

DATA ACQUISITION IN CONSTRUCTION SITE WITH REMOTE MONITORING

A PROJECT REPORT

Submitted by

VISHNU GS

LLMC18MCA029

to

The APJ Abdul Kalam Technological University

in partial fulfillment of the requirements for the award of the Degree

of

Master of Computer Applications



Department of Computer Applications

LOURDES MATHA COLLEGE OF SCIENCE AND TECHNOLOGY

KUTTICAL, THIRUVANANTHAPURAM

JULY 2021

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at



DEPARTMENT OF COMPUTER APPLICATIONS

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JULY 2021

LOURDES MATHA COLLEGE OF SCIENCE AND TECHNOLOGY

(Managed by Archdiocese of Changanacherry)

(Affiliated to APJ Abdul Kalam Technological University, Kerala)

KUTTICAL, THIRUVANANTHAPURAM-695574

DEPARTMENT OF COMPUTER APPLICATIONS



CERTIFICATE

This is to certify that the report entitled “**DATA ACQUISITION IN CONSTRUCTION SITES WITH REMOTE MONITORING**” submitted by **VISHNU GS** to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of the Degree of Master of Computer Applications is a bonafide record of the project work carried out by him under my guidance and supervision.

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DECLARATION

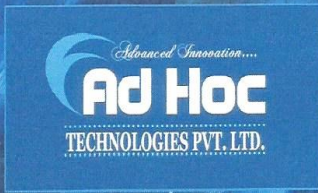
I undersigned hereby declare that the project report '**DATA ACQUISITION IN CONSTRUCTION SITES WITH REMOTE MONITORING**', submitted for the partial fulfillment of the requirements for the award of degree of Master of Computer Applications of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by me under the supervision of Prof. Justin G Russel. This submission represents my ideas in my own words and, I have adequately and accurately cited and referenced the original sources. I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in my submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University.



Place : Trivandrum

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Date : 04/07/2021



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This is to certify that **Mr. VISHNU G S (Reg No: LLMC18MCA029)** student of **“LOURDES MATHA COLLEGE OF SCIENCE AND TECHNOLOGY, KUTTICAL, THIRUVANANTHAPURAM”**, has participated in the live project titled **“ DATA ACQUISITION IN CONSTRUCTION SITES WITH REMOTE MONITORING ”** which has been implemented successfully in our company, during the period **March 2021 to June 2021**.

During the period we found him sincere, honest & hardworking. We wish him all the best in all his future endeavour.

Best Regards

For AdHocTechnologies Pvt Ltd


HR Manager



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ABSTRACT

The exact objective of the **Data Acquisition in Construction Sites with Remote Monitoring** gives process of work monitoring in any Construction Company. The construction company performs various works at various geological points. To update the day to day activities, every site supervisor requires a computer with internet connection at their sites. They also require a camera to capture the construction status. To provide all these facilities at the remote site the construction company has to spend a huge sum of money, time, and space. So to surmount this problem a new framework was proposed. Thus an Android Based Mobile Application to Monitor Works at Remote Sites” has been proposed for the betterment of the construction company. By developing this application the Construction Company can easily record their progress of various works and their day-to-day expenditures that are made at various sites. Also, the system integrates Ip cameras placed in the constitution site. Thus the construction company will get all the updates of construction without any time delay. By providing mobile applications for Site engineers, and owners(clients)the system makes easier ways to complete critical workflows, these technologies can significantly reduce delays, improve quality, and increase profits. The system aims at developing an Android based mobile application that monitors the expenditures made and works performed by the various sites of the Construction Company. The expenditures and construction work made on various sites are recorded and it can be viewed at any point of time. Using the Android based mobile application the day to day activities of the remote construction site can easily be updated to the remote database server .Also photograph and images are uploaded by site engineer .Using the entire data web api generates AI based work progress ,manpower utilization and construction work flow.

CHAPTER 1

1. INTRODUCTION

1.1 GENERAL INTRODUCTION

The construction industry has been criticized as an "old-school" industry, because of being a slow adopter of mobile technologies. Due to the rapid growth in the smartphone applications market, new applications become available every day for use in different industries. Given the large number of choices, both companies and individuals in the construction industry must beware when selecting and purchasing smartphone applications. The business needs of the potential users and the expectations from the applications must be well identified, and the selection must be made accordingly. Properly selecting and deploying smartphone applications for construction-related tasks is expected to improve communication, enhance workflow with real time information, and increase productivity. Our software is an innovative management solution created for the construction . The system can mirror your company's structure and optimize the entire workflow, giving you full control over your business.

Construction professionals use tablets and smartphones to increase job-site efficiency. Both tablets and smartphones combine mobile accessibility with mobile construction management applications, with the added advantage for smartphones that they can fit in a pocket and provide the same benefits. The main advantage gained from the use of such mobile devices is that they enable construction professionals to work interactively and dynamically; data collected from the site is shared in real time among the project participants with visual attachments, and site reports are generated with more accurate and up-to-date information. It is apparent that construction companies need to go mobile in order to stay competitive in the industry. However, it is essential to establish a mobile device strategy before selecting a mobile device and applications. Since carrying multiple devices is not ideal for construction professionals, the selected applications must be compatible for the device used for work purposes. Different mobile devices with different operating systems limit the choice of applications. Thus a cross platform based mobile application development will be more compatible and preferable.

