QR-Code Based Access Control System

Thesis submitted in partial fulfilment

of the requirements of the degree of

Bachelor of Technology

in

IT Data Science

by

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May 2023

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Declaration of Originality

We, ***Khushi Tiwari, Nishit Gundecha, Om Kathe, Tauqeer Shaikh*** URN ***20-B-05082000, 2019-B-04032002, 2019-B-01022001, 2019-B-21012001C***, hereby declare that this dissertation entitled "***QR-Code Based Access Control System"*** presents our original work carried out as a bachelor employee of School of Engineering, Ajeenkya D Y Patil University, Pune, Maharashtra. To the best of our knowledge, this dissertation contains no material previously published or written by another person, nor any material presented by us for the award of any degree or diploma of Ajeenkya D Y Patil University, Pune or any other institution. Any contribution made to this research by others, with whom we have worked at Ajeenkya D Y Patil University, Pune or elsewhere, is explicitly acknowledged in the dissertation. Works of other authors cited in this dissertation have been duly acknowledged under the sections "Reference" or "Bibliography". We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission.

We are fully aware that in case of any non-compliance detected in future, the Academic Council of Ajeenkya D Y Patil University, Pune may withdraw the degree awarded to us on the basis of thepresent dissertation.

Date: 18-04-2023

Place: Lohegaon, Pune

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Acknowledgement

We remain immensely obliged to **Prof. Ravi Khatri**, for providing us with the idea of this topic, and for his invaluable support in garnering resources for us either by way of information or computers also his guidance and supervision which made this Internship/Project happen.

We offer our sincerest gratitude to the Dean **Dr. Biswajeet Champaty** for his invaluable insights and suggestions.

We would like to say that it has indeed been a fulfilling experience for working out this Internship/Project.

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Abstract

In this era of technology smartphones play a significant role in our day-to-day life. Nowadays smartphones can solve most of the problem very quickly and easily. It has made life of every person simple and easier with different social app, commercial app, problem solving app, app for education and marketing etc. We purpose a system that will handle a problem of providing access. The proposed system is a web app which is developed in PHP, XAMPP Server and Scanner for scanning the id card. The web app will generate the complete access record of any employee in CSV or XLSX format. The Employee will need to scan the id which has a unique QR code in order to access in. The report discusses how the system verifies employee identity to eliminate false registrations. The system deals with the management and evaluation of access of all employees. The employee will be provided QR code enabled id card for getting access. The admin is responsible for managing the access of employees. The implementation of an efficient and secure access control system is crucial in any organization. The traditional methods of using physical keys or swipe cards are becoming obsolete and unreliable, leaving organizations in need of a more advanced solution. This is where the QR code-based access control system comes into play.

The QR code-based access control system is an innovative technology that enables an organization to grant access to specific areas based on a QR code generated for each individual. The QR code contains information about the individual's identity and the level of access they are entitled to. Access to specific areas can be granted or denied based on the QR code scan. The implementation of the QR code-based access control system is a straightforward process that requires minimal infrastructure and maintenance. The system requires the installation of QR code scanning devices at the entry points of specific areas. Once the QR code has been scanned, the system will automatically grant or deny access based on the information stored in the code.

Keywords: QR, access system, PHP, XAMPP Server, Scanner

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CHAPTER 1

INTRODUCTION

Over the last few decades, we have witnessed a profound digitalization of society helped by the emergence of the Internet of Things (IoT). The range of applications ranges from residential, commercial, and industrial categories spread over houses, buildings, and facilities that need to be managed efficiently, and effectively.

So, there is a need to digitalize access control system as it will automate the process without much human interventions. Our Access Control System will be developed using punch cards, log books, fingerprint systems, barcodes, QR codes and also RFID. The purpose of the QR Code based access system is to computerize the traditional way of recording access and provide an easiest and smart way to track access in Institutions. The implementation of an efficient and secure access control system is crucial in any organization. The traditional methods of using physical keys or swipe cards are becoming obsolete and unreliable, leaving organizations in need of a more advanced solution. This is where the QR code-based access control system comes into play.

The QR code-based access control system offers numerous benefits for companies. The system provides real-time monitoring and reporting of the access control activities, which helps to enhance the overall security of the organization. The QR code-based access control system eliminates the need for physical keys or swipe cards, which can be lost or stolen.

In this era of technology smartphones play a significant role in our day-to-day life. Nowadays smartphones can solve most of the problem very quickly and easily. It has made life of every person simple and easier with different social app, commercialapp, problem solving app, app for education and marketing etc. We purpose a systemthat will handle a problem of providing access. The proposed system is a web appwhich is developed in PHP, XAMPP Server and Scanner for scanning the id card.

The web app will generate the complete access record of any employee in CSV or XLSX format. The Employee will need to scan the id which has a unique QR code in order to access in. The report discusses how the system verifies employee identity to eliminate false registrations. The system deals with the management and the system also eliminates the need for manual attendance management, reducing the

risk of human error and saving time and resources. In addition, the QR code- based access control system can be integrated with other security systems, such as biometric systems, to provide an additional layer of security. The system can also be used to monitor the movement of individuals within the organization, providing insights into the usage of specific areas and the efficiency of the organization.
The QR code-based access control system is a cost-effective solution that provides a high level of security and reliability. The system is scalable and can be easily expanded as the organization grows. The system is also flexible, allowing organizations to change the level of access for individual users at any time.

Advantages of QR Code-Based Access Control Systems:

QR code-based access control systems offer several advantages over traditional access control systems, including:

1. **Security:** QR codes are unique to each user and cannot be easily duplicated, making them more secure than traditional access control methods.
2. **Convenience:** Users do not need to carry physical keys or cards, making the system more convenient to use.
3. **Cost-Effective:** QR Code-based access control systems are more cost-effective than traditional access control systems as they do not require the use of physical keys or smart cards. The only requirement is a smartphone or other mobile device with a QR code scanner.
4. **Easy to Use:** QR code-based access control systems are easy to use as they do not require any physical keys or smart cards. Users can access the facility or a specific area within the facility by simply scanning the QR code using their smartphone or other mobile device.
5. **Increased Security:** QR code-based access control systems are more secure than traditional access control systems as they use advanced encryption techniques. The QR code contains encrypted information about the user's identity and access level, which makes it difficult for unauthorized persons to gain access to the facility or a specific area within the facility.
6. **Flexibility:** QR code-based access control systems are more flexible than traditional access control systems as they can be easily integrated with other security systems, such as CCTV cameras and alarms.

7. **Remote Access:** QR code-based access control systems can be used to provide remote access to authorized personnel. For example, if an employee needs to access a specific area within the facility outside working hours, they can do so by scanning the QR code using their smartphone or other mobile device.

1.1 Problem Statement

In this era of advanced digital technology, there were plenty of ways to record down a persons' access in an event or which the person has being attended in a place. Access is a very important element for defining whether a person had been attended on some occasion. In the traditional ways that usually used to record down access with calling out names in a small organization which capacity 10 to 20 employees or a small event. However, [1]it might not be suitable for using traditional way to monitoremployee's access because there might be hundreds of employees in one branch andit will be very difficult to track down the access accurately.

This will be a potential problem for this type of access taking method which is this type of method will be time consuming due to the admin need to call out 10 to 30 employees one by one when the organization started, and this will be costing 5 to 10 minutes including making sure every employee name had been call out without omission.

Other than that, nowadays many universities and college are using signing signature on a piece of access paper as evidence that an employee had attended the organization or practical lab. This will be wasting much more manpower and time consuming for a larger organization with larger number of employees and wasting much more resources on using paper for signing their signature. Besides that, employees are much smarter and trickier, they could help their friends who absent to the organization by imitate their signature.

This will derivative a serious issue if the employee who cheated on the access but unfortunately claims an accident outside of the campus. The admin who in-charge of the organization will be taking full responsibility for this issue. Other than that, every admin will be handing more than one organization for certain subjects and certain subjects will be having more than one organization of employees attending.

If we assumed that every admin having three lecture organization and one tutorial organization per day, every organization needed at least three papers for lecture organization and one paper for tutorial organization. There are countless of admins teaching countless of organization per day. Thus, this will be a serious waste of paper, manpower, time consuming and incompatible with environmental awareness.

The motivation of this project is to create an employee access system application based on QR code with unique identification capturing to solve the current issues that faced by tradition access tracking method. With using this system in campus, employee will just need to download the application and scan the QR code that generated by the organization admin during the organization. With this technology, employees will be hard to cheat on the access which this type of access system will be using unique identification capturing to make sure that there will be an accurate access that generated for admin.

1.2 Background and motivation

In the last several decades, along with the development of information technology, there were many great improvements in our environmental such as, Smart cities, Artificial Intelligence, Smart Autonomous Car etc. As everything being improved and enhanced, we should enhance in using a modern way access tracking system
In old days, organization admin will be calling our names to record down our access in black and white using this type of traditional way for example, signing their signature on the access paper for their access. However, employees are very smart and tricky, they could have several ways to sign their access even they are absent to organization and practical organization.
For some small amount of organization such as practical lab organization or tutorial organization, admin could take the employees by traditional ways but if for a hundred employees of organization, it will be an activity that wasting time, manpower and resources.
Now, in the era of Internet of things, there are much more devices could be using as a modern way of taking employee access. The objective of taking employees access was to make sure they could learn knowledge and experience from university and college but not spending money for vacations inside the university or college, which means that the data accuracy of employee's access must be strict and accurate. In order to distinguish every employee with their unique characteristic, there are much more methods such as QR code, fingerprint recognition, face recognition, Iris recognition, RFID system, and Barcode system.
QR code system is a combination of two android applications developed for taking and storing the access. Biometric systems such as fingerprint, Iris recognition and face recognition is a type of system that capturing employees' unique identification such as fingerprint, Iris and facial features for tracking down employees' access. Other than that, RFID system is a shortening words of Radio Frequency Identification system.

It is an ID framework that utilizing remote correspondence that permit moving information between labels that are held by individuals or appended to objects. Standardized tag framework is an organization of equipment and programming, essentially by portable PCs, printers, handheld scanners, foundation, and supporting programming. Be that as it may, these two sorts of following innovation are unique. Standardized identifications are intended to be checked each in turn while numerous RFID labels can be filtered by numerous individuals without a moment's delay. Standardized identifications additionally necessitate that the scanner keep a view with each code which is very close in a distance.

While RFID is a close to handle innovation, [2]so the scanner will be just required in an inside range so the mark might be perused by it. In these modern access tracing systems having their own advantages and disadvantages in terms of visibility, ease of use, productivity, affordability and data accuracy.

Our main aim was to provide customize solution for keeping track on people. As we started and got idea from HPCL, so basically their requirement was that they needed a system so that they can check easily how many people are there in each of the zone. Like from entrance gate to license gate. They wanted something automated so that is anything hazardous happened in the plant they can keep track on each and every person in the plant and get them out of that emergency zone. So that no one should get harmed in such situations.

Because it’s a large area it’s very difficult to keep track on people in such situations, as everyone is in hurry and a single person cannot look is everyone safe or not, if everyone is out of the emergency zone to safe place or not. So many problems may arise so in such situations this system will help them to access the presence of each person in different zones easily.

So, accordingly we started working on the idea and very basic step was to understand how their system is working so that we can provided customized solution for them. So, we visited the plant we saw how the zones are and get an idea what could be done. So, we did some more research on what all things are already present in the market.

Many options are already there but the thing is they are not customized so we thought if we will provide the customized solution, we will achieve our goal. So, we thought if software part, and then we decided that we will use API and design the customized system to them.

So, we thought of all possible systems and then finally decided to move forward with QR CODE BASED ACCESS CONTROL SYSTEM. What we did is we designed a system which will tell the admin that how many people are the on each and every zone.

