

## **ACKNOWLEDGEMENT**

I take this opportunity to humbly express our thankfulness to all those concerned with my project. First of all I am thankful to **LDRP ITR** for undertaking this project. I am sincerely indebted to Prof. **Vaishali Patel** for giving me the opportunity to work on this project. His continuous guidance and help have proved to be a key to my success in overcoming the challenges that I have faced during my project work. Her support made the project a pleasantly memorable one. Without her help at all stages in spite of her own work load; the completion of the project would not have been possible. I express my sincere gratitude to **Prof. Vaishali Patel** for his valuable guidance and positive feedback. There are so many persons without whose help I would never have conceived and learnt, to whom I would like to express my gratitude – my friends, colleagues, and of course CE & IT Department of LDRP ITR.

## **Abstract**

In higher education institutions, student participation in the classroom is directly related to their academic performance. However, the majority of student attendance registration is still conventionally done, which is tedious and time-consuming, especially for those courses that involve large numbers of students. Over the years, attendance management has been conducted manually at most of the universities. To overcome the manual attendance issues, we proposed and implemented a smart attendance system with the aim to encourage the potential use of the Quick Response (QR) code as a future attendance management system, to track and record student attendance in lectures and exercises for all relevant courses, as an aim of this paper.

Every institution that depends on people must account for its employees as a first step in the modern-day. As a result, creating and maintaining a suitable management system costs the different organizations a substantial sum of money. In many countries, government organizations and educational institutions keep track of attendance using paper-based methods. For example, to maintain track of each student's attendance, it takes time to call out their name at the beginning of the course. False signs, names missing from spreadsheets, manually inputting data into systems, and the possibility of proxy attendance are further problems. Such techniques have a few problems that have grown over time. To track attendance, it is crucial to swap out these outdated practices for modern ones. As a result, a lot of work and research has been done in this area using current technologies. Especially, automatic recognition of a particular individual based on distinguishing characteristics such as QR code, ID and password, face recognition, fingerprint recognition is of interest to researcher. This paper presents a literature overview of the recent works on automated and smart attendance tracking systems. Concerning technology, application domain, and key findings, our critical assessment has emphasized research in the body of literature.

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# 1. Introduction

## 1.1 Introduction

Attendance is defined as the action or state of going regularly to or being present at a place or event. Attendance of every student is being maintained by schools and colleges. The manual attendance record system is inefficient and more time is required to record as well as calculate the attendance of each student. Hence a system is needed which will solve the issue of manual attendance. While the move towards the digital era is being accelerated every hour, Qr code have started affecting people's daily life at each and every instance.

## 1.2 Scope

QR Code Based Attendance Management System” is a combination of two android applications developed for taking and storing the attendance of the students on the daily basis in the college. Here the professor, who is handling the subjects, will be responsible to mark the attendance of the students. Each staff will be given an android application that is used for taking attendance and generate the overall attendance status. An accurate report based on the student attendance is generated here. Report of the student’s attendance on weekly and monthly basis is generated as desired. The main objective of the automated attendance system is to computerize the traditional way of recording attendance and provide an efficient and automated method to track attendance in institutions. Advantages of QR Code Based Smart Attendance System:

- ❑ Provide better security.
- ❑ Maintenance of the system is easy and cost effective.
- ❑ Generate the result quickly.
- ❑ Provide accurate and efficient data.
- ❑ User friendly.

## 2. Technology and Literature Review

### Python :

Python is a general-purpose interpreted, interactive, object-oriented, and high-level programming language.

Python is a high-level, interpreted, interactive and object-oriented scripting language. Python is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages.

Python is a MUST for students and working professionals to become a great Software Engineer specially when they are working in Web Development Domain. I will list down some of the key advantages of learning Python:

- Python is Interpreted – Python is processed at runtime by the interpreter. You do not need to compile your program before executing it. This is similar to PERL and PHP.
- Python is Interactive – You can actually sit at a Python prompt and interact with the interpreter directly to write your programs.
- Python is Object-Oriented – Python supports Object-Oriented style or technique of programming that encapsulates code within objects.
- Python is a Beginner's Language – Python is a great language for the beginner-level programmers and supports the development of a wide range of applications from simple text processing to WWW browsers to games.

### Characteristics of Python

Following are important characteristics of Python Programming –

- It supports functional and structured programming methods as well as OOP.
- It can be used as a scripting language or can be compiled to byte-code for building large applications.
- It provides very high-level dynamic data types and supports dynamic type checking.
- It supports automatic garbage collection.
- It can be easily integrated with C, C++, COM, ActiveX, CORBA, and Java.