Currently, construction information exchange is done through traditional information and communication methods that are non-automatic and paper-based. However, having construction information digitalized by using a mobile computing technology that runs automatic information management activities is ideal and much desired. Even though the use of mobile applications is gaining popularity in the construction industry, its adoption is a vital

process that must be conducted properly. The study showed that there are five elements that affect adoption: the user, the organization, the technology, the project, and the environment. A successful implementation of new technologies requires training and participation of users. Top management executives' involvement in new technologies facilitates the adoption process. The technology adopted by organizations must be easy to use, compatible, reliable, and provide information security. Project type, cost, duration, specifications, and location must also be considered in selecting and adopting technologies. The environment affects the use of mobile technologies indirectly. In recent years, construction companies have become aware of the potential in using mobile applications. Some companies are developing their own mobile applications. The reason behind this shift is that a large amount of information is produced during construction, but this information is not managed efficiently

1.2 GOAL OF PROJECT

The overall goal of **Data Acquisition in Construction Sites with Remote Monitoring** is to provide , work monitoring in construction sites. The company performing various works at various location and each location may be farway. Each site may be handled by a different site enginner, the site enginner visits daily to the construction site inorder to verify and check the daily work progress.this app can be used by the site engineer to update the daily work updates of the site.the updates provided by those site engineer can be accesed by the clients, the main goal of the project is to provide a platform which can be accessible by the users and get proper and valid information about their sites, the site engineer can update the details of daily work progress and share images of the work, this may lead good communication between the client and the customers.

CHAPTER 2

2. LITERATURE SURVEY

2.1 STUDY OF SIMILAR WORK

The **Data Acquisition in Construction Sites with Remote Monitoring** is an android application which is helpful for the making customer relation smoother. this application will help to exchange of information from construction company to the clients about their ongoing project. In existing system all the activities are done manually. It is very much costly and time consuming. The existing method followed is in a traditional way or by sending messages or email over a network, a proper communication is not followed by any of the companies. In our proposed system there is so many advanced feature which can overcome those issues. The old way of manual work are being changed by the proposed system. The important factor is that anyone having smartphone with valid login credentials can use in any platform.

2.1.1 EXISTING SYSTEM

Currently, construction information exchange is done through traditional information and communication methods that are non-automatic and paper-based. Social media application like whatsapp are used by site engineers for image and video sharing. Normally communications are via those applications. Most of the companies are following such manner in order to exchange of information or data to the customer. The traditional way exchanging of information can lead to mis-communication between the customers and the companies. Some of the companies are providing web applications to know the facility and infrastructure of the construction company, but those web applications are just for their business purpose. Those applications can be used by any user on the internet and can access the details of the construction company. For an individual who is giving a project to a company cannot view the updates through websites, some of them having the final project result in the website to boost the company. You cannot get closer to the client and build a trusting relationship. All those things are in a traditional way of communication.

2.1.2 DRAWBACKS OF EXISTING SYSTEM

- ❖ monitoring the entire system is a tedious task.
- ❖ It is very time consuming to manage the necessary activity schedule of various operation and maintenance works details.
- ❖ It is difficult to calculate or keep track of the amount of work done, make records, and retrieve previous records.
- ❖ Data and records are not organized
- ❖ Since third party applications are data loss and security issues may occur
- ❖ No location based services are there so cant track site engineer activities
- ❖ No daily updates are reports available
- ❖ Co ordination with entire team and transfer of data -diagrams ,plans etc are difficult
- ❖ Searching or sorting or finding data on day basis or name bases is difficult

CHAPTER 3

3. OVERALL DESCRIPTION

3.1 PROPOSED SYSTEM

Most of the information and communication related activities in the construction industry are time consuming when conducted manually. It is stated that it takes time to obtain an organized and complete report of visual inspection of damaged structures because engineers capture photos and gather information on site individually, and because the detection and quantification of the damage is measured through cumbersome manual approaches. Thus, system focus on mobile application to improve the current practice in team-based visual inspection of civil structures. A smartphone provides a constant feed of information among people that interact with each other on a daily basis. Using a smartphone for work purposes is a decision that many contractors are considering today. One of the potential benefits is that a construction manager can monitor job-site productivity, and take necessary actions to maximize efficiency. Built-in cameras allow project participants to exchange site data with photos and videos which, in some cases, are much more detailed and informing than a conversation. Real time job site data with visual attachments can even increase a contractor's credibility with the owner. With a variety of selections, construction companies and professionals can find commercially available applications that can assist with day-to-day operations, increase productivity, credibility, and cost efficiency

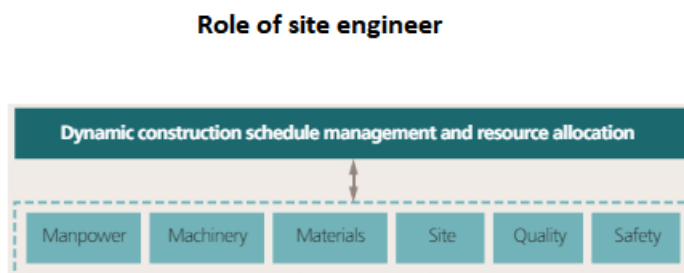
Thus, the proposed system is an Android Based Mobile Application to Monitor Works at Remote Sites". It has been proposed for the betterment of the construction company. By developing this application, the Construction Company can easily record their progress of various works and their day-to-day expenditures that are made at various sites. Also, the system integrates Ip cameras placed in the constitution site. Thus, the construction company will get all the updates of construction without any time delay. By providing mobile applications for Site engineers, and owners(clients)the system makes easier ways to complete critical workflows, these technologies can significantly reduce delays, improve quality, and increase profits.

Objectives of the system includes:

- One app for all platforms – Android, iOS operating system, mobile or tablet interfaces
- Real-time backend integration – directly into your organization's core
- Built-in Security and User Management
- Use smart device capabilities, including GPS, camera activation and barcode scanning within the app.