Suppose if 10 people entered into first gate and out of them 5 people move inside from 2nd gate so total count inside first zone will be 5 and in 2nd zone will be 5.

But initially,

Total number of people in 1st zone = 10

Once 5 people moved to 2nd zone,

Total number of people in 1st zone = 5

Total number of people in 2st zone = 5

So, we made and automated system, for this in initial phase we only provided with in build QR CODE in ID cards, but as technology is increasing, we start working upon finger print, face recognition as well.

Considering the wide popularity of smartphones, we will be introducing the use of smartphone for the smart access taking. Smartphones had become a necessity for millions of people including employees. Practically every employee will be owning one or more smartphones. Employees will be using their smartphones and installing an application for signing their access for organization. This will be implemented in a web services and web application with a location based and unique identification tracking system. [10] This access tracking system will be requiring internet connectivity such as Wi-Fi or 4G for connecting to database residing in the remote server.

In our project does not require any kind of hardware device other than smartphone which this will highly reducing the implementation time, cost of placing extra devices, and also highly increasing in accuracy of tracking the access data, productivity and affordability of implementing this project to the entire organization. In order to counter the issues of easily prone to manipulation by the employees, in our proposed system having a unique identification tracking system that able to track the location of the employee or track any unique identification from the devices that could be match from the database and if the employee location or unique ID does not fulfil the campus location and data, [19] it will not be counted as presence in the organization.

Besides that, in our system will be obtaining the unique ID from the users' phone, so that they can't cheat the access by logging out and sign-in to other users' email. In this proposed system, we will be designing for two types of login method interfaces.
One of the login method interfaces is for administrator to sign in with their email and password in web application. For administrator features in the web application will be enabling administrator to generate a certain event or subject organization's QR code. Other than generating the QR code features, administrator could summarize and generating the access list of employees that scan the QR code using the web application. For the convenience of administrator, administrator could generate the QR code earlier, save it and post it to WBLE for employees to scan the QR code.
For employees' web application function, employees will need to sign in with their email and register their name, employee ID, phone number, Department. Besides that, the features for employees' web application are they could use this web application to scan the QR code that generated by the administrator for signing theiraccess in the organization or event.
It will also be containing a feature that allow employees to view on their subjects' access percentages and for administrator will be allowed to view the number of the employees that attended their organization or events. Therefore, in this proposed system, we will be using PHP programming language and XAMPP Server software to develop the web applications.

1.3 Main objective

"QR Code Based Access Control System" is a web app which is developed in PHP, XAMPP Server and Scanner for scanning the id card. The web app will generate the complete access record of any employee in CSV or XLSX format. The Employee will need to scan the id which has a unique QR code in order to access in. The system deals with the management and evaluation of access of all employees. The employee will be provided QR code enabled id card for getting access. The admin is responsible for managing the access of employees.

An accurate report based on the employee access is generated here. Report of the employee's access on weekly and monthly basis is generated as desired. The main objective of the automated access system is to computerize the traditional way of recording access and provide an efficient and automated method to track access in institution

1.4 Feasibility

- Economic feasibility: The developed system is time effective because access is marked automatically. It is also cost effective because of no use of paperwork.
- Technical feasibility: The system is economic and it does not use any other additional Hardware and Software.
- Behavioral feasibility: The system is user friendly.

1.5 Characteristic of proposed system

- User Friendly
- Reports are easily generated
- Very less paper work
- One spot solution for access calculations

CHAPTER 2

METHODOLOGY

2.1 Biometric-based Access Management System

2.1.1 Fingerprint-Based Access Management System

Fingerprint Access Tracking System Fingerprint that anyone will be having on their finger is just one of the most mature and famous technologies that used for individual identification. Biometric technologies verify identity and characteristics in the following methods for example like fingerprints, faces, Irises, etc. The motivation behind why is that finger impression confirmation is mainstream is on the grounds that fingerprints are special as an individual ID, [18] it was significantly steadier, enduringand effectively taking. Unique finger impression Based participation the board framework adjusts finger impression verification into interaction of participation theexecutives for understudies.

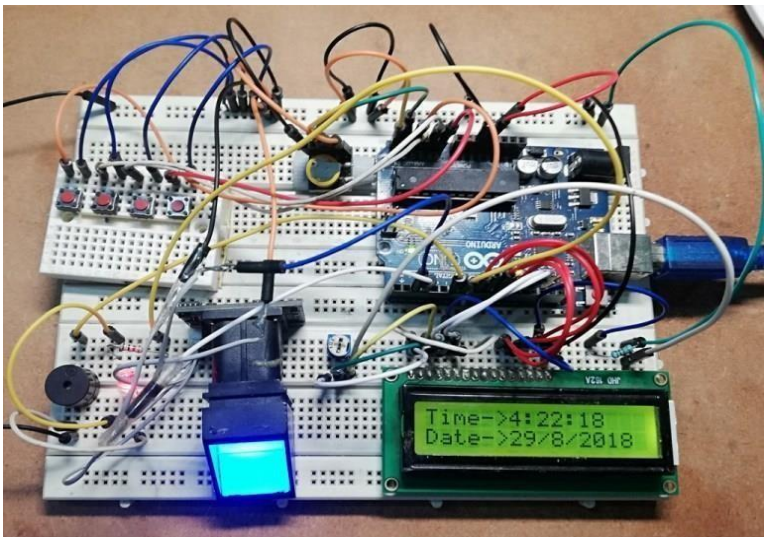

Figure 2.1: Fingerprint Module

It is made up by two techniques which is enrolment and approval. [21] Enrolment is to acknowledge a user using their ID and capturing their biometrics fingerprint of the user and stored into the database after the feature extraction. In feature extraction, it will be called the minutiae point of the fingerprint. It can filter out the attributes in the print, such as orientation, changes in the direction of ridges, arches, circles, and threads.

These capacities structure a format that is utilized to decide the character of the client and plan the confirmation cycle. During authentication, the user's biometrics will be captured again, and the extracted features will be compared with the existing biometric data recorded in the database to determine matches.

Once the matched is successful, Access will be recorded against the users' id used in matching templates. [20] This work uses a fingerprint reader as input to obtain characteristics and develops a program with a fingerprint recognition and identification system including a database that stores user information. The database will include the user's fingerprint template and other biometric data as well as the user's Access record.

2.1.2 Iris and Face based recognition

Iris recognition-based Access System Iris acknowledgment or iris examining is the way toward utilizing noticeable and close infrared light to take a high-contrast photo of a human's iris. It was a kind of biometric innovation which having similar attributes, for example, [5,14] face acknowledgment, and fingerprinting. It generally gaugesthe remarkable examples in irises, the shaded circles in an individual's eyes. The scanner typically works by illuminate the iris to get the special sample that are not noticeable to the unaided eye.

It will be prohibiting and identifying all that commonly block separated of the iris. Iris acknowledgment has been applied for getting to some high-security offices or accomplishing on explicit information in a portion of the data set.

Be that as it may, this innovation is presently being broad in created on data frameworks for instance like organization, internet business, [4] and retail applications.In these innovations, iris acknowledgment is the one that comprise of develop biometric innovation that utilized in programmed individual recognizable proof.

Figure 2.2 Iris Scan

Iris acknowledgment for individual distinguishing proof was proposed in 1936 by ophthalmologist Candid Burch. This kind of innovation was showed up in James Bond film in 1980s', yet it actually remained sci-fi and guess. [17] In 1987, this thought was protected by two ophthalmologist that are Aran Safir and Leonard Flom.

This innovation is being utilized in a few different applications for instance like getting to control for high security establishments, Visa utilization check, or worker recognizable proof. Iris acknowledgment is mainstream on account of its uniqueness for recognizable proof, soundness, permanency and effectively taking.

The programmed participation framework utilizing face acknowledgment proposes that the framework depends on face discovery and acknowledgment calculations for participation which having a gadget that examining Employees' face while they enter the class, and the framework will record the participation by identifying Employees' face. [6,16] It was one of the develop and famous innovation in Biometric-based participation framework.

Computerized Access framework is a methodology that consequently decide if the presence or the shortfall of the understudy in the instructional exercise class or speaker class. This framework can likewise recognize where the understudy is

available or missing during the talk class and it additionally can be applying to test meetings to guarantee the presence of the understudy.

The participation of understudy will be controlled by catching their appearances. There are two basic Human Face Recognition strategies are highlight based methodology and brilliance-based methodology. For the element-based methodology otherwise called nearby face acknowledgment framework. The way toinclude based methodology is that utilized in face like eyes, ears, nose, mouth, edges,and so forth, while the brilliance-based methodology likewise named as the worldwide face acknowledgment framework, utilized in perceiving every one of thepieces of the picture.

2.1.3 Bar Code Scanner Based Employee Access System

Barcode based Employee Access System Barcode recognition is one of the mature technologies and widely used in globally. There are two types of barcodes that were 1-dimensional and 2-dimensional. 1D barcodes are usually used to store text information while 2D are more complex and consist of more information such as text, price, quantity and image. [12] Barcode can be usually seen in market store, convenience store, supermarket and hypermarket. There will be a square or rectangular image consisting of a series of black striped lines and blank areas with different width on the product.

These images could be read by scanner, and it was applied to products for a quick identification by just scanning through it. They are widely used as a part of purchase process in retail, to track inventory in warehouse, and assisting in accounting on invoices.

Mostly for education such as primary, secondary and University had applied this kind of technology to their library system and access system for events. Every Employee from the new intake will be required to take a photo in the campus to conduct an enrolment process for their employee identification card. [13] On the Employee identification card will contains of their employee identification number, photo and an image of barcode.

This barcode that consists on the Employee identification card will allow Employee to borrow books from the library or attend certain event for scanning through the

barcode reader for their access. In this system, [1]it could provide a more visibility of access for administrator and lecturer of their employees' access instead of using traditional access system.

Advantages

- There is significantly more benefit for utilizing Biometric-Based participation observing framework. Above all else, it is security-wise, and it is a gigantic enhancement for secret key and furthermore ID cards.
- Fingerprints are a lot harder to fake or cozy, it additionally endures long and will not be change incredibly over a long period, so the information stays current in the data set will be keep going long than photographs and passwords.
- For client, this framework is straightforward and simple to use for client. Client will not require attempting to recollect their identity card or being hindered out because of ID card left at home.
- Fingerprints are not transferrable or fake able, precluding the sharing of passwords or 'checking in' for the benefit of another associate. This takes into consideration more exact following and observing under studies participation.
- Biometric will verification client have been available when a circumstance or episode has happened is difficult to invalidate and can be utilized as proof whenever required.
- The advantage of this system is it could provide a quicker and more accurate access records.
- It will also reduce the hectic of administrator for recording and tracking down the employee's access.
- This system will also help in going paperless because there will not be needed to use paper for Employees to sign on the paper for their access.
- Barcodes eliminate the possibility of human error because it was simple and easy to use. This could mean that administrator just need to take only a few minutes to master the hand-held scanner for reading barcodes

Disadvantage:

- Disadvantages in using this system that may be occurs is system failures. Those scanners are dependent upon similar specialized issues and constraints as any remaining electronic ID frameworks, for example, blackouts, mistakes and factors that causes by ecological.
- The unique finger impression acknowledgment framework is more practical yet for more modest organization the expense of execution and upkeep can in any case be the boundary to execution.
- Last but not least, aversions are one of the bothers also. While the biometric sign excess parts respectably stable over a person's lifetime there are spaces of the general population that will denied from using the structure or people who have persevered through the insufficiency of fingers or hands would be dismissed.
- It could not be done within a barcode scanner and a computer for scanning and retrieving information from the embedded barcode. Every scanner can only scan once barcode per time.
- It could not be effective for minimizing the time consumption for taking Employees' access. However, with the comparison with our proposed system, we could be more saving time in taking access by just scanning the QR code that prepared earlier by the administrator.
- Maintenance fees for the systems would be a massive cost too due to replace microchip, radio transceiver, antenna and battery in the system.
- This system is not as secure as others modern access system such as fingerprint-based access system or QR code-based access system because this system could be easily prone to manipulation for example, an Employee holding more than one RFID cards that belongs to their friends to scan for their access.

