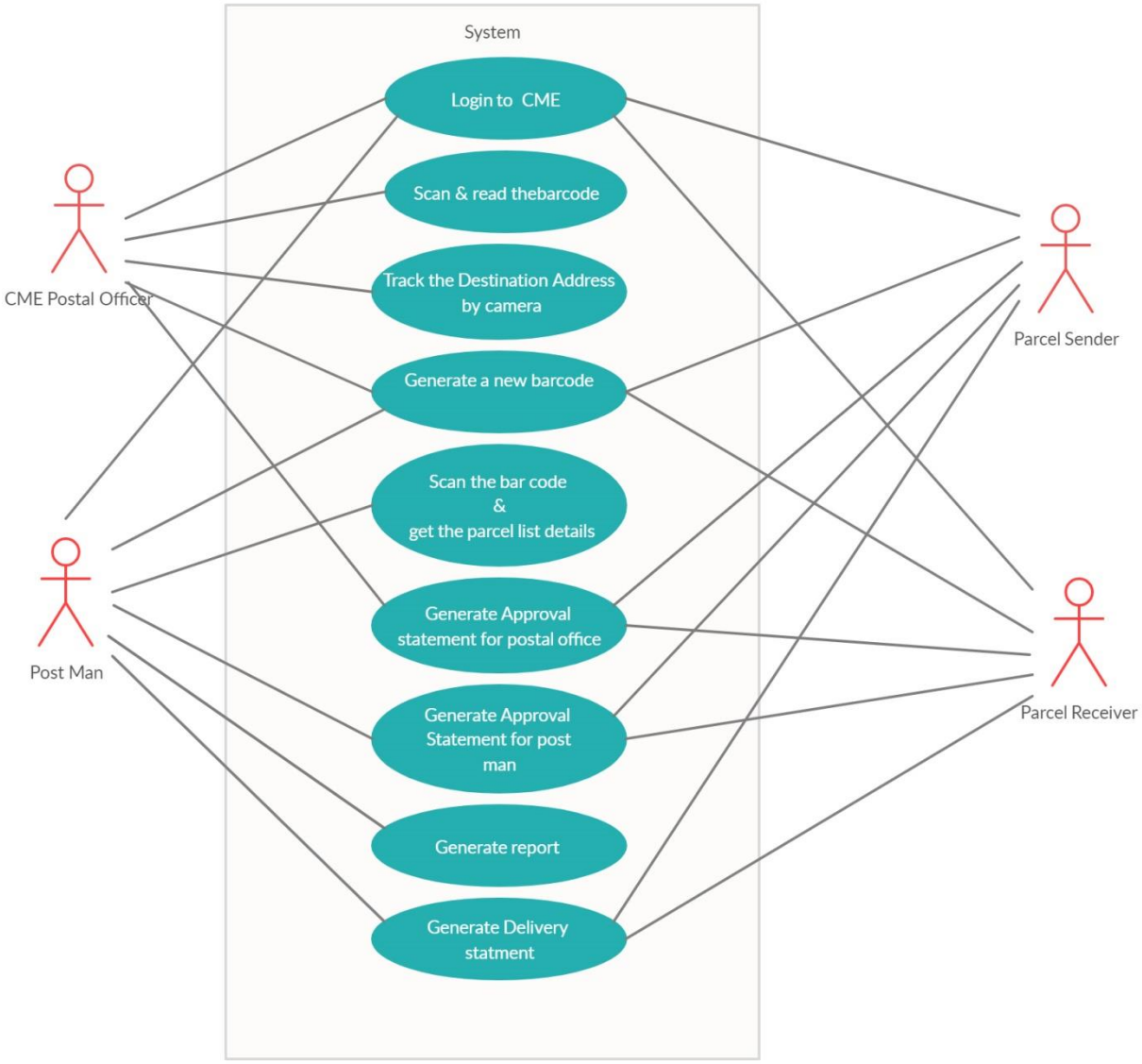



*Figure 1Use Case Diagram*

## 4.6 Sequence Diagram

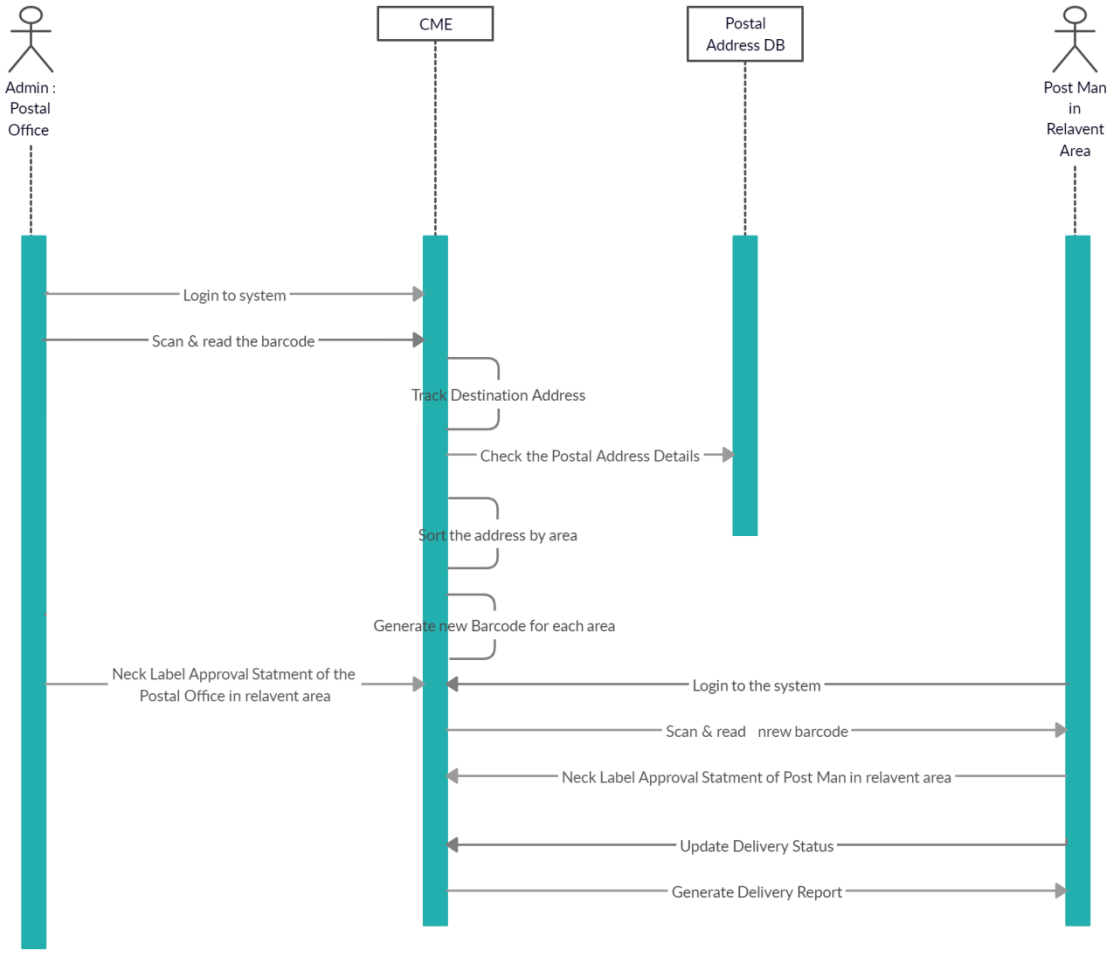



*Figure 2 Sequence Diagram*

## 4.7 Class Diagram

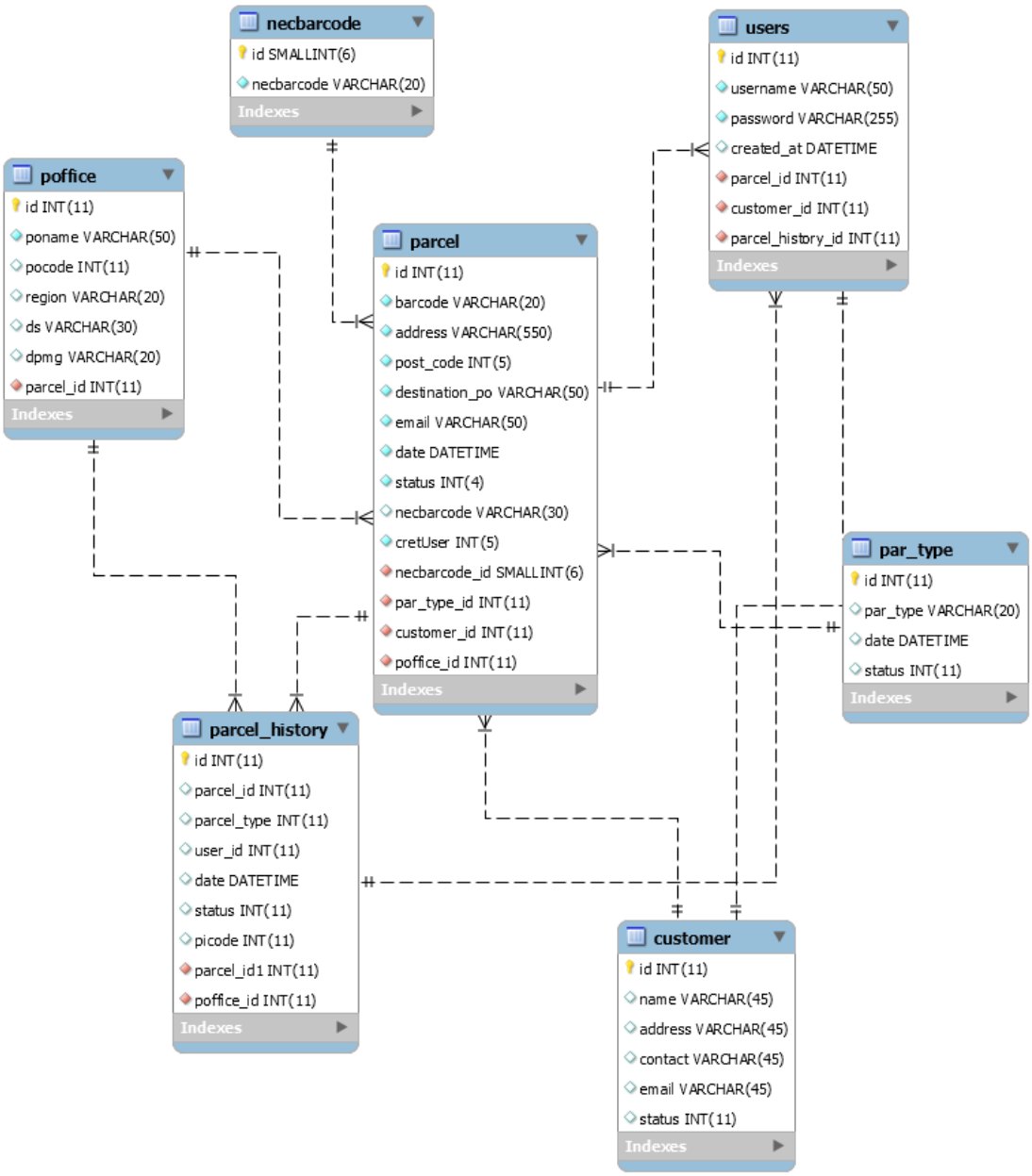



*Figure 3 Class Diagram*

### 4.8 Software Development Life Cycle

#### 4.8.1 Prototype Model

The parcel address recognition and tracking system developed as a prototype. Prototyping considered as a same working model of software alone with some limited facilities. The prototype does not necessary to meet the actual requirement. Application prototyping can be used to evaluate proposals of the developer and test proposals before implementation. User specific requirements considered at the application prototyping and developer may not be taken into consideration during the product design stage.

The propose system prototyping developed for full fill the design and requirement of the address recognition and parcel tracking. Following step approach was used in the prototype development process.

1. Identify the basic requirement for tracking the parcels.
2. Design the system using requirements.
3. Developing the Prototype.
4. Test the developed Prototype.
5. Improve and match the requirement with Prototype.

Analyzing the above different types of prototyping. Identify as most suitable option for this specific requirement would be Incremental Prototyping.