3.2 FEATURES OF PROPOSED SYSTEM

Site engineer Mobile Application:



- Site engineer can login with credentials
- Can view construction site and details
- Can view diagrams and information
- Can update daily work reports
- Can upload images and videos regarding work
- Can upload human resource details

- Can upload materials details
- Can view milestones and to do works
- Can get notifications
- Can view client queries
- Can view ip camera
- checking technical designs and drawings to ensure that they are followed correctly
- supervising contracted staff
- ensuring project packages meet agreed specifications, budgets and/or timescales
- providing technical advice and solving problems on site
- Location based updates are marked on daily report so that company can track site engineer efficiency
- Locate diff site in google map,get map view for travelling
- Details from site engineer are uploaded to server via web service.These details can be used in the web application for AI based perdition of work efficiency
- Can communicate with team members
- Can contact client and can give updates to client queries
- Can get machinery and tools details in the site
- Can upload petty expenses and bill details
- Integrated Bar code scanner to scan different barcodes in machines,equipment's etc
- can view safety features and worker details
- Can update issues and changes
- Can save details offline in case of internet or sever issues

3.3 FUNCTIONS OF PROPOSED SYSTEM

- **Enhancement:** The main objective of Data Acquisition in Construction Sites with Remote Monitoring is to enhance and upgrade the existing system by increasing its efficiency and effectiveness. The software improves the working methods by replacing the existing manual system with new features.
- **Accuracy:** The Data Acquisition in Construction Sites with Remote Monitoring provides quick response & very accurate information regarding the Onsite progress etc. Any details or system in an accurate manner, as and when required.
- **User-Friendly:** The Data Acquisition in Construction Sites with Remote Monitoring has a very user-friendly interface. Thus, the users will feel very easy to work on it. The Application provides accuracy along with a pleasant interface. Make the present manual system more interactive, speedy and user friendly.
- **Availability:** The data which uploaded can be retrieved as and when required. Thus, there is no delay in the availability of any information, whatever needed, can be obtained very quickly and easily.

3.4 REQUIREMENTS SPECIFICATION

A software requirements specification (SRS) is a detailed description of a software system to be developed with its functional and non-functional requirements. The SRS is developed based on the agreement between customer and contractors. It may include the use cases of how user is going to interact with software system. The software requirement specification document consists of all necessary requirements required for project development. To develop the software system we should have clear understanding of Software system. To achieve this we need to have continuous communication with customers to gather all requirements.

A good SRS defines how Software System will interact with all internal modules, hardware, communication with other programs and human user interactions with wide range of real life scenarios. Using the *Software requirements specification* (SRS) document on QA lead, managers create test plan. It is very important that testers must be cleared with every detail specified in this document in order to avoid faults in test cases and its expected results.

It is highly recommended to review or test SRS documents before start writing test cases and making any plan for testing. Let's see how to test SRS and the important point to keep in mind while testing it.

3.5 FEASIBILITY ANALYSIS / STUDY

The main aim of the feasibility study activity is to determine. Whether it would be financially and technically feasible to develop the product. The feasibility study activity involves analysis of the problem and collection of all relevant information relating to the product such as the different data items which would be input to the system the processing required to be carried out of these data, the output data required to be carried out of these data, the output data required to be produced by the system, as well as various constraints on the behaviour of the system.

In our application we would find the actual requirements of this software and add that features Such as monitoring, protocoring etc. For adding this feature, we will like take different ways to solving this last find the best way to complete these features.

Feasibility studies aim to objectively and rationally uncover the strengths and weakness of the existing business or proposed venture, opportunities and threats as presented by the environment, the resources required to carry through, and ultimately the prospects for success. In its simplest term, the two criteria to judge feasibility are cost required and value to be attained As such, a well-designed feasibility study should provide a historical background of the business or project, description of the product or vice, accounting statements, details of the operations and management, marketing research and policies, financial data, legal requirements and tax obligations. Generally, studies precede technical development and project implementation.

The feasibility study to be conducted for this project involves

3.5.1 TECHNICAL FEASIBILITY

The technical Feasibility depends on the technical aspects of the proposed system. The main consideration is to be given at the study of available resources of the organizations where the project is to be developed and implemented. Here the system analyst evaluates the technical merits of the given system emphasis on the performance, reliability, maintainability and productivity. In our project technical feasibility is implemented in such a way that the required resources and its availability was successfully studied and applied.

3.5.2 OPERATIONAL FEASIBILITY

Operational analysis is the most frequently used method for evaluating the effectiveness of a new system. More commonly known as cost/benefit analysis, the procedure is to determine the benefits and saving that are expected from a candidate system and compare them with costs. If benefits outweigh costs, then the decision is made to design and implement the system. An entrepreneur must accurately weigh the cost versus benefits before taking an action. Cost-based study: It is important to identify cost and benefit factors, which can be categorized as follows:

1. Development costs.
2. Operating costs.

This is an analysis of the costs to be incurred in the system and benefits derivable out of the system. Time-based study: This is an analysis of the time required to achieve a return on investments the future value of a project is also a factor. The system is operationally Feasible

3.5.3 ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus, the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

In case of new project, financial viability can be judged on the following parameters:

- Total estimated cost of the project
- Financing of the project in terms of its capital structure, debt equity ratio and promoter 's share of total cost
- Existing investment by the promoter in any other business

Projected cash flow and profitability.

The system is Economically Feasible

3.5.4 BEHAVIOURAL FEASIBILITY

The behavioral feasibility depends upon whether the system performed in the expected way or not. Feasibility study is a test of system proposal according to its workability, impact on organization ability to meet the user's need and efficient use of resources. However, a feasibility study provides a useful starting point for full analysis. Our project checks whether the system is performed in the expected way or not. For this we have given inputs for checking whether the expected outputs where generated. Feasibility study is a test of system proposal according to its workability, impact on organization ability to meet the user's need and efficient use of resources. However, a feasibility study provides a useful starting point for full analysis.

CHAPTER 4

4. OPERATING ENVIRONMENT

4.1 HARDWARE REQUIREMENT

Processor	: Intel i5 8th Gen
RAM	: 8 GB DDR4
Hard Disk	: 512 GB SSD
Display Size	: Compatible Size(Recommend 15'inch)
Screen Resolution	: 1920*1080 Pixels
Keyboard	: Wireless Enabled Keyboard(Recommend :Logitech)
Keyboard Mouse	: Wireless Enabled Mouse (Recommend :Logitech)
MONITOR	: LED Monitor
Dedicated Graphics Card	: Nvidia Geforce GTX 1050 4GB DDR5

4.2 SOFTWARE REQUIREMENT

Operating System	: Windows (7/8/10)/Ubuntu (14/16/18/20)
Programming Language	: Dart, Java
IDE	: Android studio 4.1
Front-End	: Flutter SDK, Android SDK,
Back-End	: Mysql, Sqlite

4.3 TOOLS AND PLATFORMS

4.3.1 DART:

DART is an open-source general-purpose programming language. It is originally developed by Google and later approved as a standard by ECMA. Dart is a new programming language meant for the server as well as the browser. Introduced by Google, the Dart SDK ships with its compiler – the Dart VM. The SDK also includes a utility -dart2js, a transpiler that generates JavaScript equivalent of a Dart Script. This tutorial provides a basic level understanding of the Dart programming language.