## 3 System Requirements Study

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- User Requirements
- Hardware and Software Requirements
- Constraints
- Assumptions and Dependencis

### 3.1 User Requirements

Analyzing user characteristics is an important aspect of any project. It allows us to clearly define and focus on who the end users are for the project. Also, it allows checking the progress of the project to ensure that we are still developing the system for the end users. The user must have following requirements:

- User should be logged in to visit the website and donate to campaign.
- User can subscribe to blogs of website.
- User should understand the use of all modules.
- User can easily interact with the proposed system.
- User should be also being aware about the running process of the system.



## 3.2 Hardware and Software Requirements

Software and Hardware Requirements are used to describe the minimum hardware and software requirements to run the Software. These requirements are described below.

### 3.2.1 Software Requirements:

Client:

- Internet Connection Web Browser:
- Any Python Compliant Browser Operating System:
- WINDOWS or LINUX SERVER OS

### 3.2.2 Hardware Requirements:

- Device with Internet Connection
- Minimum 2.0 GHz processor
- Minimum 2GB of RAM

### **3.3 Constraints**

#### **3.3.1 Regulatory Policies**

Support countries to develop and implement good regulatory practices; help countries achieve better social, economic and environmental objectives; assist governments in improving regulatory quality to foster competition, innovation, economic growth and meet important social objectives.

#### **3.3.2 Hardware Limitations**

Display size: Inches or higher recommended or the recommended PC display.

Processing speed: 2.4 GHz minimum or the recommended PC settings

Memory size: 1 GB RAM or higher recommended.

Screen resolution: 1024 x 768 pixels or higher recommended.

#### **3.3.3 Parallel Operations**

The project is on basis of multi-user. This is used for carrying out updating as well as entry by preventing the redundancy of the data.

#### **3.3.4 Reliability Requirements**

The system shall have a minimum uptime of 99% excluding time pre-scheduled for maintenance and/or upgrades. The system designed has a very simple database which will store user's name, email and contact. It is tested for all constraints at development stage.

#### **3.3.5 Criticality of the Application**

The system can stop working computers with very low internet connection. Other than that, there won't be any issue. apart from this the system should be able to make updates at regular time intervals.

#### **3.3.6 Safety and Security Consideration**

All the system data must be backed up every day and backup copies stored in another server at different location for disaster recovery. only legitimate users are allowed to use the application. If the legitimate users share the information, then the system is open to outsiders.

### 3.4 Assumptions and Dependencies

#### i. Assumptions

There are some assumptions you definitely need to define:

- Human resource availability: All key project team members are available and have the necessary skills and knowledge to work on the project.
- Budget availability: The determined budget is accurate and covers all project expenses.
- Scheduling accuracy: The set deadlines and milestones are achievable and the project can be finished on time. Performance of contractors, suppliers and vendors: All necessary equipment and goods are available whenever you need them.
- Upper management support: You have the support and buy-in from the C-Level and the project sponsor, who will back you up when issues arise.

#### 3.4.2 Dependencies

The followings are identified as some of the potential risk factors or dependencies:

- Non-availability of required resources.
- Power cuts.
- Each user must have a name, email address, password and contact number.
- There is only one Administrator.
- Internet connection speed.
- System should be available when user needed.