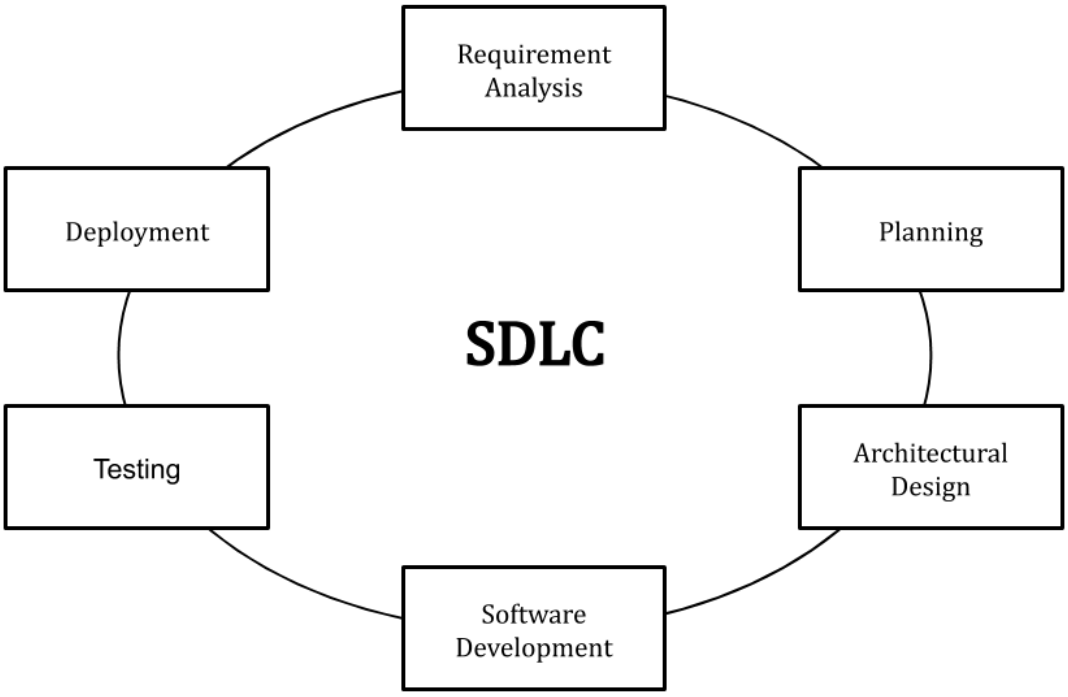



*Figure 4 Software Development Life Cycle*

### 4.9 Chapter Summary

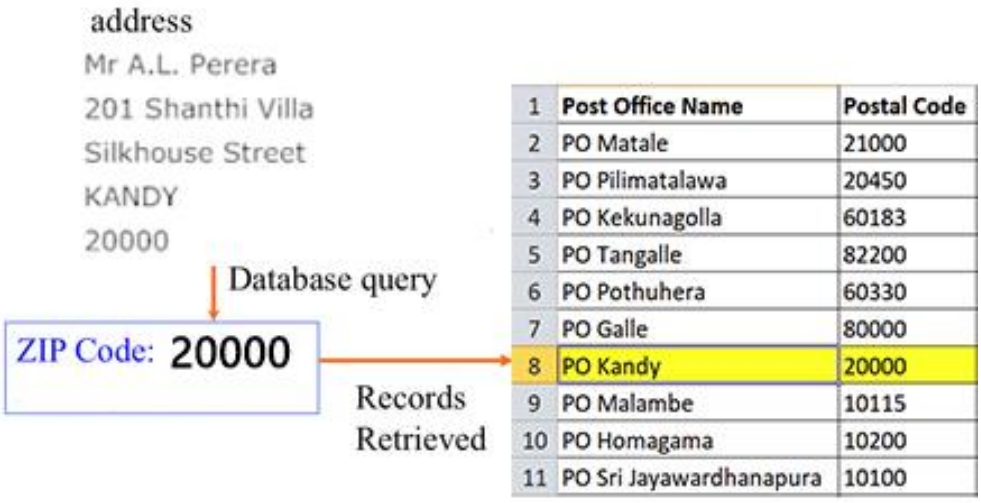
This chapter describes design process of the initiation of the project implementation stage. It descriptively consider software development lifecycle and software prototype model used in the design process. It also describes the functional and non-functional requirements, user characteristic that were identified in documented.

# CHAPTER 05

# Implementation

## 5.1. Introduction

A random sample of postal packages for a pre-decided time period will be collected. Identify the postal address type of sample postal packages. Analyze the addresses and postal code types. Collect all postal code and name of the post office to implement the package sorting function. Tries to use several types of image processing tools for recognized the postal addresses. The proposed system will be introduced as a web-based system for package tracking using image and postal code types. Collect all postal code and name of the post office to implement the package sorting function.




| | Post Office Name | Postal Code |
|---|---|---|
| 2 | PO Matale | 21000 |
| 3 | PO Pilimatalawa | 20450 |
| 4 | PO Kekunagolla | 60183 |
| 5 | PO Tangalle | 82200 |
| 6 | PO Pothuhera | 60330 |
| 7 | PO Galle | 80000 |
| 8 | PO Kandy | 20000 |
| 9 | PO Malambe | 10115 |
| 10 | PO Homagama | 10200 |
| 11 | PO Sri Jayawardhanapura | 10100 |

*Figure 5 Post office match Diagram*

### 5.2. Data pre-processing

In general addresses in packages are noisy. That is while some data use informative some data are on informative and they are not meaningful. Some data cannot be analysed since they contain garbage such as symbols only. In addition, on words level, many words in the text do not have an impact on the general orientation of it. Keeping these words makes the dimensionality of the problem high and hence the classification more difficult since each word in the text is treated as one dimension. Here is the hypothesis of having the data properly pre-processed: to reduce the noise in the text should help improve the performance of the recognition of the address.

Data pre-processing contains white space removal, expanding abbreviation, stop words removal, negation handling and finally feature selection.

### 5.3. Analysing the Problem

Regarding all samples, analyze the addresses of the postal packages and find a way to recognize the address on the package. The discovered problems are then analyzed, and the problem analysis step is a step to understand the identified problem. When analyzing the problems identified, it is expected by analyzing the main problems, address recognition by image processing and get the correct destination post office. These techniques are used to provide an automated solution.

### 5.4. Introduction the Process

The department of the post uses manual processing and tracking system to delivering customer parcels to end recipients. When a number of parcels get increases the manual processing and tracking system resulting in delayed deliveries that lead to reduction of customer satisfaction. All postal parcels and packages directing to Central Mail Exchange ‘CME’ through post offices. The purpose of this research is to propose & implement an

easy and quick process to sort packages/parcels based on addresses and introduce an effective tracking system. This system proposes only for the delivery of foreign parcels.

### 5.5. Process of the Central Mail Exchange

The process starts with scan the barcode via a barcode scanner. Then an image of the address on the parcel capture by the camera and match the destination post office of each parcel with the listing of post offices already included in the System database. Once the parcel receives the 'CME', postal officer targets the camera to the address on the parcel and captures only the address. Then the system automatically scans the image and using image processing techniques the address of the parcel recognize by the system.

JavaScript language used to image processing by considering factors such as common and powerfulness. JavaScript is a scripting language and freely available, also it is lightweight language. In image processing, there are a lot of libraries available, in this research & implementation we used 'Tracecat' library for image processing. The reason is to use the library is it is common and freely available. Tracecat library passes the string to the java variable and then address is recognizing via PHP methods. Explode function is used to separate the string to word and get all single words to add the array element. Then that string easy to match the post office table and show the result when array elements and database values are matched. Results should be added to the frontend of the system. Therefore the post officer can save & assign that parcel to the sorted destination post office when the address identifies correctly. If the address is not identified correctly, the post officer can add the corrected destination post office manually and assign the parcel to the correct office. Finally, the post officer can successfully complete the task.

Addresses matched with the database through postal code or cities of the addresses. If all customers documented postal code on the parcel, the destination post office will be easily identified. Once the image capture via camera, the whole text of the address on the parcel identifies using the image processing system. This system provides the facility of

gathering all addresses to the single string. Based on the information provided by the system parcels and packages are physically allocating to separate bags based on the destination post office and end of the day postal supporter shall attach barcode tag to each bag before delivery of those to the destination post offices. After all the above-explained processes, the barcode tag should be scanned by the barcode reader and the barcode tag attached to each bag should be assigned to the system. Then the officer can crosscheck parcels in the bag with view barcode tag information in the system. After postal officer sends parcel bags to destination post offices through their transportation methods. Ex. Van or Bus. Then the process of 'CME' is over.

Once the bag received by the relevant destination post office, officer log in to the system and read the barcode tag attached in the parcel bag using the barcode reader, the system recognized automatically and show report of all the packages and parcels included in the bag. Then the officer of the destination post office shall check all the received parcels with the details of parcels in the system and the officer can confirm that all the parcels received to the destination post office via the given button of each row in the report. If there is any package which is not relevant for that particular post office, the postal officer can reject the postal package on the system with a given button.

### 5.6. Testing

Software testing is a process, to evaluate the functionality of a software application with an intent to find whether the developed software met the specified requirements or not and to identify the defects to ensure that the product is defect-free in order to produce the quality product. Regarding this research try to provide the best prototype version. So on we have to test the application with real word example and find the errors and bugs regarding the problems occurred.

# CHAPTER 06

# User Interface

## 6. Introduction

This chapter present the user interface, system generated reports, dashboards of the propose system.