Features of DART

- Open Source-Dart is an open-source programming language, which means it is freely available. It is developed by Google, approved by the ECMA standard, and comes with a BSD license.
- Platform Independent-Dart supports all primary operating systems such as Windows, Linux, Macintosh, etc. The Dart has its own Virtual Machine which known as Dart VM, that allows us to run the Dart code in every operating system.
- Object-Oriented-Dart is an object-oriented programming language and supports all oops concepts such as classes, inheritance, interfaces and optional typing features. It also supports advance concepts like mixin, abstract, classes, reified generic, and robust type system.
- Concurrency-Dart is an asynchronous programming language, which means it supports multithreading using Isolates. The isolates are the independent entities that are related to threads but don't share memory and establish the communication between the processes by the message passing. The message should be serialized to make effective communication. The serialization of the message is done by using a snapshot that is generated by the given object and then transmits to another isolate for desterializing.
- Extensive Libraries-Dart consists of many useful inbuilt libraries including DK (Software Development Kit), core, math, async, math, convert, html, IO, etc. It also provides the facility to organize the Dart code into libraries with proper namespacing. It can reuse by the import statement.
- Easy to learn-As we discussed in the previous section, learning the Dart is not the Hercules task as we know that Dart's syntax is similar to Java, C#, JavaScript, kotlin, etc. if you know any of these languages then you can learn easily the Dart.
- Flexible Compilation-Dart provides the flexibility to compile the code and fast as well. It supports two types of compilation processes, AOT (Ahead of Time) and JIT (Just-in-Time). The Dart code is transmitted in the other language that can run in the modern web-browsers.

- **Type Safe**-The Dart is the type safe language, which means it uses both static type checking and runtime checks to confirm that a variable's value always matches the variable's static type, sometimes it known as the sound typing.
- **Objects**-The Dart treats everything as an object. The value which assigns to the variable is an object. The functions, numbers, and strings are also an object in Dart. All objects inherit from Object class.
- **Browser Support**-The Dart supports all modern web-browser. It comes with the dart2js compiler that converts the Dart code into optimized JavaScript code that is suitable for all type of web-browser.
- **Community**-Dart has a large community across the world. So if you face problem while coding then it is easy to find help. The dedicated developers' team is working towards enhancing its functionality.

4.3.2 JAVA:

JAVA is a general-purpose programming language that is class-based, object-oriented, and designed to have as few implementation dependencies as possible. Java applications are typically compiled to byte code that can run on any Java virtual machine (JVM) regardless of the underlying computer architecture. & J2EE applications are made up of components such as Java Server Pages (JSP), Java servlets, and Enterprise JavaBeans (EJB) modules. These components enable software developers to build large-scale, distributed applications. Developers package J2EE applications in Java Archive (JAR) files (similar to zip files), which can be distributed to production sites. Administrators install J2EE applications onto the Application Server by deploying J2EE JAR files onto one or more server instances (or clusters of instances).

Features of Java

- **Object Oriented** – In Java, everything is an Object. Java can be easily extended since it is based on the Object model.
- **Platform Independent** – Unlike many other programming languages including C and C++, when Java is compiled, it is not compiled into platform specific machine, rather into platform-independent bytecode. This byte code is distributed over the web and interpreted by the Virtual Machine (JVM) on whichever platform it is being run on.
- **Simple** – Java is designed to be easy to learn. If you understand the basic concept of OOP Java, it would be easy to master.
- **Secure** – With Java's secure feature it enables to develop virus-free, tamper-free systems. Authentication techniques are based on public-key encryption.

- Architecture-neutral – Java compiler generates an architecture-neutral object file format, which makes the compiled code executable on many processors, with the presence of Java runtime system.
- Portable – Being architecture-neutral and having no implementation dependent aspects of the specification makes Java portable. The compiler in Java is written in ANSI C with a clean portability boundary, which is a POSIX subset.
- Robust – Java makes an effort to eliminate error-prone situations by emphasizing mainly on compile time error checking and runtime checking.
- Multithreaded – With Java multithreaded feature it is possible to write programs that can perform many tasks simultaneously. This design feature allows the developers to construct interactive applications that can run smoothly.
- Interpreted – Java byte code is translated on the fly to native machine instructions and is not stored anywhere. The development process is more rapid and analytical since the linking is an incremental and light-weight process.
- High Performance – With the use of Just-In-Time compilers, Java enables high performance.
- Distributed – Java is designed for the distributed environment of the internet.
- Dynamic – Java is considered to be more dynamic than C or C++ since it is designed to adapt to an evolving environment. Java programs can carry an extensive amount of run-time information that can be used to verify and resolve accesses to objects at run-time.

4.3.3 MYSQL:

MySQL Server is the world's most used relational database management system (RDBMS) that runs as a server providing multi-user access to a number of databases. This stores data in the form of multiple related tables. The SQL phrase stands for Structured Query Language. The MySQL development project has made its source code available under the terms of the GNU General Public License, as well as under a variety of proprietary agreements. MySQL was owned and sponsored by a single for-profit firm, the Swedish company MySQL AB, now owned by Oracle Corporation.

4.3.4 SQLLITE:

SQLite is a C-language library that implements a small, fast, self-contained, high-reliability, full-featured, SQL database engine. SQLite is the most used database engine in the world. SQLite is built into all mobile phones and most computers and comes bundled inside countless other applications that people use every day. The SQLite file format is stable, cross-platform, and backwards compatible and the developers pledge to keep it that way through the year 2050. SQLite database files are commonly used as containers to transfer rich content between systems and as a long-term archival format for data. There are over 1 trillion (1e12)

SQLite databases in active use .SQLite source code is in the public-domain and is free to everyone to use for any purpose.