2.2 Requirements

2.2.1 Software requirement

- XAMPP Server

2.2.2 Hardware requirement

- 4 GB RAM
- 512 GB HARD DISK
- i3 5th Gen Processor
- Scanner

2.2.3 Input/output

- Input: QR code, Bar code
- Output: XLSX and CSV sheet

2.3 Tools to Use

The tools that were used in this project will be mainly on software. The main software tools that were used in this project will be VS Code with PHP plugins. The Programming language we are using is PHP and XAMPP Server as our localhost and MySQL as a Database.

2.3.1 PHP

PHP is a general-purpose scripting language geared toward web development It was originally created by Danish-Canadian programmer Rasmus Lerdorf in 1993 and released in 1995. The PHP reference implementation is now produced by The PHP Group. PHP originally stood for Personal Home Page, but it now stands for the recursive initialism PHP: Hypertext Preprocessor.

Figure 2.3: PHP

PHP code is usually processed on a web server by a PHP interpreter implemented asa module, a daemon or as a Common Gateway Interface (CGI) executable. On a web server, the result of the interpreted and executed PHP code – which may be any typeof data, such as generated HTML or binary image data – would form the whole or part of an HTTP response.

Various web template systems, web content management systems, and web frameworks exist which can be employed to orchestrate or facilitate the generation of that response. Additionally, PHP can be used for many programming tasks outsidethe web context, such as standalone graphical applications and robotic drone control.PHP code can also be directly executed from the command line.

The standard PHP interpreter, powered by the Zend Engine, is free software released under the PHP License. PHP has been widely ported and can be deployed on most web servers on a variety of operating systems and platforms.

The PHP language evolved without a written formal specification or standard until 2014, with the original implementation acting as the de facto standard which other implementations aimed to follow. Since 2014, work has gone on to create a formal PHP specification.

2.3.2 VS Code

Visual Studio Code is a source-code editor that can be used with a variety of programming languages, including C#, Java, JavaScript, Go, Node.js, Python, C++, C, Rust and Fortran. It is based on the Electron framework, which is used to develop Node.js web applications that run on the Blink layout engine. Visual Studio Code employs the same editor component (codenamed "Monaco") used in Azure DevOps (formerly called Visual Studio Online and Visual Studio Team Services).

Out of the box, Visual Studio Code includes basic support for most common programming languages. This basic support includes syntax highlighting, bracket matching, code folding, and configurable snippets. Visual Studio Code also ships with IntelliSense for JavaScript, TypeScript, JSON, CSS, and HTML, as well as debugging support for Node.js. Support for additional languages can be provided by freely available extensions on the VS Code Marketplace.

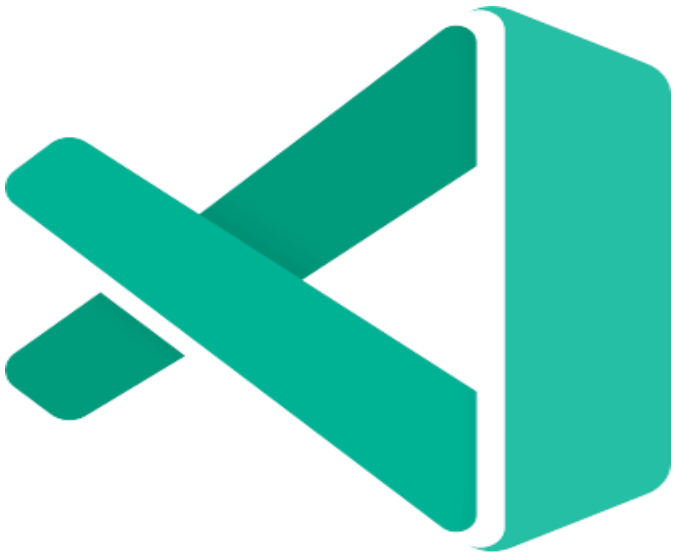

Figure 2.4: VS Code

An orange version of the Visual Studio Code logo for the insider version of Visual Studio Code. Instead of a project system, it allows users to open one or more directories, which can then be saved in workspaces for future reuse. This allows it to operate as a language-agnostic code editor for any language. It supports many programming languages and a set of features that differs per language. Unwanted files and folders can be excluded from the project tree via the settings. Many Visual Studio Code features are not exposed through menus or the user interface but can be accessed via the command palette.

2.3.3 XAMPP Server

XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts written in the PHP and Perl programming languages. Since most actual web server deployments use the same components as XAMPP, it makes transitioning from a local test server to a live server possible.

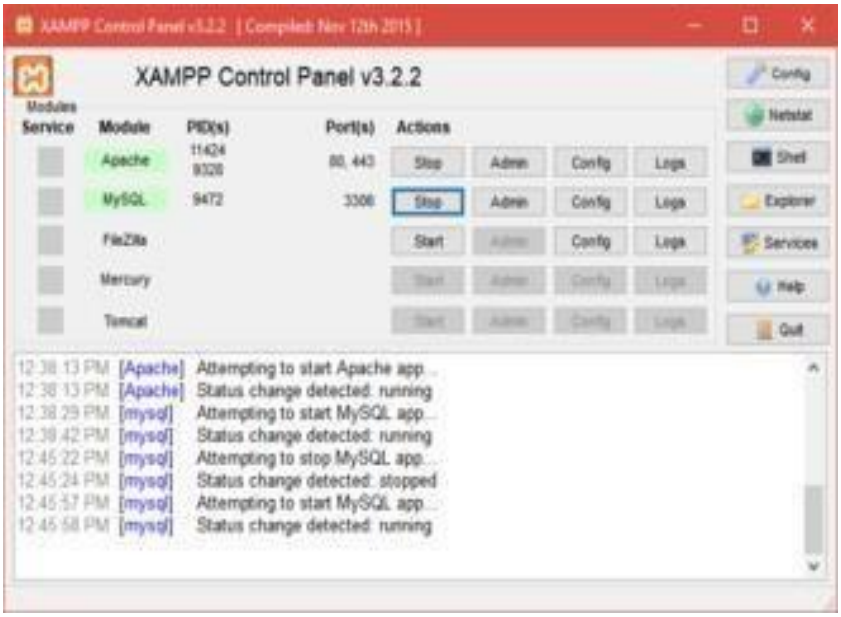

Figure 2.5: XAMPP Control Panel

XAMPP's ease of deployment means a WAMP or LAMP stack can be installed quickly and simply on an operating system by a developer, with the advantage that

common add-in applications such as WordPress and Joomla! can also be installed with similar ease using Bitnami.

XAMPP is regularly updated to the latest releases of Apache, MariaDB, PHP and Perl. It also comes with a number of other modules, including OpenSSL, phpMyAdmin, MediaWiki, Joomla, WordPress and more. Self-contained, multiple instances of XAMPP can exist on a single computer, and any given instance can be copied from one computer to another. XAMPP is offered in both a full and a standard version (Smaller version).

2.3.4 MySQL

MySQL is currently the most popular database management system software used for managing the relational database. It is open-source database software, which is supported by Oracle Company. It is fast, scalable, and easy to use database management system in comparison with Microsoft SQL Server and Oracle Database. It is commonly used in conjunction with PHP scripts for creating powerful and dynamic server-side or web-based enterprise applications.

Figure 2.6: MySQL

It is developed, marketed, and supported by MySQL AB, a Swedish company, and written in C programming language and C++ programming language. The official pronunciation of MySQL is not the My Sequel; it is My Ess Que Ell. However, you can pronounce it in your way. Many small and big companies use MySQL. MySQL supports many Operating Systems like Windows, Linux, MacOS, etc. with C, C++, and Java languages.

MySQL is a Relational Database Management System (RDBMS) software that provides many things, which are as follows:

- It allows us to implement database operations on tables, rows, columns, and indexes.
- It defines the database relationship in the form of tables (collection of rows and columns), also known as relations.
- It provides the Referential Integrity between rows or columns of various tables.
- It allows us to updates the table indexes automatically.
- It uses many SQL queries and combines useful information from multiple tables for the end-users.

2.3.5 API

An **application programming interface** (**API**) is a way for two or more computer programs to communicate with each other. It is a type of software interface, offering a service to other pieces of software.[1] A document or standard that describes how to build or use such a connection or interface is called an *API specification*. A computer system that meets this standard is said to *implement* or *exVpose* an API. The term API may refer either to the specification or to the implementation AND NAME IS API

In contrast to a user interface, which connects a computer to a person, an application programming interface connects computers or pieces of software to each other. It is not intended to be used directly by a person (the end user) other than a computer programmer who is incorporating it into the software. An API is often made up of different parts which act as tools or services that are available to the programmer. A program or a programmer that uses one of these parts is said to *call* that portion of the API. The calls that make up the API are also known as subroutines, methods, requests, or endpoints. An API specification defines these calls, meaning that it explains how to use or implement them. One purpose of APIs is to hide the internal details of how a system works, exposingonly those parts a programmer will find useful and keeping them consistent even if the internal details later change. An API may be custom-built for a particular pair ofsystems, or it may be a shared standard allowing interoperability among many systems.

The term API is often used to refer to web APIs, which allow communication between computers that are joined by the internet. There are also APIs for programming languages, software libraries, computer operating systems,and computer hardware. APIs originated in the 1940s, though the term did not emerge until the 1960s and 1970s. Recent developments in APIs have led to the risein popularity of micro services, which are loosely coupled services accessed through public APIs.

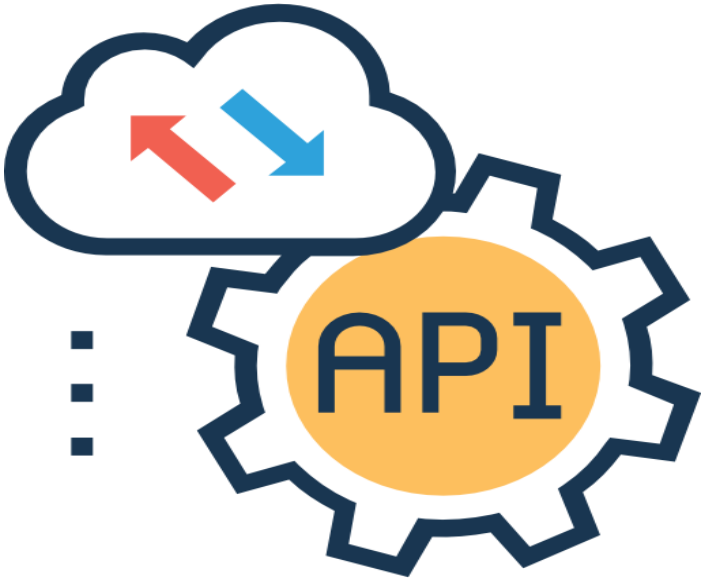

Figure 2.7: Application Program Interface

2.4 Marketing Overview

- We organized various advertisement campaigns through which we were able to connect through various industrial partners.
- We even went on-field with the clients for implementing the problem statement.
- We marketed our product through various social media platforms such as Instagram, Facebook, Twitter, etc.
- With this campaign we were able to achieve a good market place with over 50+ plants installation in HPCL.
- We are now acquiring and getting ready to work with BPCL plant firm