### Login Page

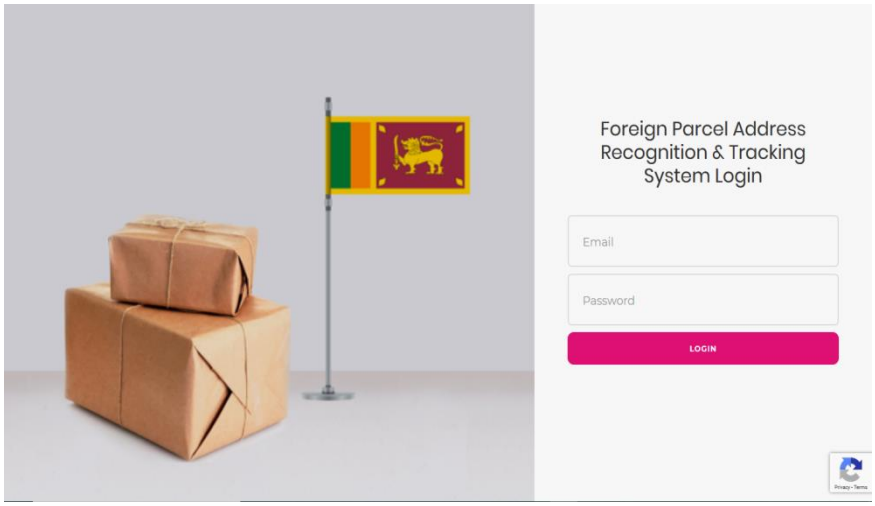



*Figure 6 User Interface – Login Page*

### Add Parcel

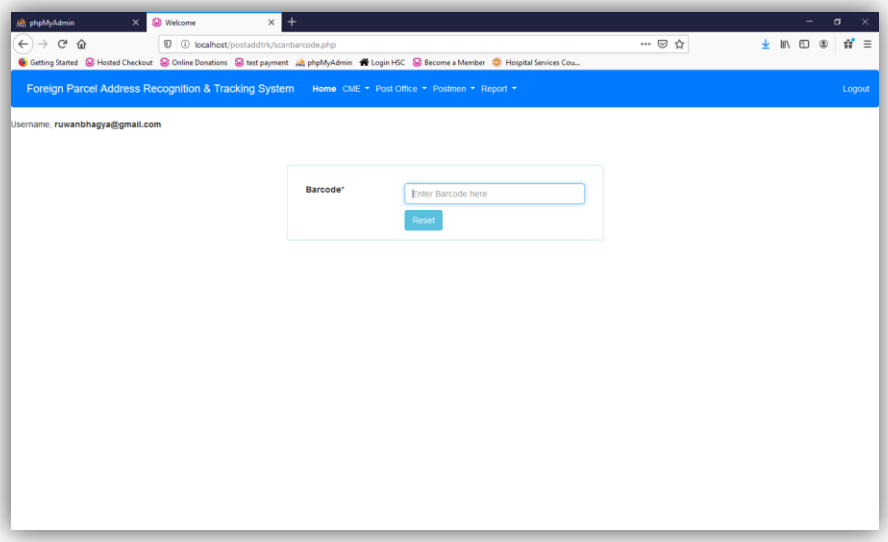



*Figure 7* User Interface – Add Parcel

## Assign Package

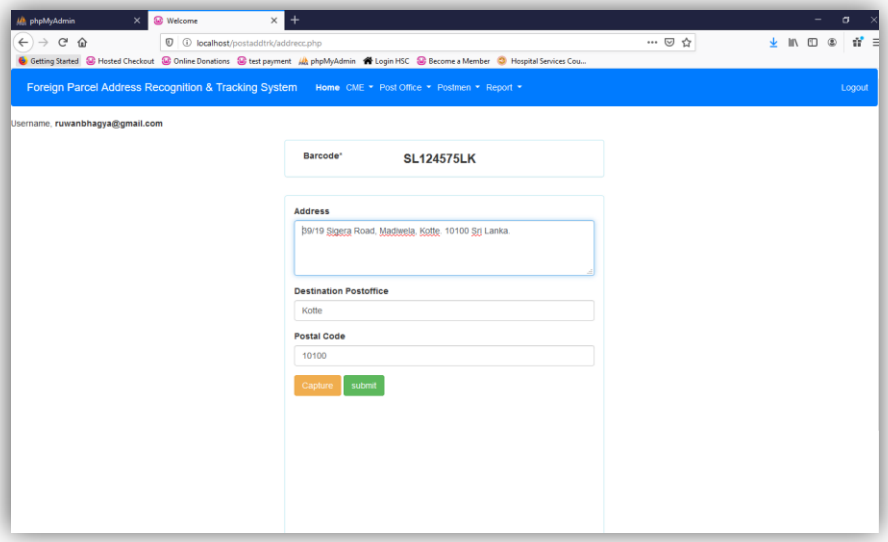



*Figure 8 User Interface – Assign Package*

## Accept & Reject Parcels

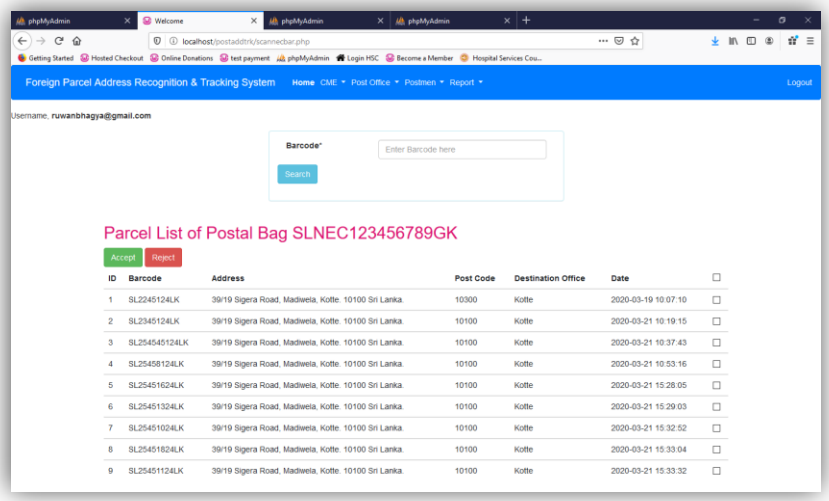



*Figure 9 User Interface – Accept & Reject Parcels*

## Assign Packages to Post Office

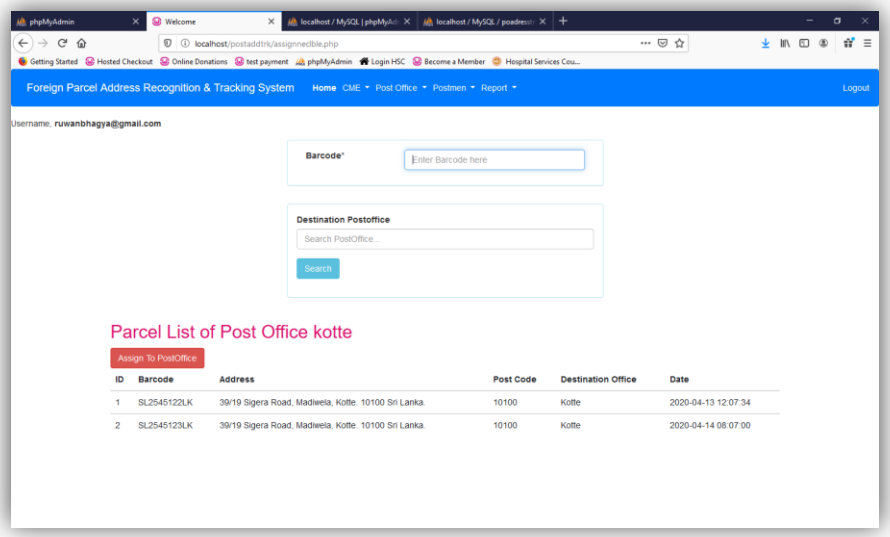



*Figure 10 User Interface – Assign Packages to Post Office*

## Parcel Accept Form of Postman

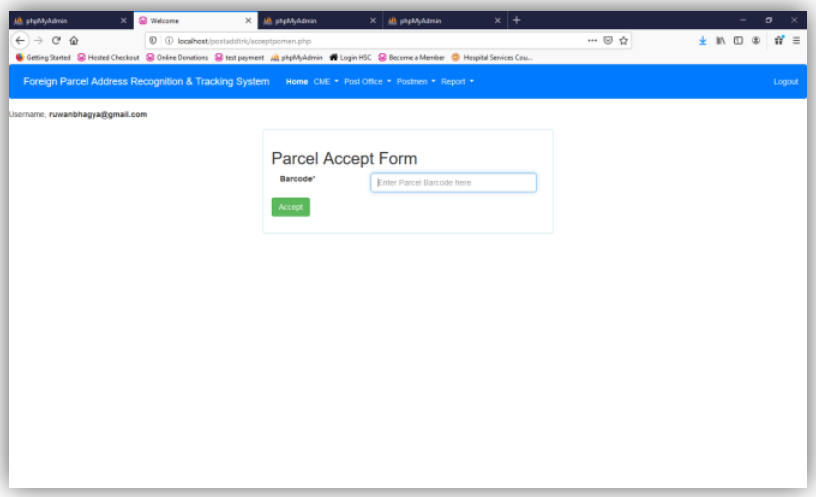



*Figure 11 User Interface – Parcel Accept Form of Postman*

## Postman Parcel Accept Report

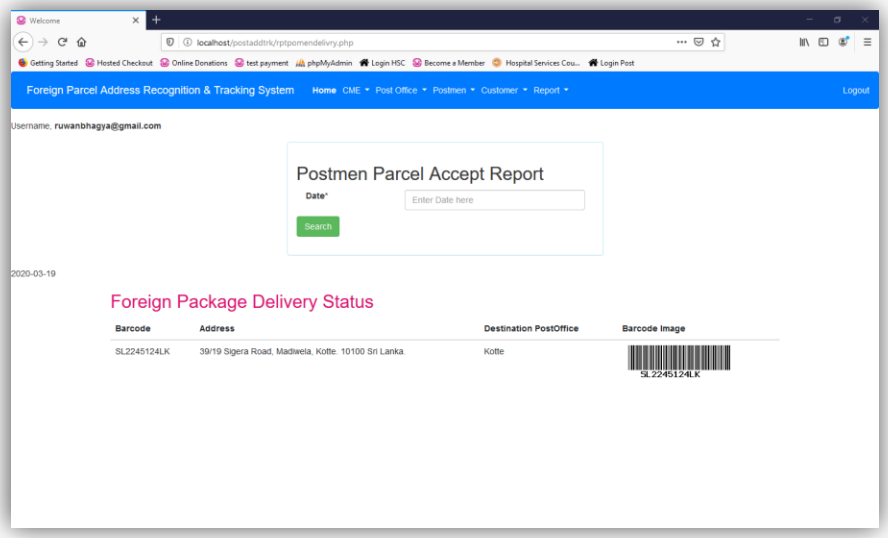



*Figure 12 User Interface – Postman Parcel Accept Report*

## Parcel Reject Form of Postman

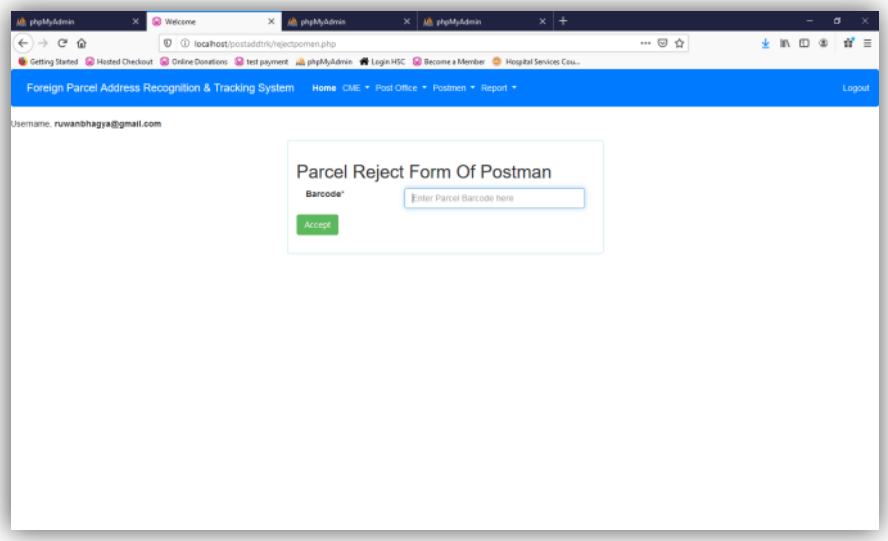



*Figure 13 User Interface – Parcel Reject Form of Postman*

## Postman Parcel Delivery Update

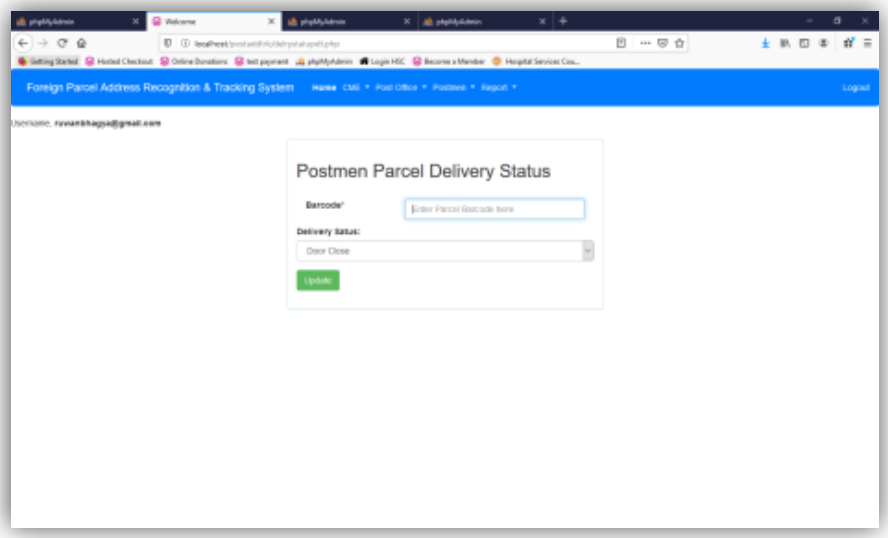



*Figure 14 User Interface – Postman Parcel Parcel Delivery Update*

## Dashboard

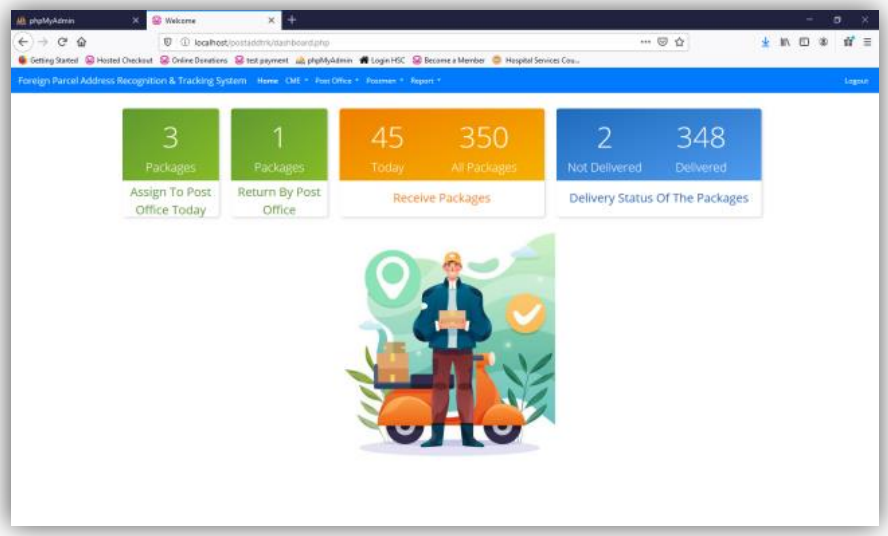



*Figure 15 User Interface - Dashboard*

## Customer Search

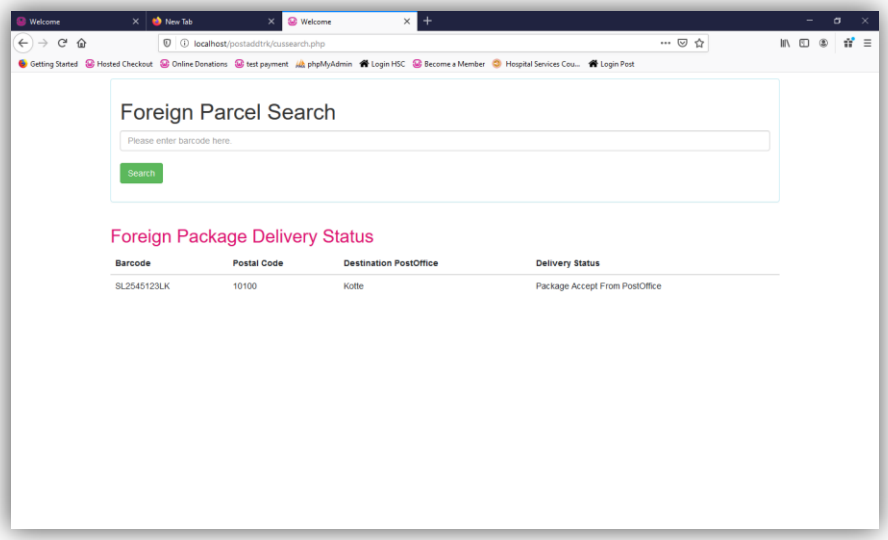



*Figure 16 User Interface – Customer Search*

# CHAPTER 07

# Conclusion and Future Works

## 7.1 Introduction

This research successfully implements the outcome of the tracking system with address recognition. The project was initiated as a solution for delay deliveries of foreign packages in the Central Mail Exchange of department of post Sri Lanka. Furthermore it provides a practical solution to establish the tracking system effectively to the end users of the system. The research successfully attempted to clear the hassle of the foreign parcel delivery at domestic level in Sri Lanka. As a country, if we continue to use systems such as tracking systems implemented by this project will help to booming the package delivery and e commerce industry. A benefit of the proposed system reaches to all citizens in the country and to the people who send the parcel in to the country. This improves the efficiency and cost effectiveness of parcel delivery.