4.3.5 ANDROID SDK:

SDK is a collection of tools which make easiness and help in app development. It is an essential part of the android application development.

4.3.6 ANDROID STUDIO:

Android Studio is an official IDE for Android Operating System of Google. It is specially built for Android Development and is based on IntelliJ IDEA software. Mostly Java is used but app can also be built using C++. It targets all size of screen devices like android smart phones, Tablets, Smart TVs and Wearable devices. For coding, there is a most featured editor and a layout designer. For the output, an Emulator is given which is also known as Android Virtual Device (AVD) which looks like real device

4.3.7 FLUTTER SDK

Flutter is an open-source UI software development kit created by Google. It is used to develop applications for Android, iOS, Linux, Mac, Windows, Google Fuchsia, and the web from a single codebase. Flutter apps are written in the Dart language and make use of many of the language's more advanced features. On Windows, macOS, and Linux Flutter runs in the Dart virtual machine, which features a just-in-time execution engine. While writing and debugging an app, Flutter uses Just In Time compilation, allowing for "hot reload", with which modifications to source files can be injected into a running application. Flutter extends this with support for stateful hot reload, where in most cases changes to source code are reflected immediately in the running app without requiring a restart or any loss of state.

Release versions of Flutter apps are compiled with ahead-of-time (AOT) compilation on both Android and iOS, making Flutter's high performance on mobile devices possible.

4.3.8 GOOGLE MAP

Google map is a product of Google and it shows Map of the world with many great features. The features we have used for the development of this app include: Navigation, Direction, Markers, Current Location, Distance, Duration and Path. HTTP.

4.3.9 JSON WEB SERVICE

JSON-WSP (JavaScript Object Notation Web-Service Protocol) is a web-service protocol that uses JSON for service description, requests and responses. ... The description format has the same purpose for JSON-WSP as WSDL has for SOAP or IDL for CORBA, which is to describe the types and methods used in a given service.

4.4.0 SAFETY REQUIREMENTS

The application will not affect data stored outside of its servers nor will it affect any other applications installed in the system. It cannot cause any damage to the system or internal components. The application can be used in any browser or laptop, which meets minimum system specifications as mentioned above. As per the client request the application may use 1) Google Cloud Platform provides infrastructure as a service, platform as a service, and server less computing environments. It provides a series of modular cloud services including computing, data storage, data analytics and machine learning.¹⁸ 2) Amazon Web Services is a subsidiary of Amazon that provides on-demand cloud computing platforms and APIs to individuals, companies, and governments, on a metered pay-as-you-go basis

4.4.1 SECURITY REQUIREMENTS

Security relies on Google Cloud Platform Service Account/Data server maintained by client, for authentication, instead of the previously used client and developer access tokens. The Google security model is an end-to-end process, built on over 15 years of experience focused on keeping customers safe on Google applications like Gmail, Search and other Apps. With Google Cloud Platform your applications and data take advantage of the same security model.

CHAPTER 5

5. DESIGN

5.1 SYSTEM DESIGN

System can be defined, as an orderly grouping of interdependent components can be simple or complex. The most creative and challenging phase of the system life cycle is system design. The term design describes a final system and the process by which it is developed .It refers to the technical specifications that will be applied in implementing the candidate system .It also includes the construction of programs and program testing. The first step in the system design is to determine how the output is to be produced and in what format. Samples of the output and the inputs are also presented in the second step, input data and master files are to be designed to meet requirement of the proposed output .The processing phase's system's objectives and complete documentation.

System design has two phases:

- Logical
- Physical

The logical design reviews the present physical system, prepares the input and output and also prepares a logical design walk- through. We have to deal with how to take entries required and whether and how to process the user data.

Physical design maps out the details of the physical system, plans the system implementation, devices a test and implementation plan and new hardware and software.

We have to decide how and where to store the input data and how to process it so as to present it to the user in an easy, informative and attractive manner.

Modules

- Profile updates
- Work updates
 - (i) Quick Updates
 - (ii) Daily Reports
 - (iii) To do lists
- Construction details
- Album and gallery
- Google Map API
- Qr/bar code readers
- Expense Tracker
- ip cameras

ABOUT THE PROJECT (The main modules of the project are)

Data Acquisition in Construction Sites with Remote Monitoring is one the leading mobile application for an entire construction details regarding each construction site is included in this module .Below are the sub module details

- **Profile updates**

In this module,it deals with the site engineer profile,in which all the details of site engineer has been given,it can be updated or can be viewedthe user can can update or edit any of the information in the profile

- **Work updates**

This module deals with the work updates of site engineers .Below are the sub modules

- (i) **Quick Updates:**

Quick updates deals with quick updates in the site.Site engineer must visit his/her construction sites multiple times a day ,during that time he/she must update the work details with images.Also if they found any issues ,those issues must be update with images.Application takes the location coordinates of site engineer while updating these details to server.which help to track site engineer work .

- (ii) **Daily Reports:**

The daily work report deals with daily updates in the construction site.Site engineer must update the entire construction report at the end of the working day through this

module.he/she must upload work details in a day which includes report,work status in the site,no of employees worked,upload documents & images.Also have to update complaints and messages with images.

(iii) **To do lists:**

Manager will assign daily jobs to site engineer .These daily jobs are listed in this module.Site engineer view the details of this job and have to give a report after completion of each and ever task in todolist

- **Construction details :**

This module is related with construction projects and its details.Site engineer login to the application and will view the entire construction details .He/she will view the details such as construction projects names,Locations,features of the construction ,view all documents related to the construction,details of the client etc.Also Location details on the construction site is implemented using google map.

- **Album and gallery:**

This module also deals with album and gallery.site engineer can create albums and can upload images of construction .These album can be viewed by client and the verification from manager web application.Also these albums are published in portfolio after the completion of the construction work

- **Google Map API:**

In this module Google Map API is integrated with the application which helps site engineer to view site location in google map with route maps,which helps site engineer to travel from to unknown construction location easily .