## **4. SYSTEM ANALYSIS**

4.1 Problem Statement

4.2 Feasibility Study

4.3 Class Diagram

4.4 Use Case Diagram

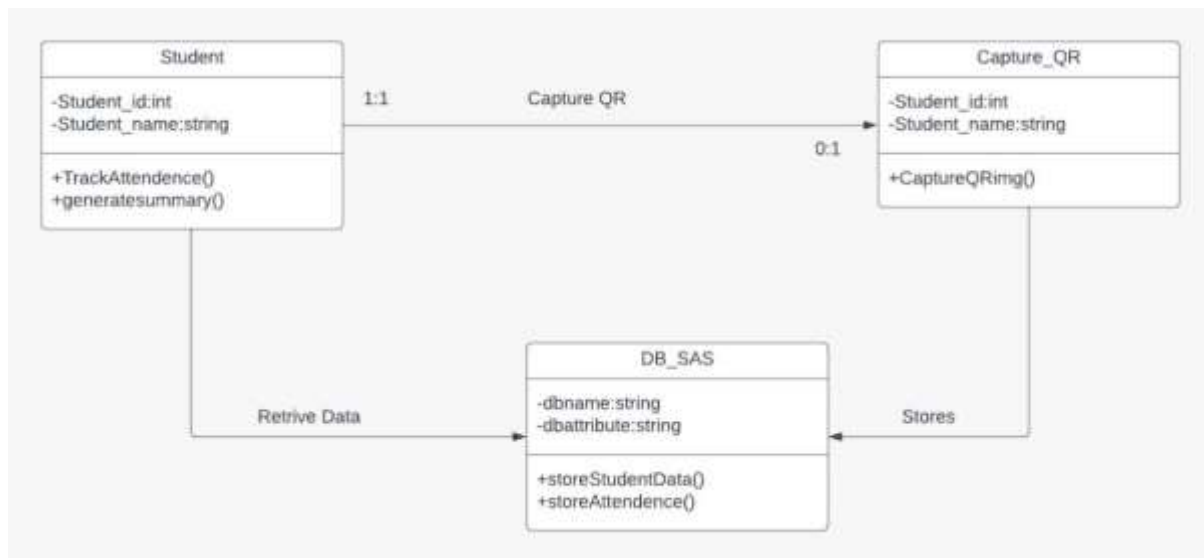
## 4.1 Problem Statement

- Development of a SMART QR CODE BASED ATTENDANCE SYSTEM.
- Analyzing the attendance on Daily and weekly basis.
- At the moment, most of the attendance systems that are being used in universities still are written a piece of paper. For classes, tutorial and laboratory session the student still have to sign the signature on the attendance sheet. This method is not flexible because the risk of losing the attendance data is very high. If the attendance sheet is missing, the attendance data will be lost. Other than that, unethical problem may be occurring such as cheating in signature. For example, a student does not attend his class but his attendance form has been signed by other student. This system is proposed to overcome these problems. Besides that, since the proposed system also record the time, the lecturer can monitor the punctuality of the students too.