This research expresses only the prototype of the proposed system, also noted that the proposed address recognition and tracking system facilitate only for foreign parcels in the project.

This research can be expressing as proof of concepts and show the way of how to achieve the end goal. Further it shows implementation of this tracking system would be advantage for the three parties, Staff of department of post and persons who ship packages to Sri Lanka, and who buy those parcel in Sri Lanka. As a country the proposed system helps to collect fee for delivered packages from foreign postal services without any hesitation.

## 7.2 Future Work

The proposed system can be develop and improve by many ways. The proposed System developed as a prototype. Assumed, if the system is using in a real world, application system should be changed to identify the address automatically. The proposed system identified addresses only when images uploaded manually to the system. To recognize addresses of the packages to the system automatically, high end cameras should be connected to the system. The proposed system can be improved further by introducing address recognition process based on broader range of parcel sizes. Most of the parcels are not in same size. At present postal officers are capturing the image manually and upload it to the system, if the same process continues it is really hard to clear bulk of the packages in a daily basis. There is a necessity to develop a device to identify the package size and place of the address on the parcels are an added advantage to improve the efficiency of sorting address of packages. Addresses sorting device can be used as sorting machine to sort the packages to the destination, which will be the biggest improvement to the department of post.

Further the proposed system does not support many user levels in this research such as postmen, postal officers, and post masters. The system must be developed to support many users for reliable of achieving end goals. Most parcels and letters are delivering at the domestic level using the Sinhala and Tamil Language. If the proposed system implemented to the Central Mail Exchange, address recognition system should support to the Sinhala and Tamil Characters and hand writing. Handwriting recognition in Sinhala and Tamil languages would be a huge development, requiring best algorithms to identify the characters and letters pattern. Map should be developed to identify relevant post office among all addresses. At present all address cannot match with available post office list due to list of post offices not categorized properly. Therefore the mentioned issue must be soughed effective way. Then it will be the main development of the system if it is going to real world.

## 7.3 Limitations

Main limitation of the proposed system is user should upload only address of the image, if the sender of the parcel inserts incorrect information which is not related to address of the end recipient, the output will not be effective. Hence postal officer should check manually whether the address stated in the parcel is acceptable. Image should not be contained any text other than the address in the space provided on the parcel. The prototype accepts only the addresses. Furthermore the prototype is not support to hand writing characters in Sinhala and Tamil language. Another limitation of proposed system is at different user privilege levels the system is not support to recognize the image and to track the parcel. Also proposed system is not supports to all the addresses leads to another limitation. Because at present all the addresses not match with the current list of post office locations due to list of post offices not categorized properly in a user friendly manner. Map should be developed to identify relevant post office among all addresses.

## 7.4 Summary

This chapter summarizes the thesis by Address Recognition future improvements of the project and implement and fulfill the real requirements. Furthermore propose system limitation discuss about the above chapter in detail.