2.5 Financial Aspect

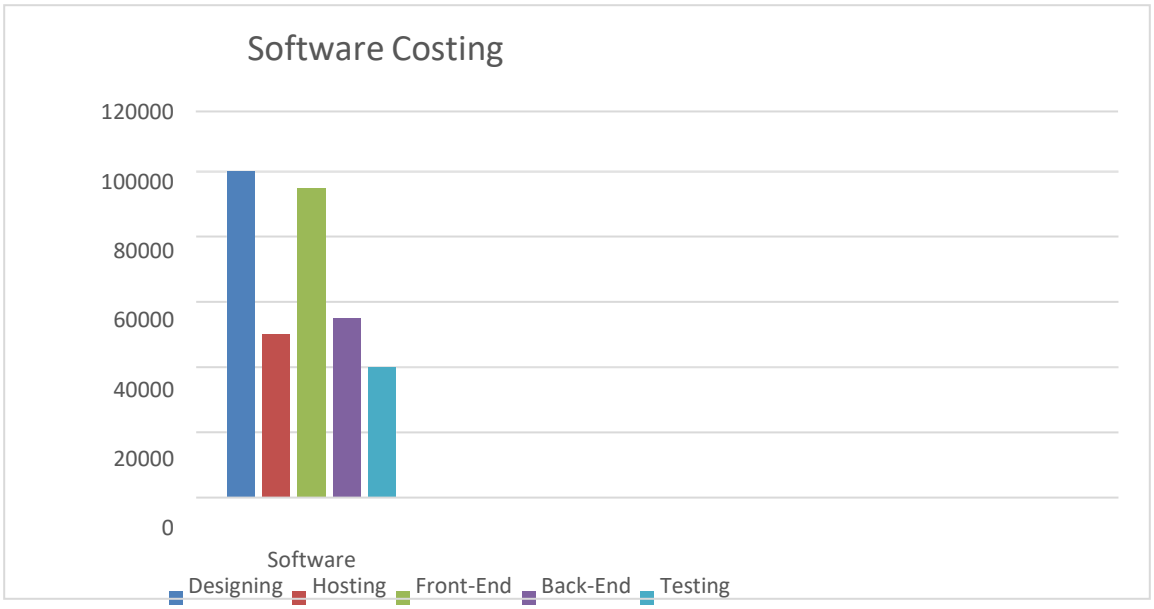

Figure 2.8: Financial Aspect of Software Costing

2.5.1 Software Overall Costing

- Designing: 100000
- Hosting: 50000
- Front-End Development: 95000
- Backend Development: 55000
- Testing: 40000