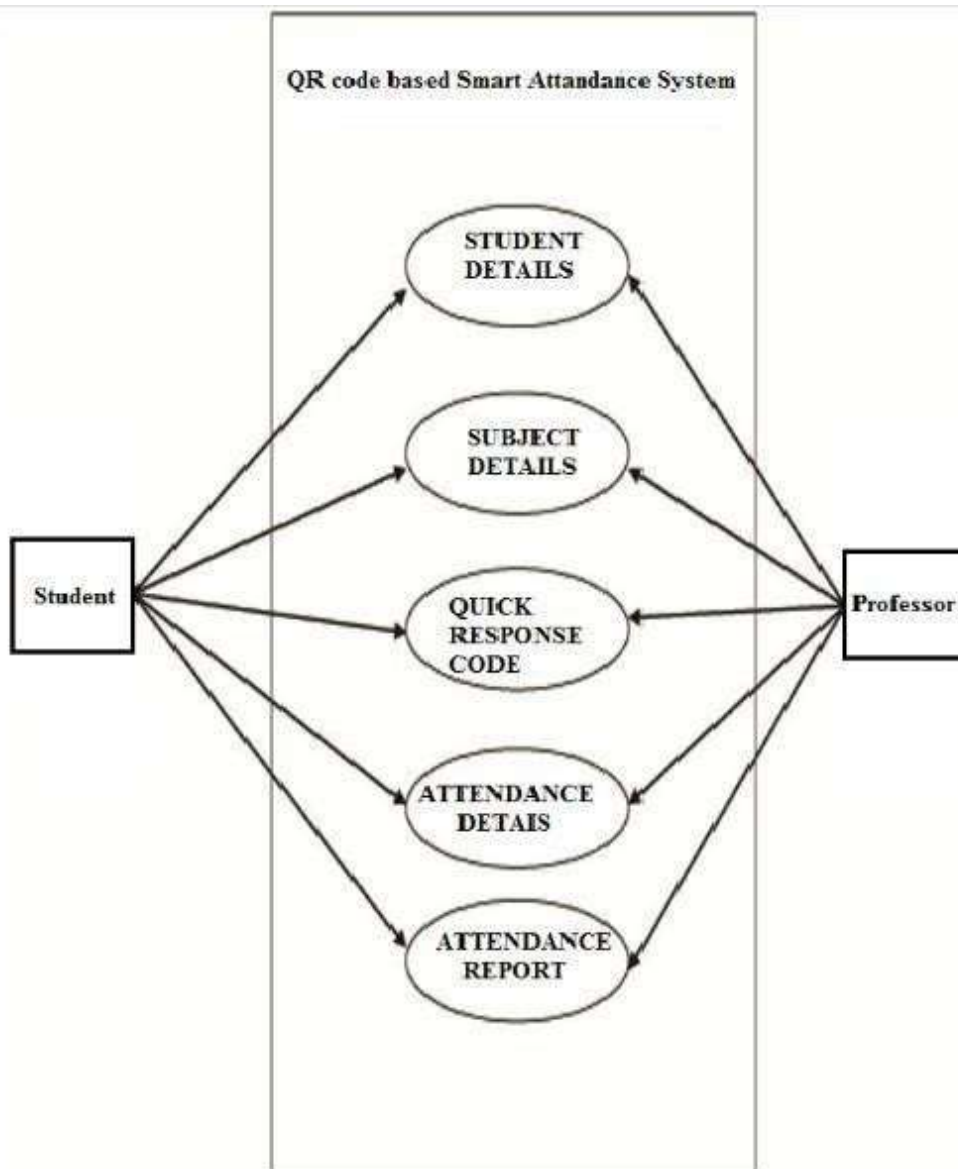
## 4.2 Feasibility study

- Behavioral feasibility: The system Economic feasibility: The developed system is time effective because attendance 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.
- is user friendly.