## References

[1] Automatic sorting of handwritten Singapore postal addresses [online] Available at: https://ieeexplore.ieee.org/document/791892
[2] A system for Indian postal automation [online] Available at: https://ieeexplore.ieee.org/document/1575706

# Appendix A

```
<? php

$target_dir = "uploads/";
$target_file = $target_dir . basename($_FILES["fileToUpload"]["name"]);
$uploadOk = 1;
$imageFileType = strtolower(pathinfo($target_file,PATHINFO_EXTENSION));

// Check if image file is a actual image or fake image

if(isset($_POST["submit"]))
{
  $check = getimagesize($_FILES["fileToUpload"]["tmp_name"]);
  if($check !== false) {
    //echo "File is an image - " . $check["mime"] . ".";
    $uploadOk = 1;
  } else {
    echo "File is not an image.";
    $uploadOk = 0;
  }
}

// Check if file already exists
if (file_exists($target_file)) {
  echo "Sorry, file already exists.";
  $uploadOk = 0;
}

// Check file size
if ($_FILES["fileToUpload"]["size"] > 500000) {
  echo "Sorry, your file is too large.";
  $uploadOk = 0;
}

// Allow certain file formats
if($imageFileType != "jpg" && $imageFileType != "png" && $imageFileType
!= "jpeg"
&& $imageFileType != "gif" ) {
  echo "Sorry, only JPG, JPEG, PNG & GIF files are allowed.";
  $uploadOk = 0;
}

// Check if $uploadOk is set to 0 by an error
if ($uploadOk == 0) {
  echo "Sorry, your file was not uploaded.";
// if everything is ok, try to upload file
```

```
} else {
  if (move_uploaded_file($_FILES["fileToUpload"]["tmp_name"], $target_file)) {
    //echo "The file ". basename( $_FILES["fileToUpload"]["name"]). " has been
uploaded.";
    echo '</br>';
    $imname =basename( $_FILES["fileToUpload"]["name"]);
    //echo $imname;

    echo '</br>';
     echo '<img id="userImage" width="350px" height="650px"
src="uploads/'.$imname.'"/>';

  } else
  {
    echo "Sorry, there was an error uploading your file.";
  }
}
?>

<script
src='https://cdn.rawgit.com/naptha/tesseract.js/1.0.10/dist/tesseract.js'></script>

<script>
      var myImage= document.getElementById('userImage');
      Tesseract.recognize(myImage).then(function(result)
      {
       console.log(result.text);
       var imgtxt = result.text;
       alert(imgtxt);

       });
</script>

<script type="text/javascript">
    var foo = <?php echo json_encode($imgtxt); ?>
    document.writeln(foo);
    alert(foo);
</script>
```

# Appendix B

```
<?php
// Initialize the session
session_start();

// Check if the user is logged in, if not then redirect him to login page
if(!isset($_SESSION["loggedin"]) || $_SESSION["loggedin"] !== true){
   header("location: login.php");
   exit;
}

require_once "config.php";
?>

<!DOCTYPE html>
<html lang="en">
   <body>
      <?php echo file_get_contents("html/header.php"); ?>
      <h5>Username, <b><?php echo
htmlspecialchars($_SESSION["username"]); ?></b></h5>
         <!--This is page 1, the home page.-->
         <link
href="//maxcdn.bootstrapcdn.com/bootstrap/3.3.0/css/bootstrap.min.css"
rel="stylesheet" id="bootstrap-css">
         <script
src="//maxcdn.bootstrapcdn.com/bootstrap/3.3.0/js/bootstrap.min.js"></script>
         <script src="//code.jquery.com/jquery-1.11.1.min.js"></script>

      <div class="container">
         <form method="post" action="" >
            <div id="signupbox" style=" margin-top:10px" class="mainbox col-md-
6 col-md-offset-3 col-sm-8 col-sm-offset-2">
               <div class="panel panel-info">
                  <div class="panel-body" >
                     <div id="div_id_name" class="form-group required">
                        <label for="id_name" class="control-label col-md-4
requiredField">Barcode<span class="asteriskField">*</span> </label>
                           <div class="controls col-md-8 ">
                              <b><span style="font-size:20px;"><?php echo
$_POST["barcode"]; ?></span></b>
                           </div>
                     </div>
                  </div>
               </div>
            </div>
```

```
            <div id="signupbox" style=" margin-top:10px" class="mainbox col-md-
6 col-md-offset-3 col-sm-8 col-sm-offset-2">
                <div class="panel panel-info">
                    <div class="panel-body" >
                        <div class="form-group">
                            <label
for="exampleFormControlTextarea1">Address</label>
                            <textarea class="form-control" id="" name="address"
rows="3" autofocus >39/19 Sigera Road, Madiwela, Kotte. 10100 Sri
Lanka.</textarea>
                        </div>
                        <div class="form-group">
                            <label for="exampleFormControlInput1">Destination
Postoffice</label>
                            <input type="text" class="form-control" id="" name="dstpo"
placeholder="postoffice" value="Kotte">
                        </div>
                        <div class="form-group">
                            <label for="exampleFormControlInput1">Postal
Code</label>
                            <input type="text" class="form-control" id="" name="postco"
placeholder="postoffice" value="10100">
                        </div>
                        <div class="form-group">
                            <div>
                                <input type="submit" id="start" class="btn btn-warning"
onclick="start()" value="Capture"></input>
                                  <input type="submit" value="submit" name="submit"
class="btn btn-success">
                            </div>
                            <video id="video" width="480" height="360" class="center"
autoplay=true style="display: none;"></video>
                            <canvas id="myCanvas" width="480" height="360"
class="center">
                                Your browser does not support the HTML5 canvas tag.
                            </canvas><br/>
                        </div>
                    </div>
                </div>
            </div>
        </form>
    </div>
  </body>
</html>

<?php
```

```
//if($_SERVER["REQUEST_METHOD"] === "POST")
if(isset($_POST["submit"]))
  {
     $param_userid = $_SESSION["id"];
     echo "Ruwan";
     $bar_code = "SL2545124LK";
     //$bar_code = $_POST["barcode"];
     $add_ress = $_POST["address"];
     $dst_po = $_POST["dstpo"];
     $em_ail = "ruwanbhagya@gmail.com";
     $po_code = $_POST["postco"];


     //prepare and bind SP's parameters with your variables only once
     $stmt=$link->prepare("CALL sp_parcel_insert(?,?,?,?,?,?)");
     $stmt->bind_param('ssissi', $bar_code, $add_ress, $po_code, $dst_po,
$em_ail, $param_userid);
     $stmt->execute();

     //Close statement
     mysqli_stmt_close($stmt);

  }
    // Close connection
    mysqli_close($link);
?>
```