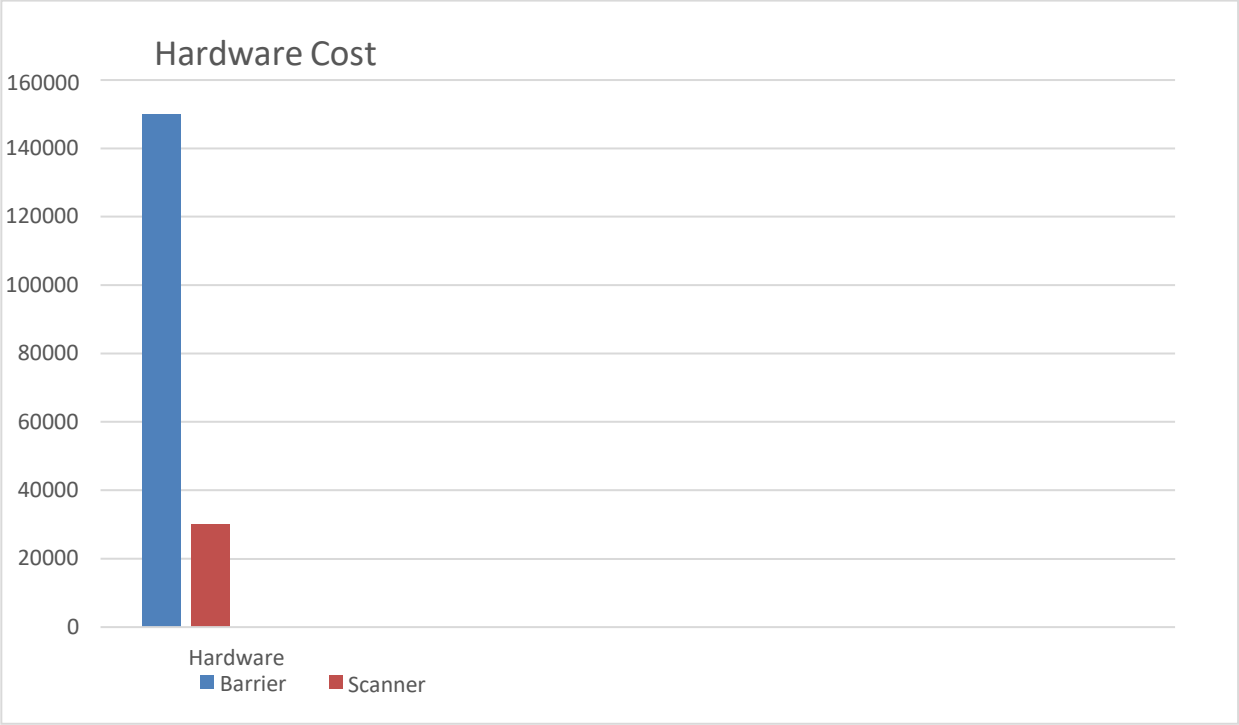

Figure 2.9: Financial Aspect of Hardware Costing

2.5.2 Hardware Overall Costing

- Barrier: 150000
- Scanner: 30000
- ID Cards: 100 per Card

2.6 Data Flow Diagram

2.6.1 Flow of Check-In System

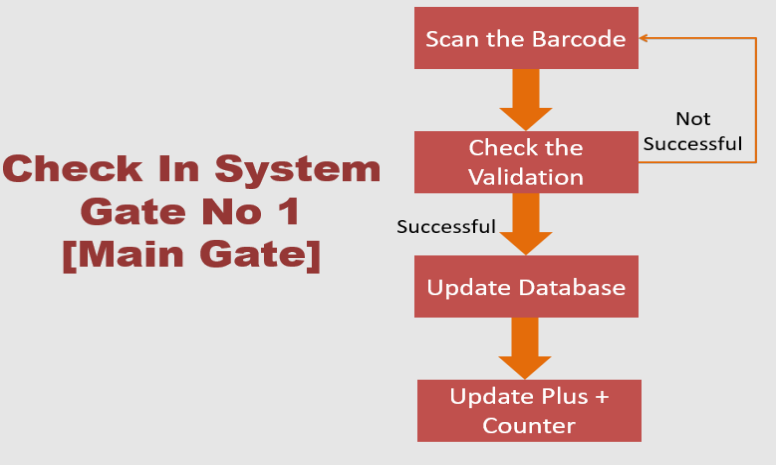

Figure 2.10: Check in system for Gate-01

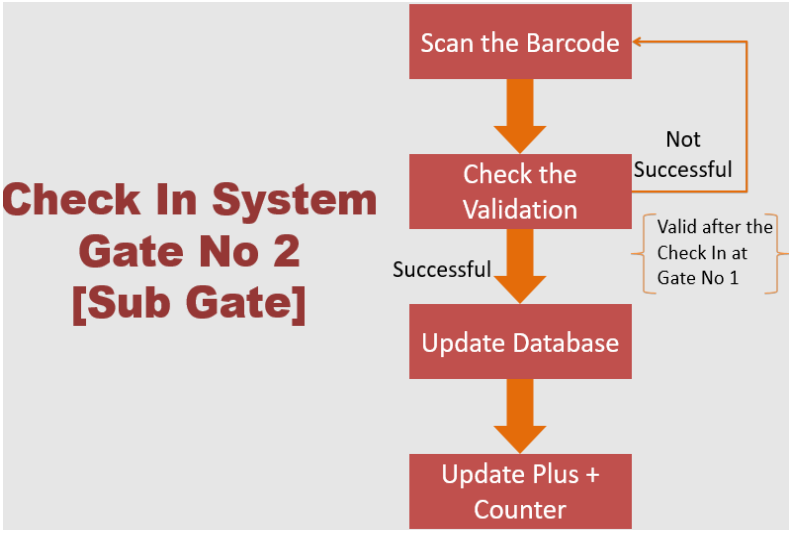

Figure 2.11: Check in system for Gate-02

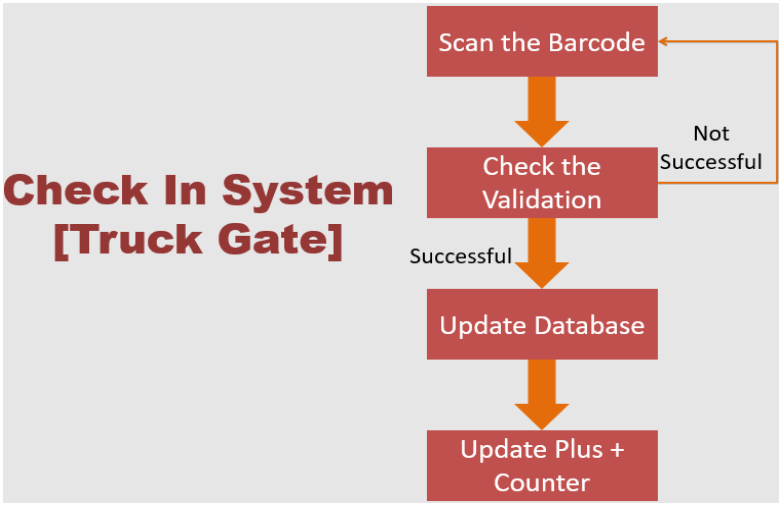

Figure 2.12: Check-In system for Truck Gate

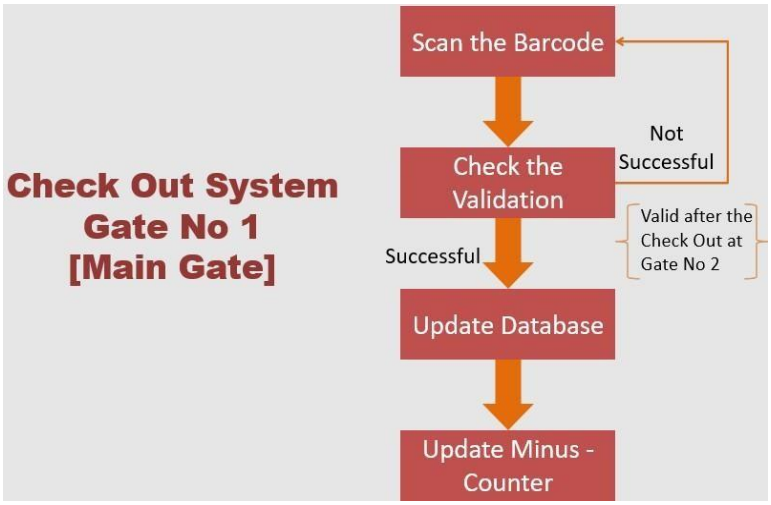

Figure 2.13: Check-out system for Gate-01

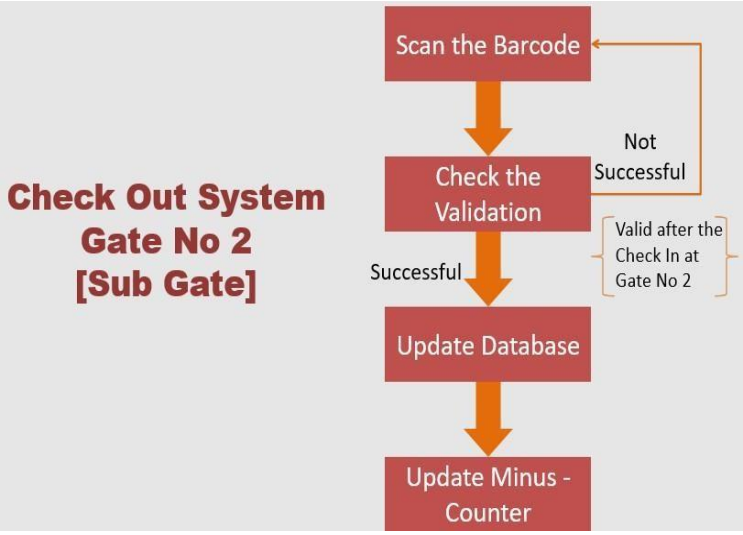

Figure 2.14: Check-out system for Gate-02

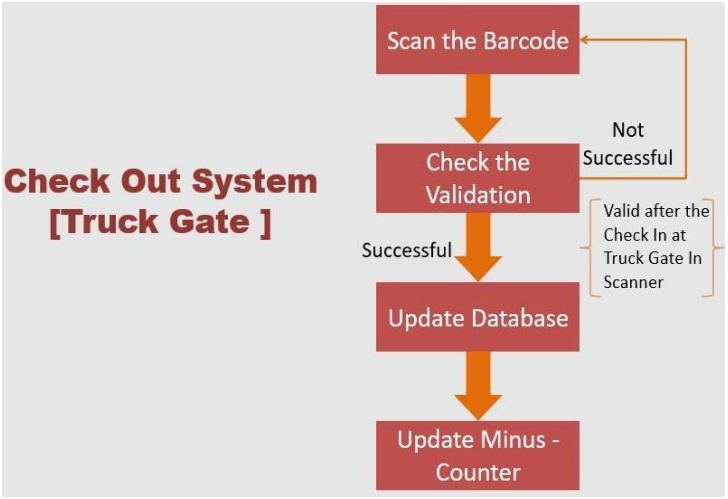

Figure 2.15: Check-out system for Truck Gate

2.6.2 Flow of System

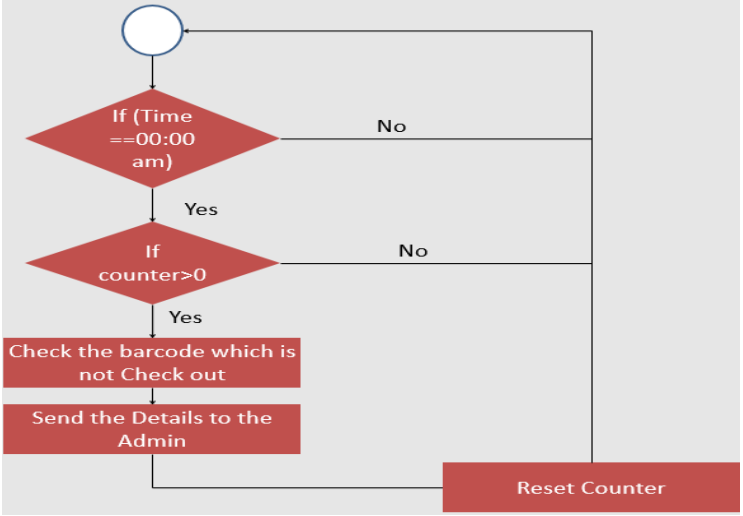

Figure 2.16: Flow of system

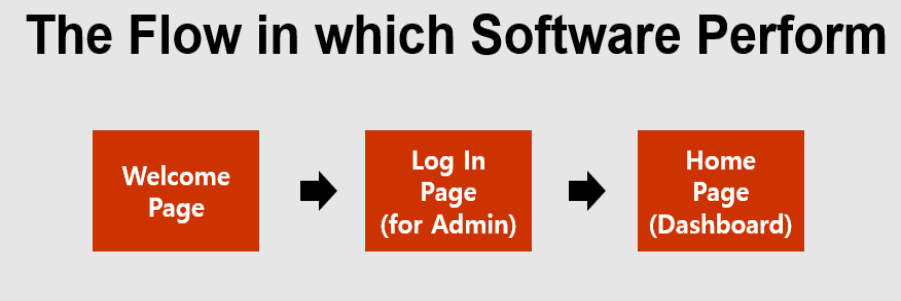

Figure 2.17: Flow of system

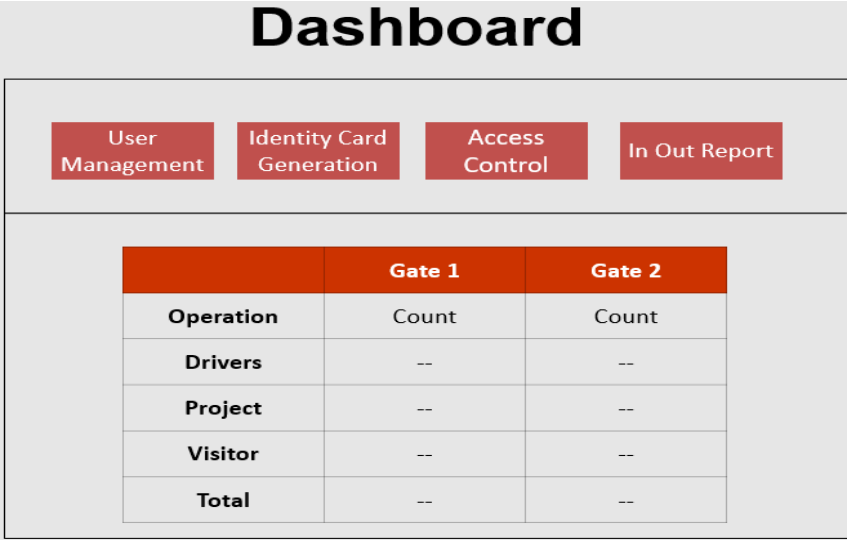

Figure 2.18: Dashboard

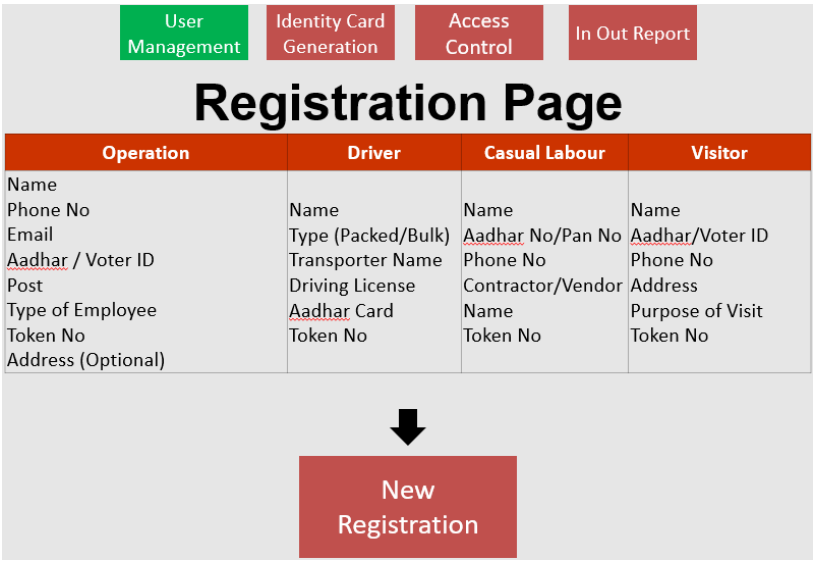

Figure 2.19: Registration Page

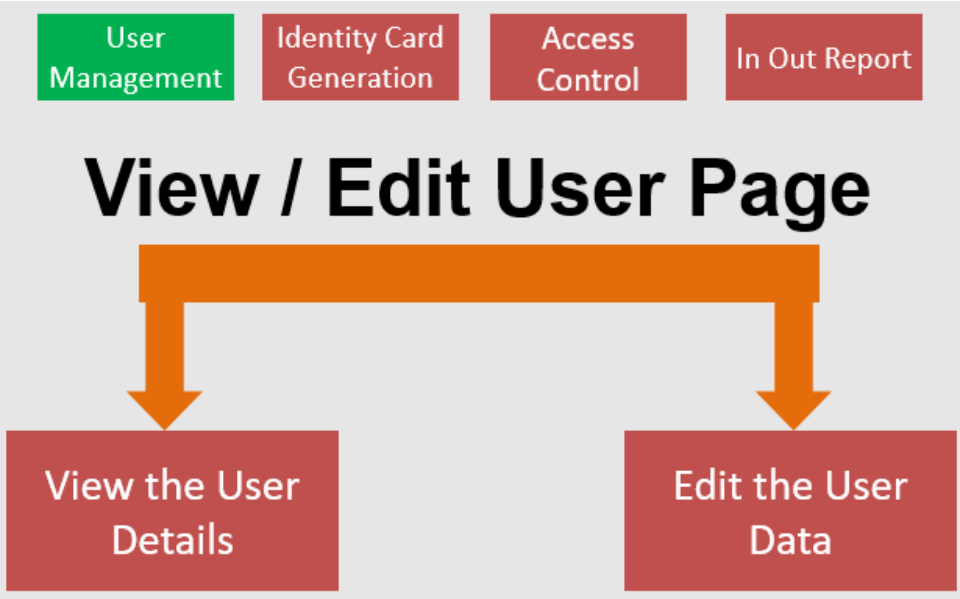

Figure 2.20: View/User Page

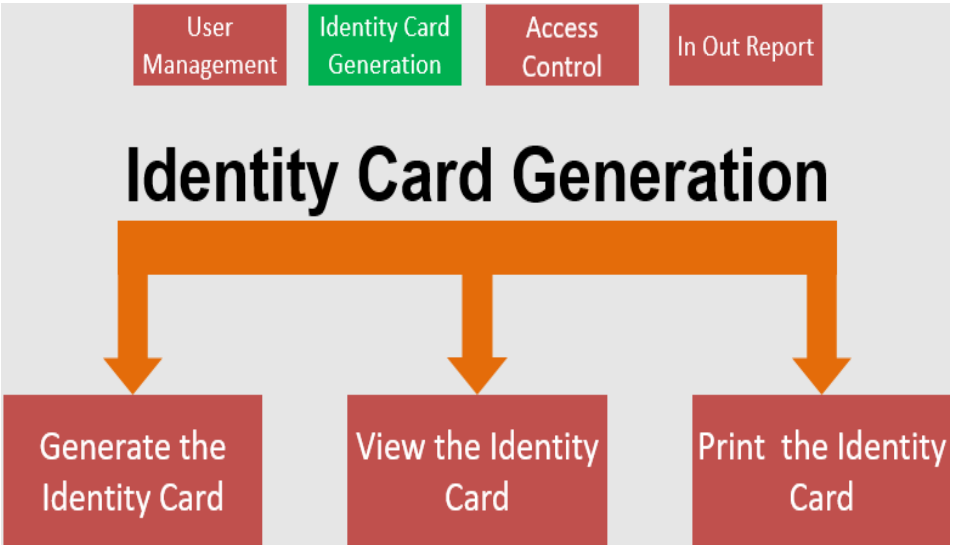

Figure 2.21: Identity card generation

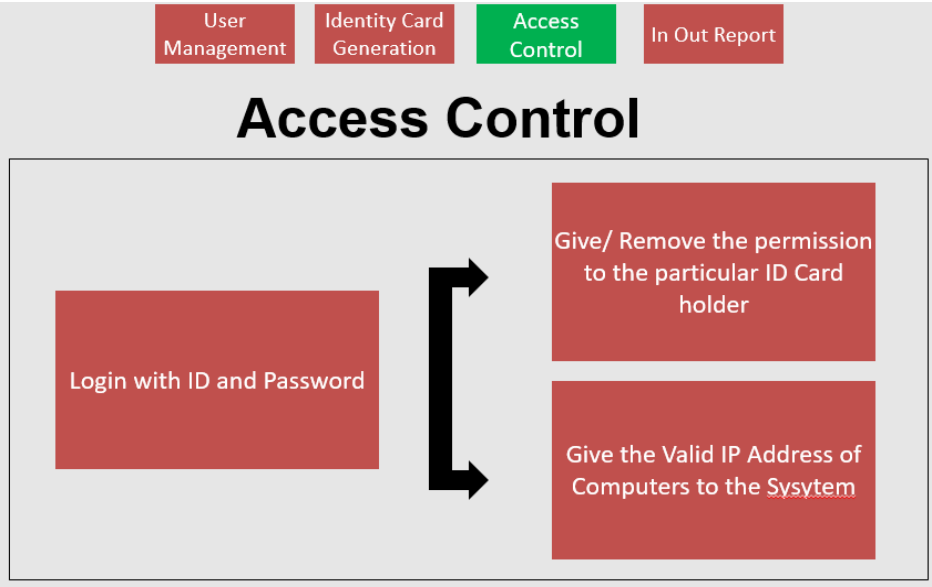

Figure 2.22: Access control