### 4.3 Class Diagram



#### 4.4 Use case Diagram





## **5. SYSTEM DESIGN**

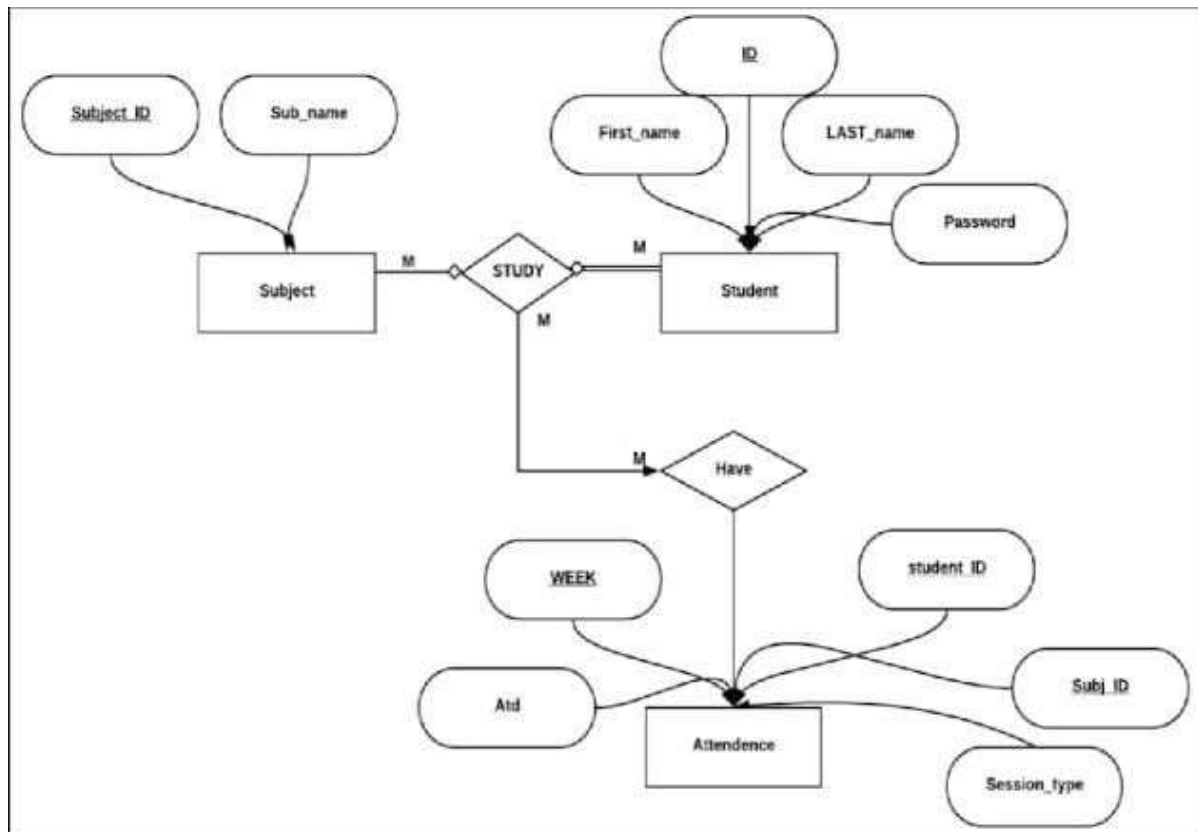
5.1 ER DIAGRAM

5.2 FLOW CHART

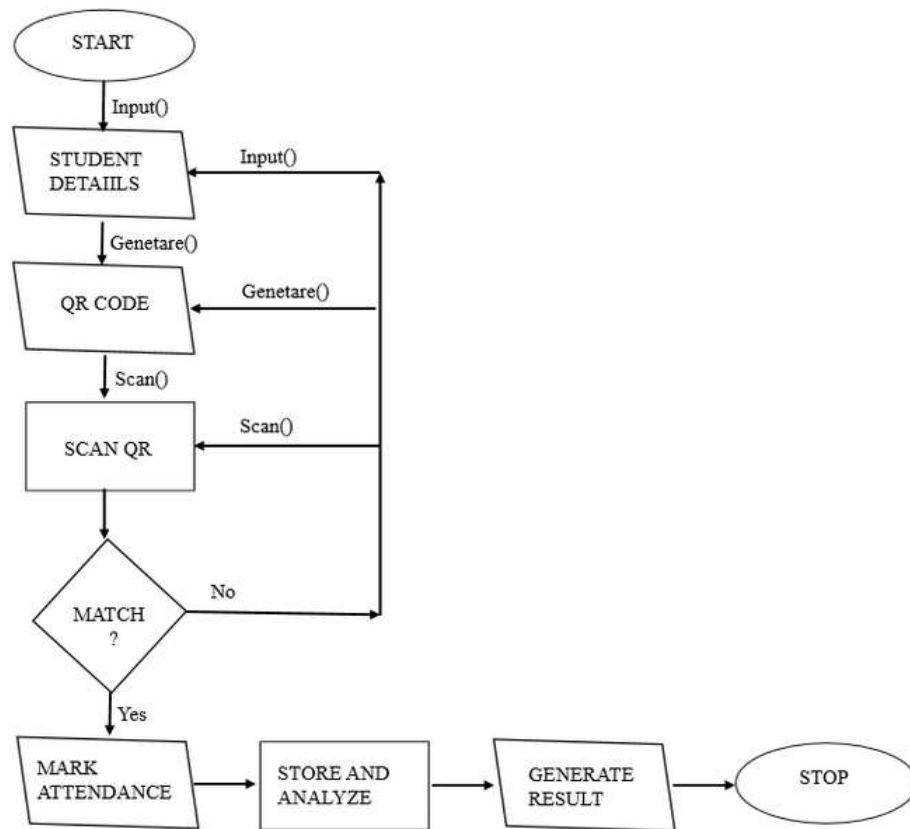
5.3 Sequence Diagram

,

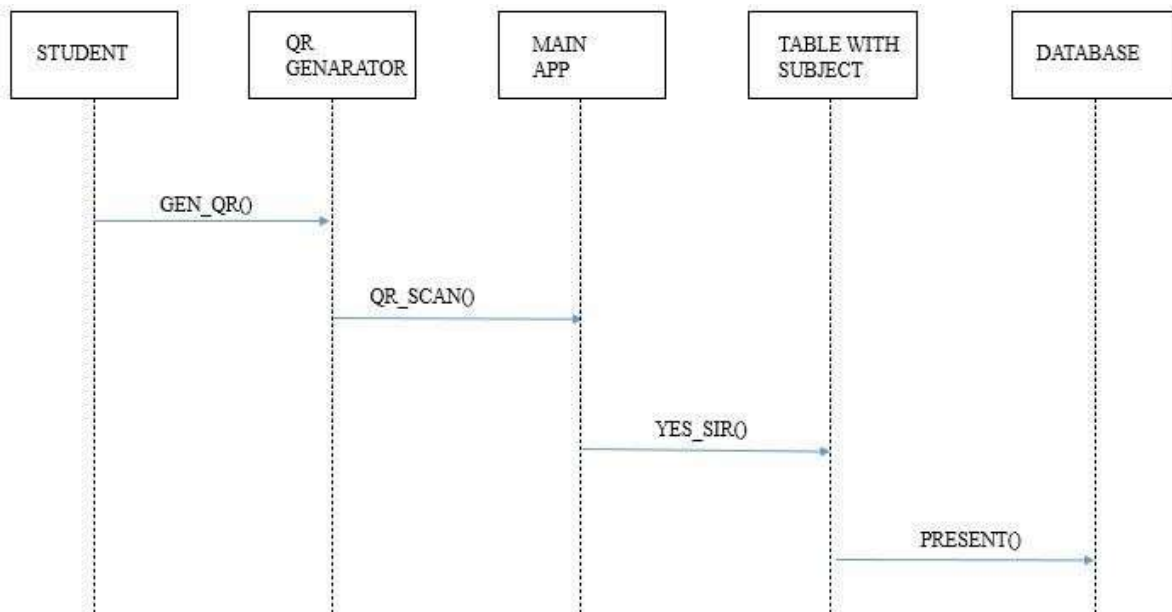
## 5.1 Entity Relationship Diagram



## 5.2 Flowchart\_Diagram



### 5.3 Sequence Diagram



## 6 System Testing

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1. Test Report
2. Testing plan
3. Testing strategies
4. Screenshots

## ***6.1 Test Report***

Test Report is a document which contains a summary of all test activities and final test results of a testing project. Test report is an assessment of how well the Testing is performed. Based on the test report, stakeholders can evaluate the quality of the tested product and make a decision on the software release.

For example, if the test report informs that there are many defects remaining in the product, stakeholders can delay the release until all the defects are fixed.

### **Test report contains**

Project Information:

All information of the project such as the project name, product name, and version should be described in the test report.

Test Objective:

As mentioned in Test Planning tutorial, Test Report should include the objective of each round of testing, such as Unit Test, Performance Test, System Test etc.

Test Summary:

This section includes the summary of testing activity in general.

## 6.2 Testing Plan

### Planning Steps :-

- 1) Functionality Testing
- 2) Usability testing
- 3) Interface testing
- 4) Performance testing
- 5) Security testing

### 1) Functionality Testing:

Test for all the links in web pages, database connection, forms used in the web pages for submitting or getting information from user, Cookie testing.

Check all the links:

- Test the outgoing links from all the pages from specific domain under test.
- Test all internal links.
- Test links jumping on the same pages.
- Test links used to send the email to admin or other users from web pages.
- Test to check if there are any orphan pages.
- Lastly in link checking, check for broken links in all above-mentioned links.

Test forms in all pages:

- Forms are the integral part of any web site. Forms are used to get information from users and to keep interaction with them. So what should be checked on these forms?
- First check all the validations on each field.
- Check for the default values of fields.
- Wrong inputs to the fields in the forms.