# Appendix C

```
<?php
// Initialize the session
session_start();

// Check if the user is logged in, if not then redirect him to login page
if(!isset($_SESSION["loggedin"]) || $_SESSION["loggedin"] !== true){
   header("location: login.php");
   exit;
}

require_once "config.php";
?>

<!DOCTYPE html>
<html lang="en">
   <body>
      <?php echo file_get_contents("html/header.php"); ?>
      <h5>Username, <b><?php echo
htmlspecialchars($_SESSION["username"]); ?></b></h5>
         <!--This is page 1, the home page.-->
         <link
href="//maxcdn.bootstrapcdn.com/bootstrap/3.3.0/css/bootstrap.min.css"
rel="stylesheet" id="bootstrap-css">
         <script
src="//maxcdn.bootstrapcdn.com/bootstrap/3.3.0/js/bootstrap.min.js"></script>
         <script src="//code.jquery.com/jquery-1.11.1.min.js"></script>
         <!-- <script src="https://code.jquery.com/jquery-1.12.4.min.js"></script> -
->
         <script src="http://localhost/postaddtrk/jquery-1.12.4.min.js"></script>
         <!--<script type="text/javascript">
           $(document).ready(function(){
              $('.search-box input[type="text"]').on("keyup input", function(){
                 /* Get input value on change */
                 var inputVal = $(this).val();
                 var resultDropdown = $(this).siblings(".result");
                 if(inputVal.length){
                    $.get("backend-search.php", {term:
inputVal}).done(function(data){
                       // Display the returned data in browser
                       resultDropdown.html(data);
                    });
                 } else{
                    resultDropdown.empty();
                 }
```

```
            });

            // Set search input value on click of result item
            $(document).on("click", ".result p", function(){
                $(this).parents(".search-
box").find('input[type="text"]').val($(this).text());
                $(this).parent(".result").empty();
            });
        });
    </script>-->
    <!------ Include the above in your HEAD tag ---------->

    <script src="https://code.jquery.com/jquery-1.12.4.js"></script>
    <script src="https://code.jquery.com/ui/1.12.1/jquery-ui.js"></script>
    <script>
      $( function() {
        var availableTags = [
        "ActionScript",
        "AppleScript",
        "Asp",
        "BASIC",
        "C",
        "C++",
        "Clojure",
        "COBOL",
        "ColdFusion",
        "Erlang",
        "Fortran",
        "Groovy",
        "Haskell",
        "Java",
        "JavaScript",
        "Lisp",
        "Perl",
        "PHP",
        "Python",
        "Ruby",
        "Scala",
        "Scheme"
        ];
        $( "#tags" ).autocomplete({
        source: availableTags
        });
      } );
    </script>
```

```
      <div class="container">
         <form method="post" action="" >
            <div id="signupbox" style=" margin-top:10px" class="mainbox col-md-
6 col-md-offset-3 col-sm-8 col-sm-offset-2">
               <div class="panel panel-info">
                  <div class="panel-body" >
                     <div id="div_id_name" class="form-group required">
                        <label for="id_name" class="control-label col-md-4
requiredField">Barcode<span class="asteriskField">*</span> </label>
                           <div class="controls col-md-8 ">
                              <input type="text" class="input-md textinput textInput
form-control" id="nec_bracode" name="nec_barcode" placeholder="Enter
Barcode here" autofocus style="margin-bottom: 10px"   required/>
                           </div>
                     </div>
                  </div>
               </div>
            </div>
            <div id="signupbox" style=" margin-top:10px" class="mainbox col-md-
6 col-md-offset-3 col-sm-8 col-sm-offset-2">
               <div class="panel panel-info">
                  <div class="panel-body" >
                     <div class="form-group">
                        <label for="exampleFormControlInput1">Destination
Postoffice</label>
                           <div class="search-box">
                              <input type="text" autocomplete="off"
placeholder="Search PostOffice..." class="form-control" id="search_po"
name="search_po" required/>
                              <div class="result"></div>
                           </div>
                     </div>
                        <div class="form-group ">
                           <input class="btn btn-info"  name="search_btn"
type="submit" value="Search" />
                           </div>
                  </div>
               </div>
            </div>
         </form>
      </div>
   </body>
</html>

<?php
```

```
//define The Array
$a=array();

//if($_SERVER["REQUEST_METHOD"] === "POST")
//if(isset($_POST["submit"]))
if(isset($_POST['search_btn']))
  {
    $count = 1;
    $sql = "select `id`, `barcode`, `address`, `post_code`,       `destination_po`,
`date` from parcel where destination_po = ? and `status` = 0";

    if($stmt = mysqli_prepare($link, $sql))
    {

        // Bind variables to the prepared statement as parameters
        mysqli_stmt_bind_param($stmt, "s", $post_search);

        $nec_bar_variable = $_POST["nec_barcode"];
        $_SESSION['ses_neclbl_barcode'] = $nec_bar_variable;

        if(empty($_POST["search_po"]))
        {
           //echo "Post Office Search is Empty!!!!.";
        }
        else
        {
           // Set parameters
           $post_search = $_POST["search_po"];
           //$post_search = "Nugegoda";
        }

        // Attempt to execute the prepared statement
        if(mysqli_stmt_execute($stmt))
        {
          //Result bind to the variable
          $stmt->bind_result($district, $ds,$dist, $dse,$drict, $dss);
           echo '<!DOCTYPE html>
           <html>
           <head>
             <meta name="viewport" content="width=device-width, initial-scale=1">
             <link rel="stylesheet"
href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
             <script
src="https://ajax.googleapis.com/ajax/libs/jquery/3.4.1/jquery.min.js"></script>
```

```
          <script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></scri
pt>
        </head>
        <body>

        <div class="container">
          <h2 style="color:#df0e73;">Parcel List of Post Office
'.$post_search.'</h2>
          <div class="table">
          <form action="" method="post">
            <input type="submit" name="assign_btn" class="btn btn-danger"
value="Assign To PostOffice">
            <table class="table">
              <thead>
                <tr>
                <th>ID</th>
                <th>Barcode</th>
                <th>Address</th>
                <th>Post Code</th>
                <th>Destination Office</th>
                <th>Date</th>
                </tr>
              </thead>';
            while($row = $stmt->fetch())
              {
                //array_push($a,"blue","yellow", $dss);
                echo '
                <tbody>
                <tr>
                  <td>'.$count.' </td>
                  <td>'.$ds.' </td>
                  <td>'.$dist.' </td>
                  <td>'.$dse.' </td>
                  <td>'.$drict.' </td>
                  <td>'.$dss.' </td>
                </tr>
                </tbody>';
                //adding Id to the session array
                $_SESSION['ses_parcel_id'][] = $ds;

                $playlists = array("One", "Two", "Three");

                for ($i = 0; $i < count($_SESSION['ses_parcel_id']); $i++) {
                  array_push($playlists, $_SESSION['ses_parcel_id'][$i]);
                }
```

```
                $_SESSION['main'] = $playlists;

                $count++;
            }
        echo '
      </table>
    </form>
    </div>
  </div>
  </body>
  </html>';
      $stmt->close();
        //}
      } else{
        echo "Oops! Something went wrong. Please try again later.";
      }
  }
 }

  //Assign Button Code
  if(isset($_POST['assign_btn']))
  {
        $sql = "update parcel set status = 1 where barcode = 1;";

        //$ses_variable_parcel = $_SESSION['ses_parcel_id'];
        for ($i = 0; $i < count($_SESSION['ses_parcel_id']); $i++)
        {
          $to_db_necbarcode = $_SESSION['ses_neclbl_barcode'];
          $to_db_parcel_id = $_SESSION['ses_parcel_id'][$i];

          $sql = "update parcel set status = 1 , necbarcode = '$to_db_necbarcode'
where barcode = '$to_db_parcel_id';";
          mysqli_query($link, $sql);
        }
          // if(mysqli_query($link, $sql))
          // {
            echo ' <div class="alert alert-success control-label col-md-5"
style="margin-left: 420px;"  role="alert">
                    Record Inserted Successfully !!!.
                  </div>';
            // echo "Record was updated successfully.";
          // } else
          // {
          //     echo "ERROR: Could not able to execute $sql. ".
mysqli_error($link);
```

```
            // }
        //remove the store data in session
        unset($_SESSION['ses_parcel_id']);
        unset($_SESSION['main']);
        unset($_SESSION['ses_neclbl_barcode']);
}
mysqli_close($link);  ?>
```