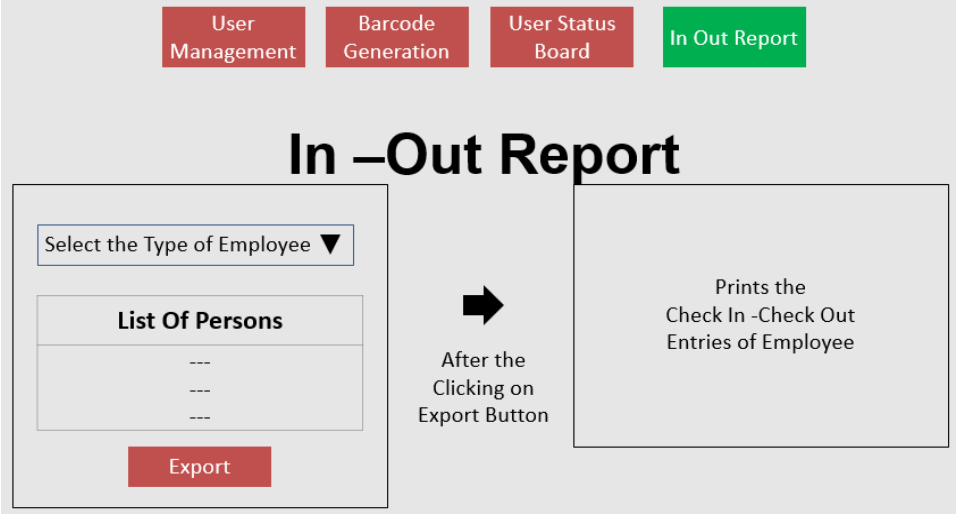

Figure 2.23: In-out report

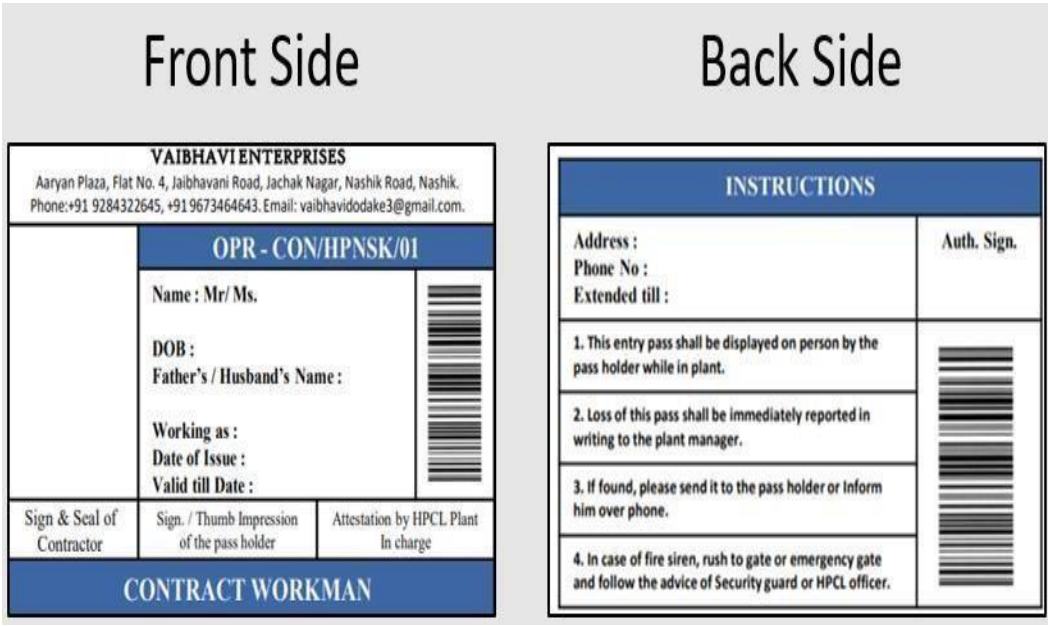

Figure 2.24: Identity Card

2.6.3 Web Page

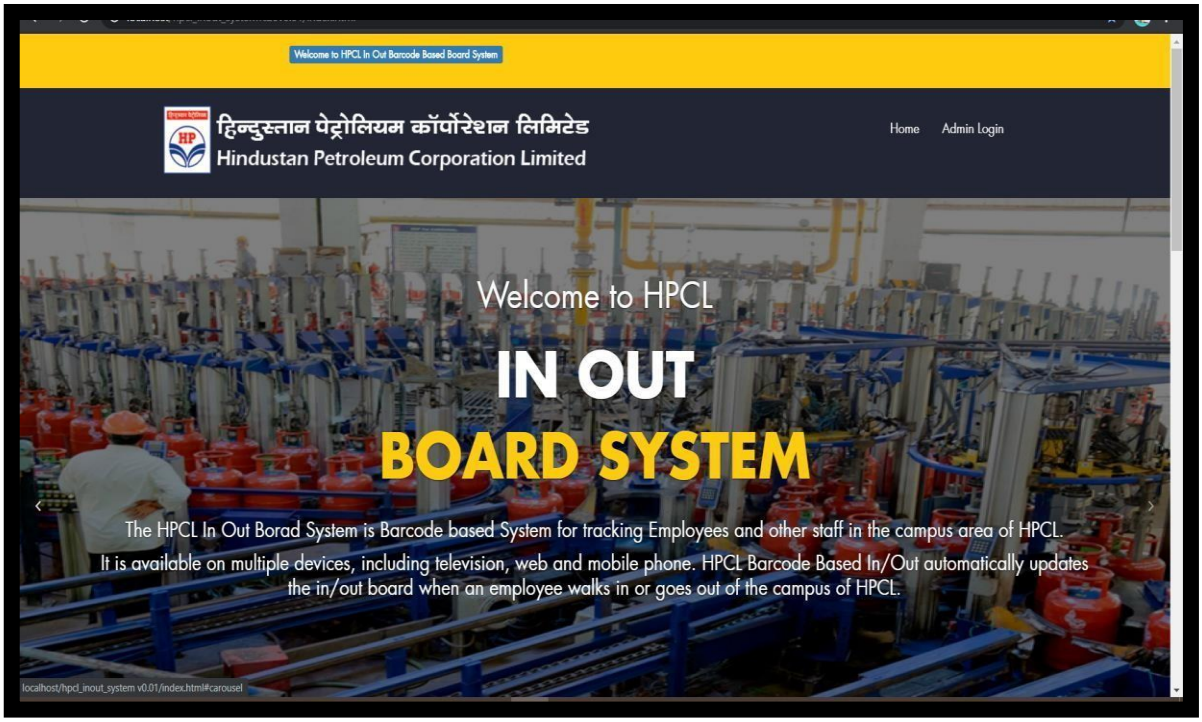

Figure 2.25: Web front page

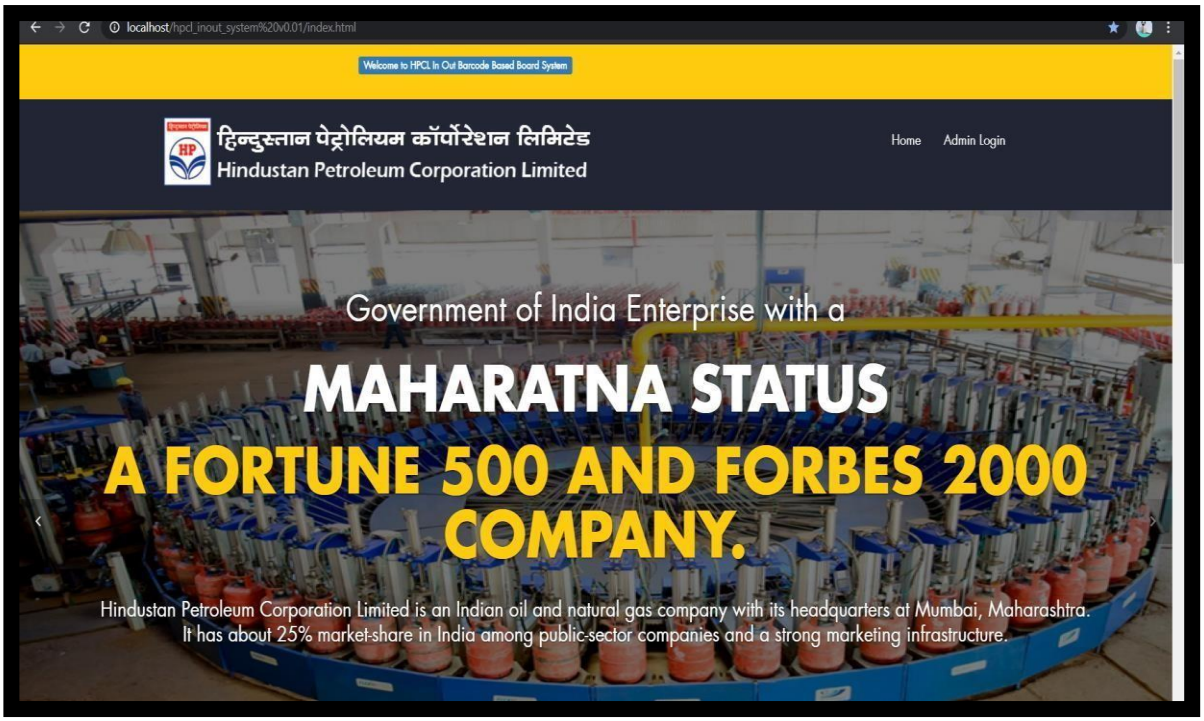

Figure 2.26: Web front page

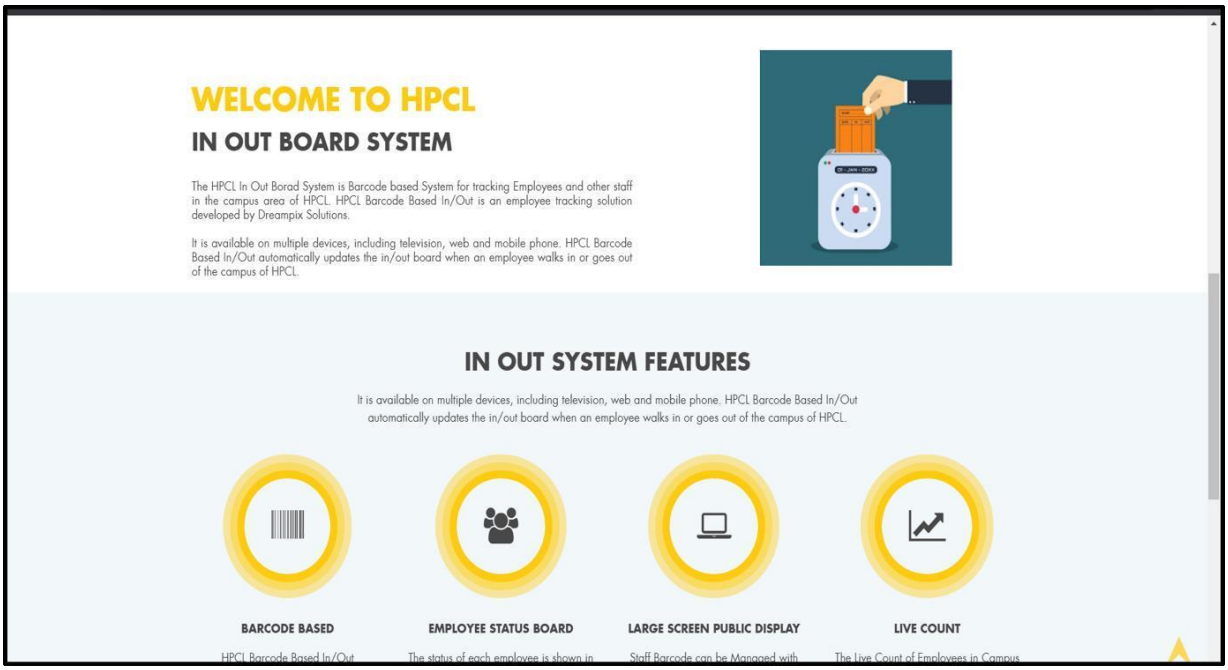

Figure 2.27: Web front page

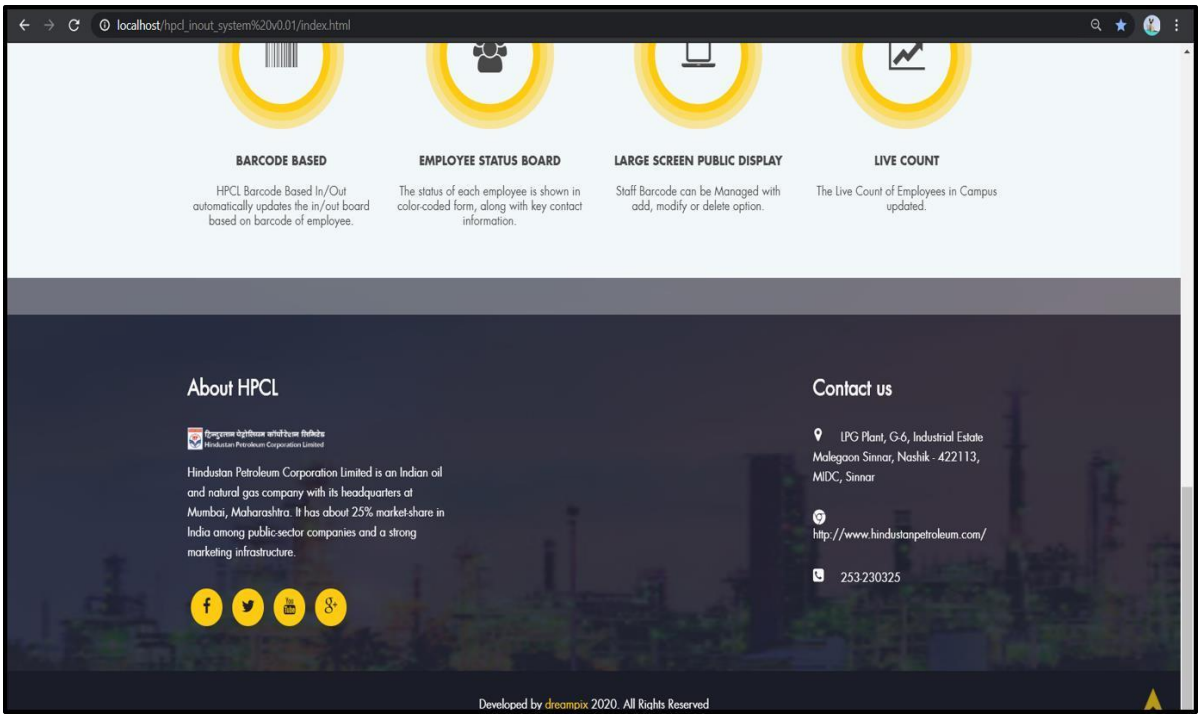

Figure 2.28: Web front page

Figure 2.29: Admin Panel Page

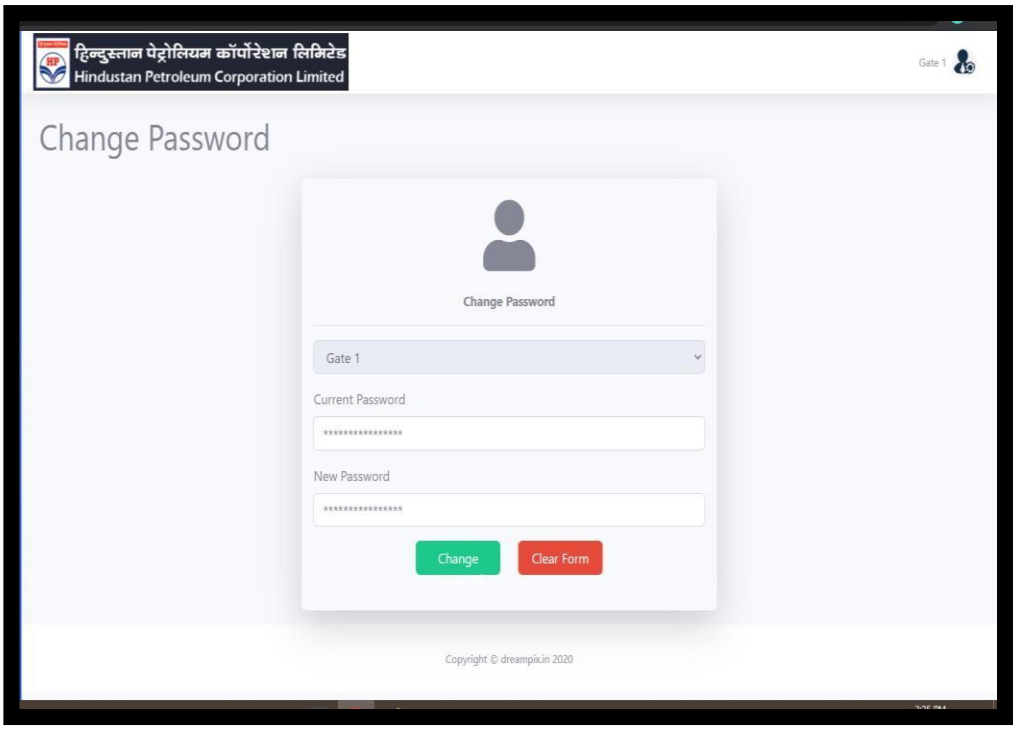

Figure 2.30: User login

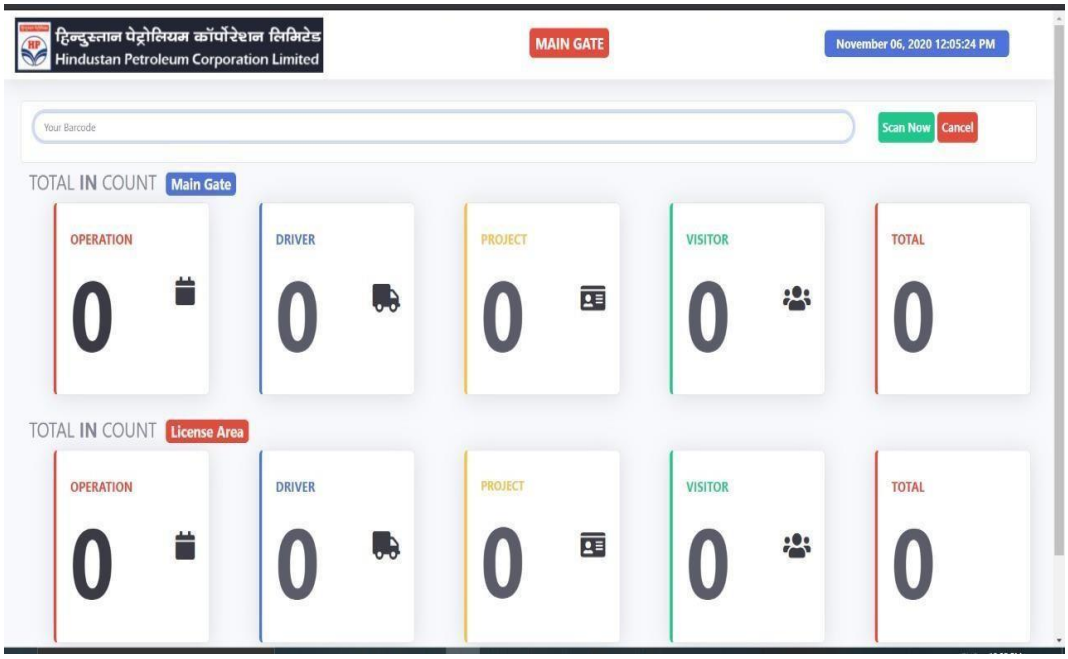

Figure 2.31: Dashboard for main gate

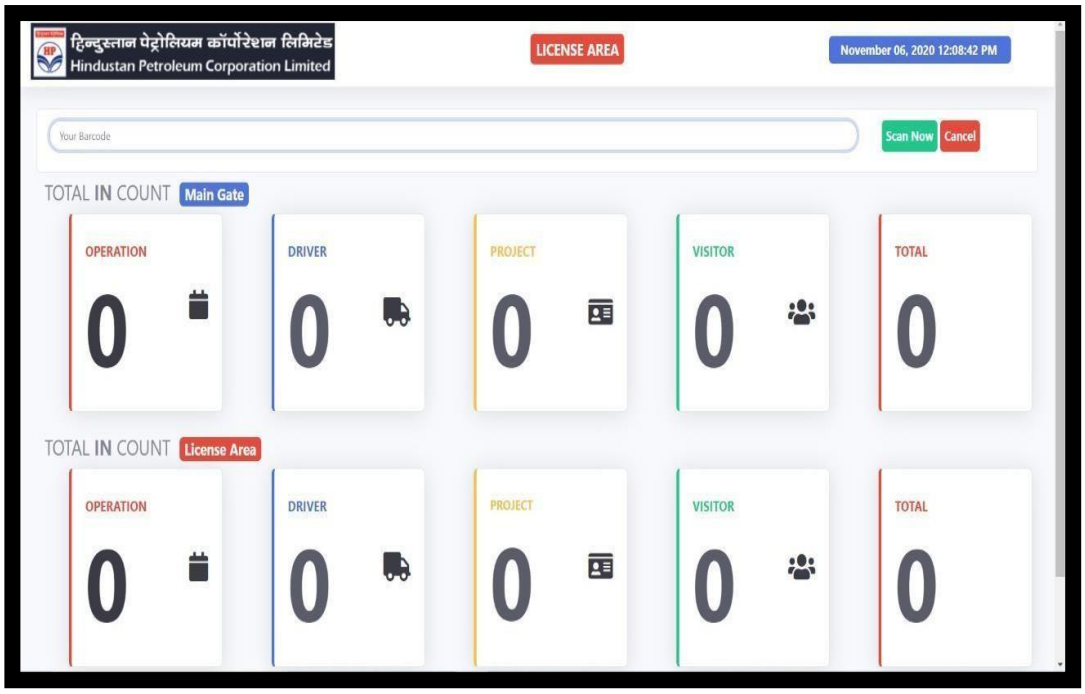

Figure 2.32: Dashboard for license area

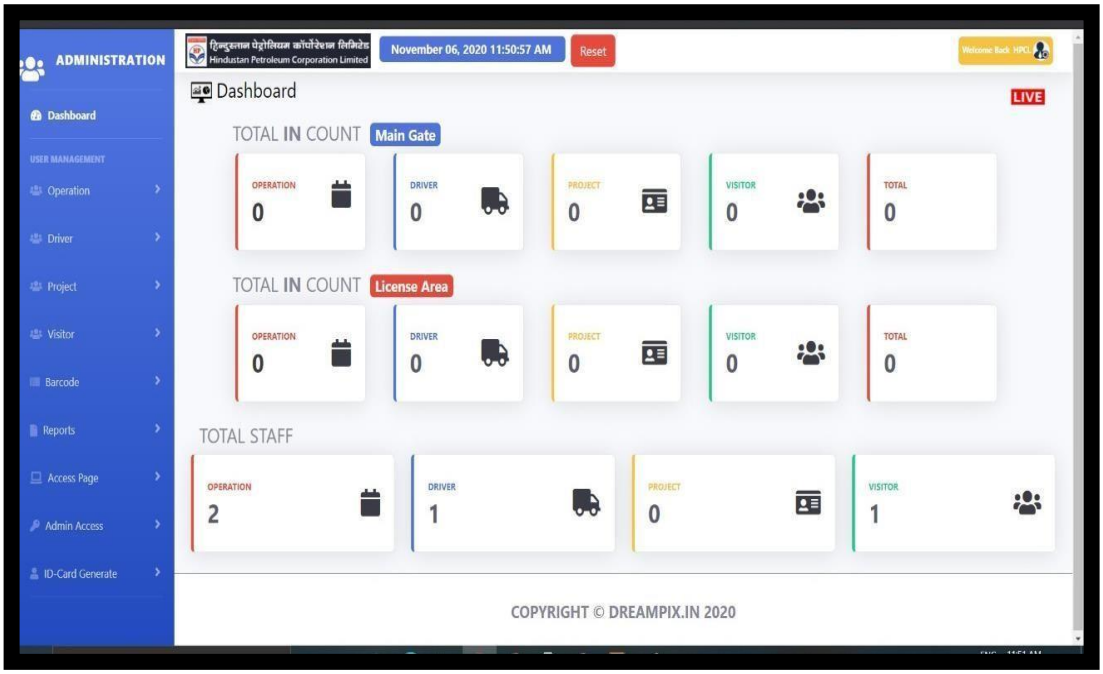

Figure 2.33: Dashboard

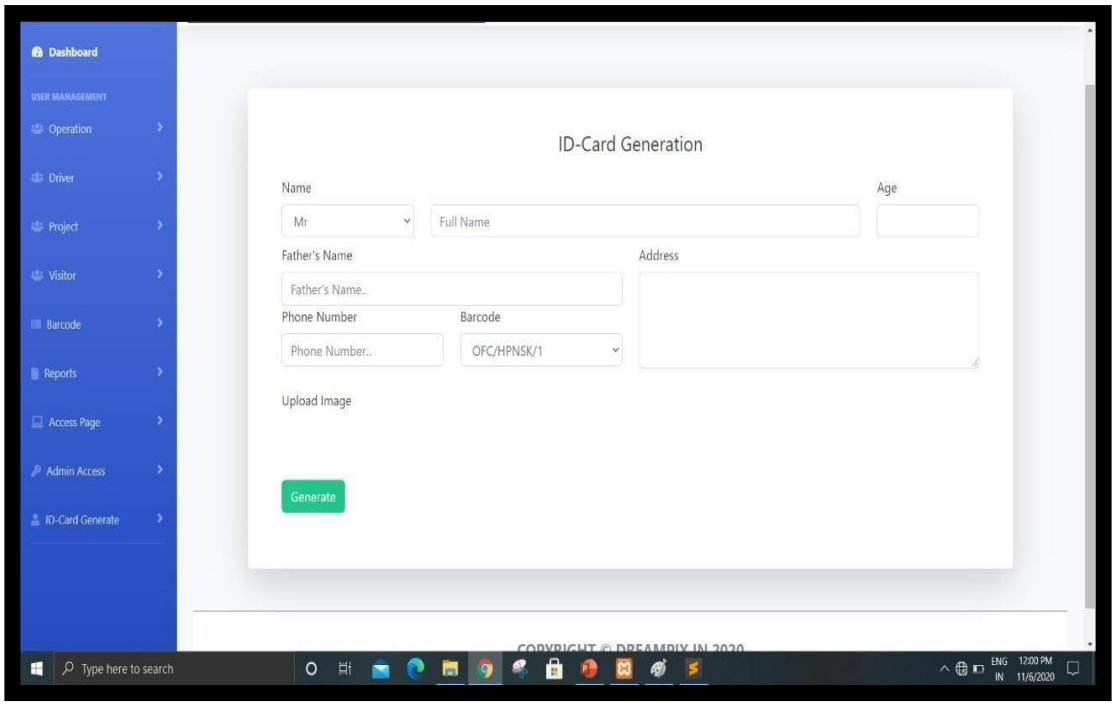

Figure 2.34: ID Card generation

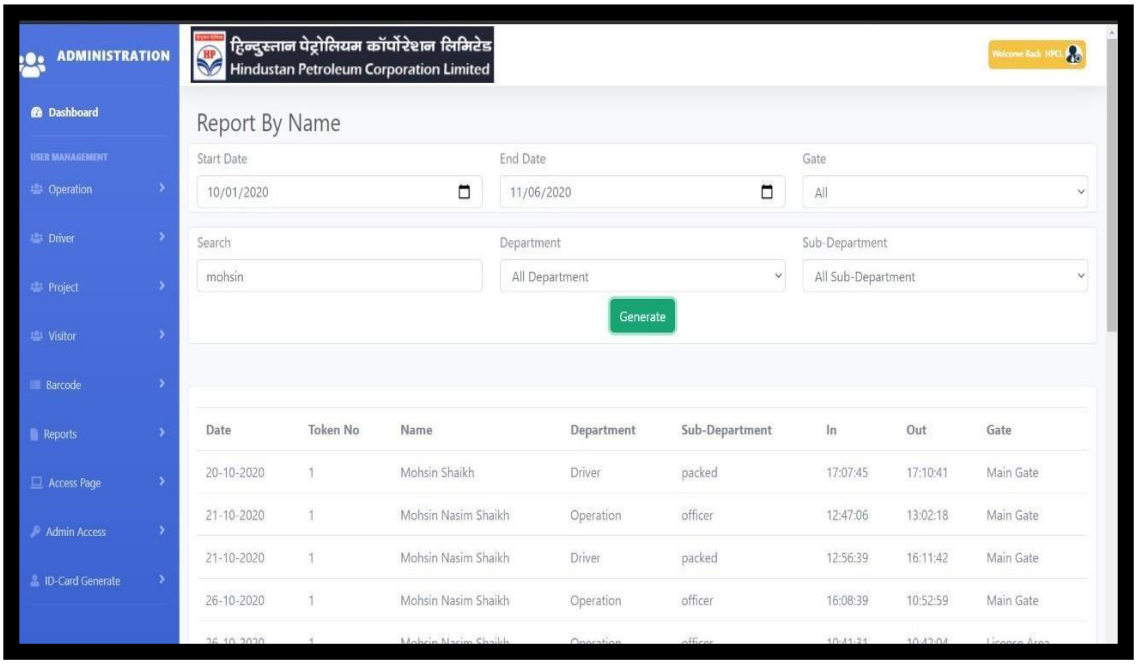

Figure 2.35: Employee details report

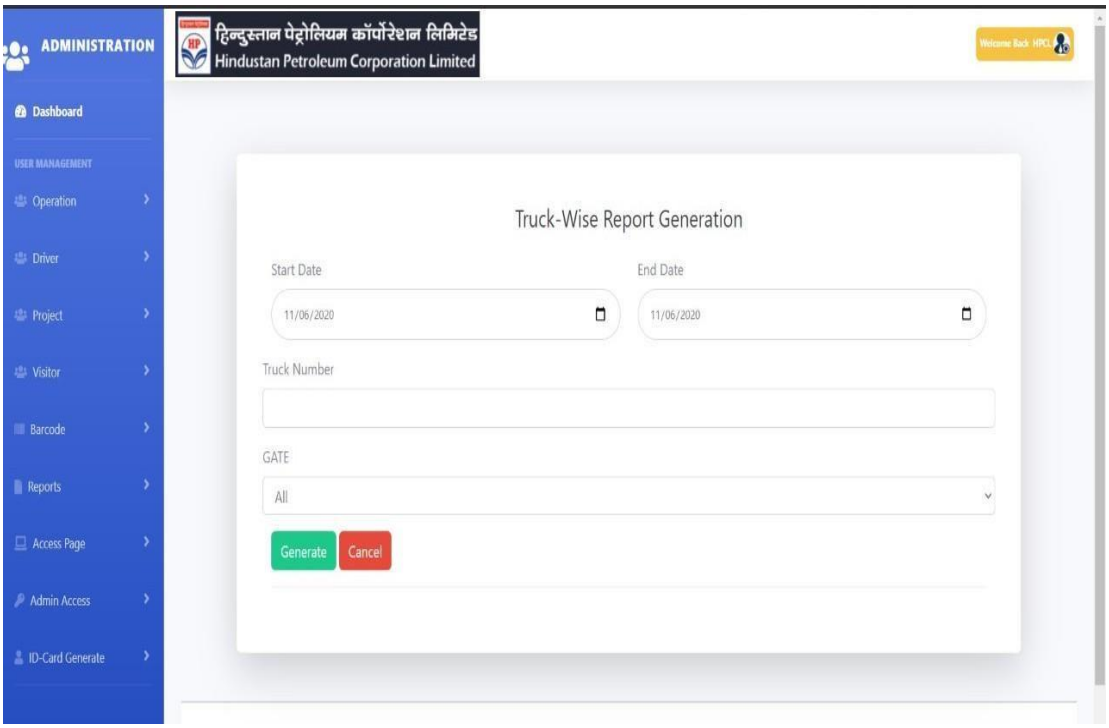

Figure 2.36: ID Card generation

CHAPTER 3

RESULTS AND DISCUSSION

3.1 Introduction

This chapter discuss about limitation of the project, future improvement and recommendation and conclusion.

3.2 Limitation

The project comes with few limitations as stated in the following