- Options to create forms if any, form delete, view or modify the forms.

Let's take example of the Smart City Ambulance project currently we are working on, In this project we have driver registration and live tracking steps . Each registration step is different but dependent on other steps. So registration flow should get executed correctly.

There are different field validations like driver phone number, license number. All these validations should get checked in manual or automated web testing.

### 2) Usability Testing:

Test for navigation: Navigation means how the user surfs the web pages, different controls like buttons, boxes or how user using the links on the pages to surf different

pages. Usability testing includes: Web site should be easy to use. Instructions should be provided clearly. Check if the provided instructions are correct means whether they satisfy purpose. Main menu should be provided on each page. It should be consistent.

Content: Content should be logical and easy to understand. Check for spelling errors. Use of dark colours annoys users and should not be used in site theme. You can follow some standards that are used for web page and content building. These are common accepted Department standards like as I mentioned above about annoying colors, fonts, frames etc. Content should be meaningful. All the anchor text links should be working properly. Images should be placed properly with proper sizes. These are some basic standards that should be followed in web development. Your task is to validate all for UI testing.

Other user information for user help: Like search option, sitemap, help files etc. Sitemap should be present with all the links in web sites with proper tree view of navigation. Check for all links on the sitemap. "Search in the site" option will help users to find content pages they are looking for easily and quickly. These are all optional items and if present should be validated.

### 3) Interface Testing:

The main interfaces are:

- Web server and application server interface

- Application server and Database server interface.

Check if all the interactions between these servers are executed properly. Errors are handled properly. If database or web server returns any error message for any query by application server then application server should catch and display these error messages appropriately to users. Check what happens if user interrupts any transaction in-between? Check what happens if connection to web server is reset in between?