- **Qr/bar code readers:**

This module helps site engineer to scan QR codes /Bar codes which are used on different machines,employee idcards,Tool Kits etc .This application module uses android camera feature to scan qr/bar codes

- **Expense Tracker:**

This module also deals with expense details .Using expense details feature site engineer can update petty expenses that occurs in the site such as travel expense, purchase of small construction materials such a nail,clamps etc.

- **Ip cameras:**

This module deals with the integration of ip camera API in site engineer application, Which helps site engineer for remote monitoring .HTTP request session of the IP camera SDK is implemented in this module which helps to select construction sites and view IP camera installed in that remote locations

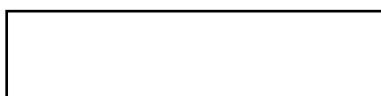
5.2 Data Flow Diagram

Data Flow Diagram (DFD) are directed graphs in which the nodes specify processing activities and the arcs that specify data items transmitted between processing nodes. Like flow charts DFD can be used at any desired level of abstraction. A DFD might represent data flow between individual statements or block of statements in a routine, data flow between concurrent process and data flow in a distributed computing system. Unlike flow charts DFD do not indicate a decision logic or condition under where various processing nodes in the diagram might be activated.

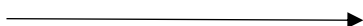
DFD is necessary for communicating for customer during requirement analysis; they are also widely used for representing external and internal design specifications. In the lack of structure DFD's are quite valuable for establishing meaning, conventions and names of system components such as subsystems, files and data links. A database is a collection of interrelated data stored with minimum redundancy to serve many users quickly and efficiently to make the data access easy, inexpensive and flexible to the user

A DFD consists of a series of bubbles joined by lines. The bubble represents data transformation and line represents data flow in the system. In the normal convention a DFD has four major symbols:

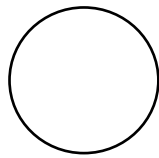
- Square, this defines source or destination of data.



- Arrow, which shows data flow



- Circle, which represents a process that transforms incoming data into outgoing flow



- Open rectangle, which shows a data store.



Figure 5.1 DFD Components

5.2.2 PROJECT DFD

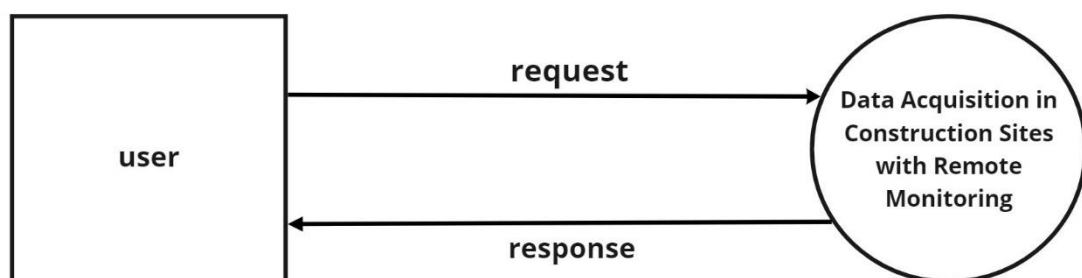


Figure 5.2 Context level

Level 1

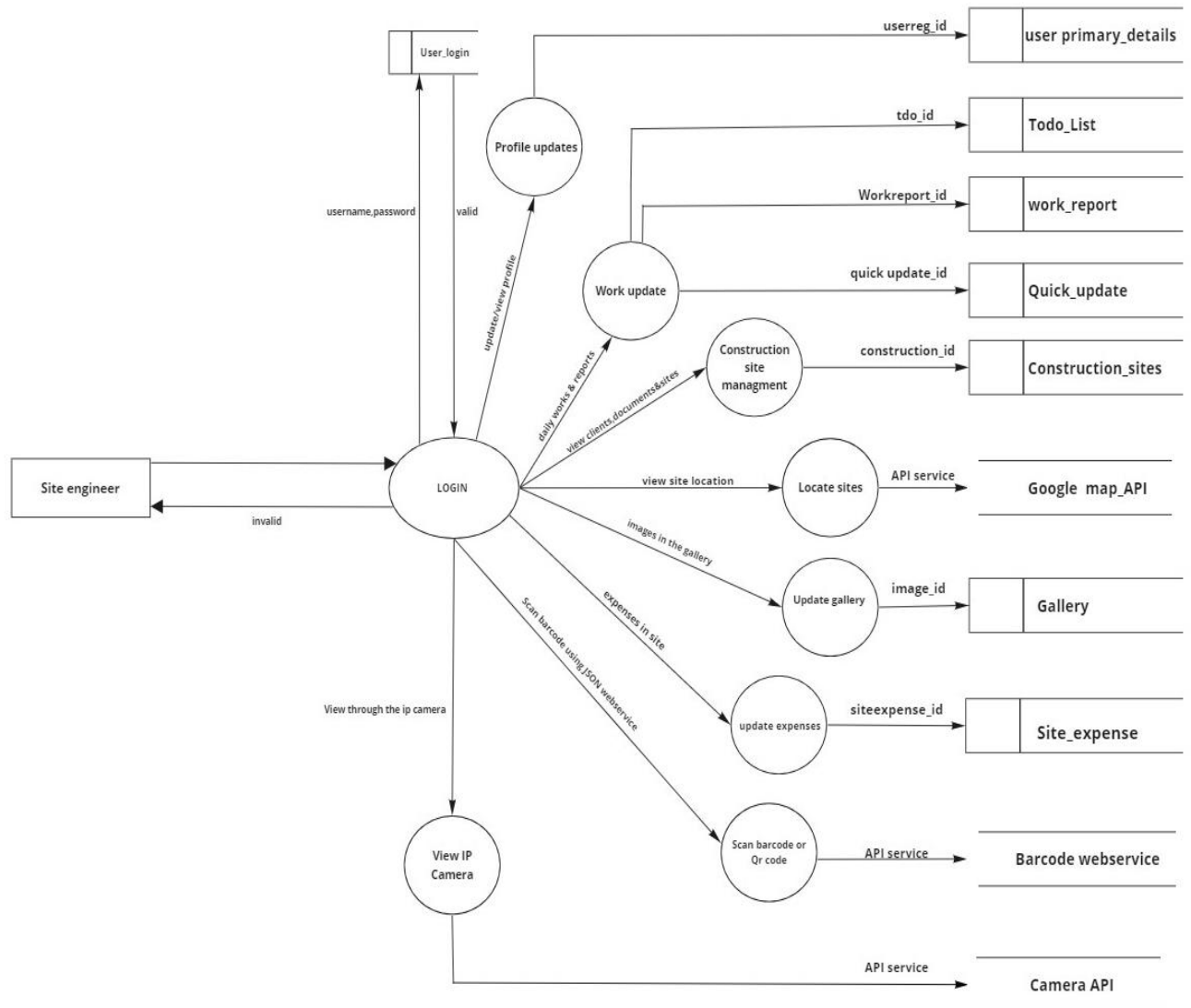


Figure 5.3 Module Description (Level 1)