• No secure connection on code generator server as secure connection requires a verified domain to get an SSL license.

• No HTTPS connection on lecturer web app as web service that the web app consume are not secure.

3.3 Improvement and Recommendation

There are several improvements and recommendations to be considered in thefuture development.

• Administrator view for manage timetable, users, and view resources consumed.

• Zoom able camera on employee view web app.

• Develop as full-fledged progressive web app on all web apps.

• Develop in-deep data analysis feature to further analyze employees' attendance (in & out) records.

3.4 Challenges

The challenges when developing the projects are listed as follows:

• Required a lot of self-learning to pick up libraries, frameworks and cloud services.

• Less similar implementations or solutions to refer to when designing the application.

Chapter 4

Conclusion AND Future Scope

4.1 Conclusion

In conclusion, taking attendance with QR code is the cheapest and adaptable options among all of the solutions. It does not require infrastructure changes to adapt it. With the popularity of the smartphone and internet accessibility, it can widely use in universities. With the automatically refresh QR code, cheating on attendance is become even difficult. Besides, it eliminates a lot of guards' efforts on managing employees' attendance records. The project objectives were achieved.

The developed system presented in this paper has been successfully designed and tested. The employees' attendance status will be analyzed, and exported. Access control system is very important in our daily life. It is possessing a really great advantage, among the whole types of code scanning technology, QR Code Based Smart Access Control System is the most accurate. In this project report, we have given an introduction of Access control system and its advantage.
It is an efficient method to store the access records in system rather than using paper.

4.2 Future Scope:

Since till now we ate covering HPCL plants only, but further we are trying to go with all other oil industries such as-

- BPCL
- IOCL
- Reliance Industries
- Nayara
- Essar

And once we are some with oil and petroleum plants we are trying to cover to major sectors-

- Health care
- Education
- PSUs

So, these are industries we are targeting, so we are trying to customize an access control system for these industries as well. As these two sectors have huge number.

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