### 4) Performance

Testing Web application should sustain to heavy load. Web performance testing should include:

- Web Load Testing

- Web Stress Testing

Test application performance on different internet connection speed. In web load testing test if many users are accessing or requesting the same page. Can system sustain in peak load times? Site should handle many simultaneous user requests, large input data from users, Simultaneous connection to DB, heavy load on specific pages etc.

**Stress testing:** Generally stress means stretching the system beyond its specification limits. Web stress testing is performed to break the site by giving stress and checked how system reacts to stress and how system recovers from crashes. Stress is generally



given on input fields, login and sign up areas. In web performance testing web site functionality on different operating systems, different hardware platforms is checked for software, hardware memory leakage errors.

## 5) Security Testing:

Following are some test cases for web security testing:

- Test by pasting internal url directly into browser address bar without login. Internal pages should not open.
- If you are logged in using username and password and browsing internal pages then try changing url options directly. I.e. If you are checking some publisher site statistics with publisher site ID= 123. Try directly changing the url site ID parameter to different site ID which is not related to logged in user. Access should denied for this user to view others stats.
- Try some invalid inputs in input fields like login username, password, input text boxes. Check the system reaction on all invalid inputs.
- Web directories or files should not be accessible directly unless given download option.
- Test if SSL is used for security measures. If used proper message should get displayed when user switch from non-secure http:// pages to secure https:// pages and vice versa.
- All transactions, error messages, security breach attempts should get logged in log files somewhere on web server.

## 6.3 Testing Strategies

### White Box Testing:

White box testing (WBT) is also called Structural or Glass box testing. White box testing involves looking at the structure of the code. When you know the internal structure of a product, tests can be conducted to ensure that the internal operations performed according to the specification. And all internal components have been adequately exercised.

### Why we do White Box Testing?

To ensure:

- That all independent paths within a module have been exercised at least once.
- All logical decisions verified on their true and false values.
- All loops executed at their boundaries and within their operational bounds internal data structures validity.

### Need of White Box Testing?

- To discover the following types of bugs:
- Logical error tend to creep into our work when we design and implement functions, conditions or controls that are out of the program
- The design errors due to difference between logical flow of the program and the actual implementation
- Typographical errors and syntax checking

### Limitation Of WBT:

Not possible for testing each and every path of the loops in program. This means exhaustive testing is impossible for large systems. This does not mean that WBT is not effective. By selecting important logical paths and data structure for testing is practically possible and effective.

### Black Box Testing:

- Black box testing treats the system as a “black-box”, so it doesn’t explicitly use Knowledge of the internal structure or code. Or in other words the Test engineer need not know the internal working of the “Black box” or application.
- Main focus in black box testing is on functionality of the system as a whole. The term ‘behavioural testing’ is also used for black box testing and white box testing is also sometimes called ‘structural testing’. Behavioural test design is slightly different from black-box test design because the use of internal knowledge isn’t strictly forbidden, but it’s still discouraged.
- Each testing method has its own advantages and disadvantages. There are some bugs that cannot be found using only black box or only white box. Majority of the application are tested by black box testing method. We need to cover majority of test cases so that most of the bugs will get discovered by black box testing.

- Black box testing occurs throughout the software development and Testing life cycle i.e. in Unit, Integration, System, Acceptance and regression testing stages.

#### Advantages of Black Box Testing

- Tester can be non-technical.
- Used to verify contradictions in actual system and the specifications.
- Test cases can be designed as soon as the functional specifications are complete

#### Disadvantages of Black Box Testing

- The test inputs needs to be from large sample space.
- It is difficult to identify all possible inputs in limited testing time. So writing test cases is slow and difficult.
- Chances of having unidentified paths during this testing.

## 6.4 Screenshot



## 7.Conclusion

The developed system presented in this paper has been successfully designed and tested. The student's attendance status will be analysed and exported. Attendance monitoring system is very important in our daily life. It possesses a really great advantage, among the whole types of code scanning technology, QR Code Based Smart Attendance System is the most accurate. In this project report, we have given an introduction of Attendance monitoring system and its advantage. It is an efficient method to store the attendance in the smart phone rather than wasting the paper.

## 8 Bibliography

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### Web Resources

[www.w3cschools.com](http://www.w3cschools.com)

<https://www.tutorialspoint.com>

<https://www.geeksforgeeks.org>

### Books

Software Engineering by Roger S. Pressman

Software Engineering by K.K. Agrawal