Level 2 (profile updates)

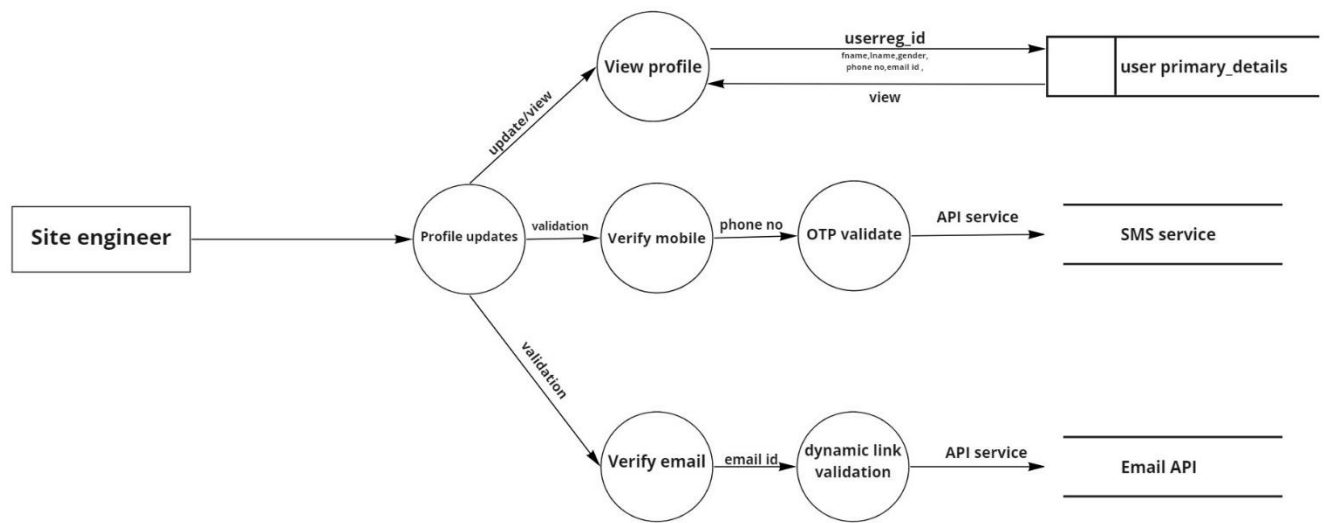


Fig: 5.4 Profile DFD Level 2

Level 2 (work updates)

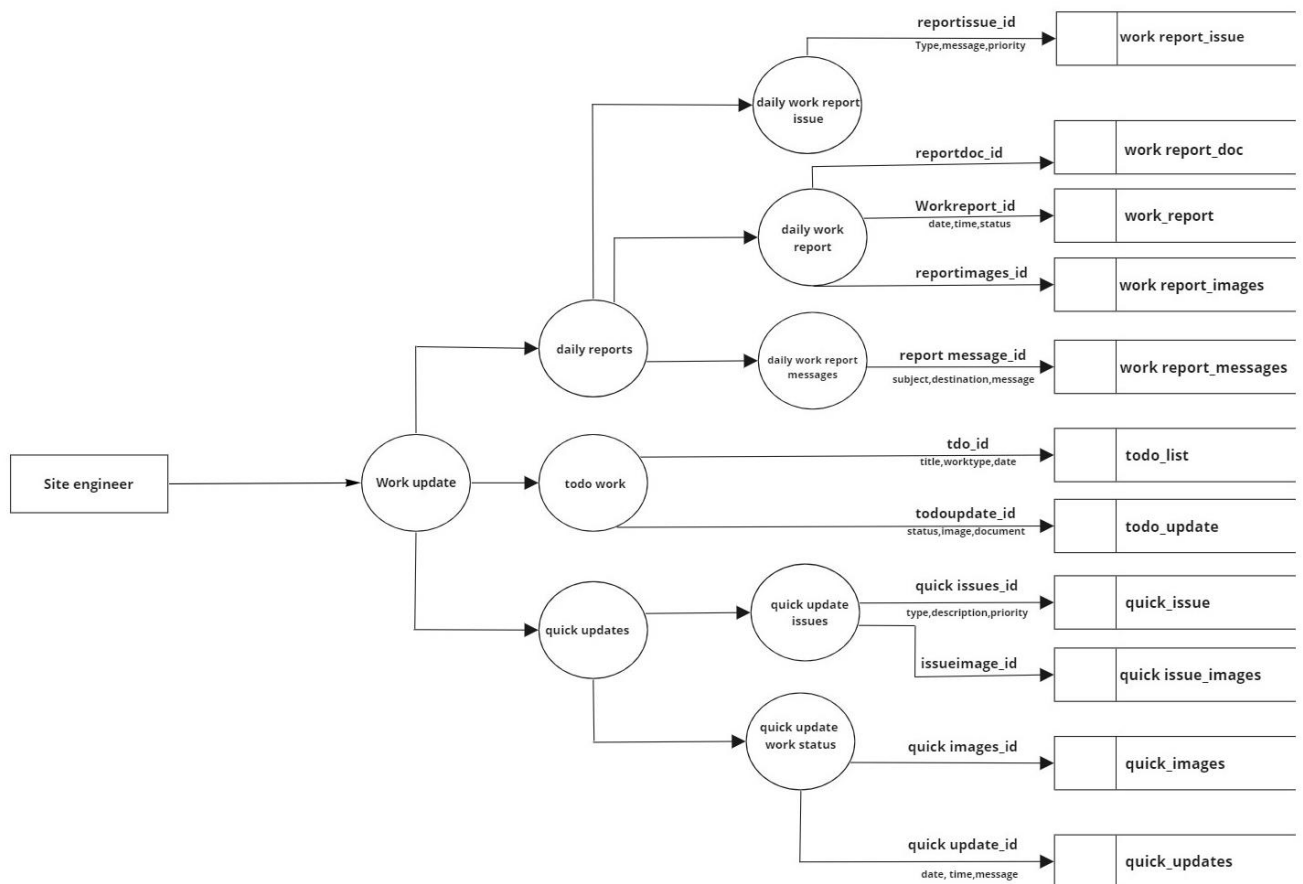


Fig: 5.5 Work update DFD Level 2

Level 2 (Construction site management)

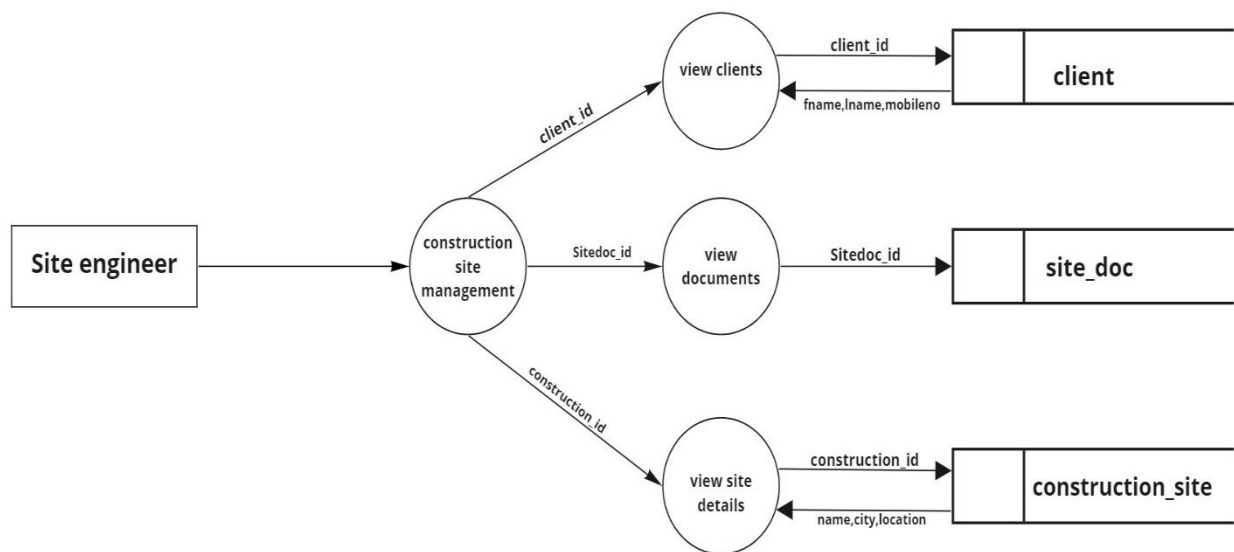


Fig: 5.6 Construction site management DFD Level 4

Level 2 (Locate Site details)

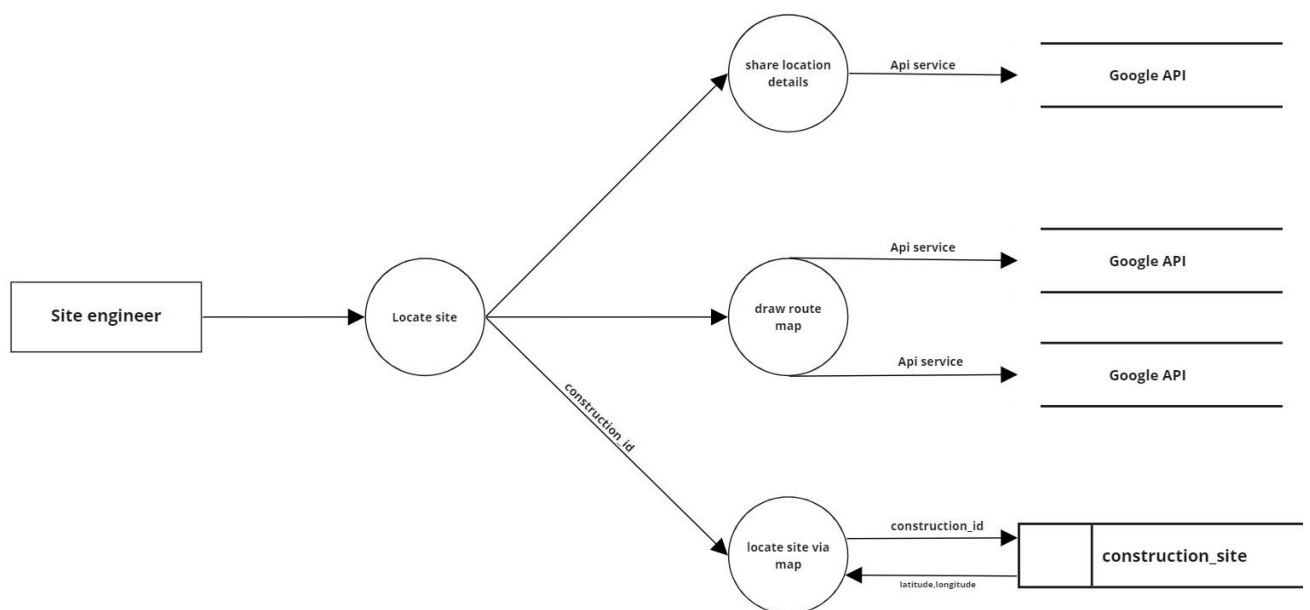


Fig: 5.7 Locate Site details DFD Level 2

Level 2 (update gallery)

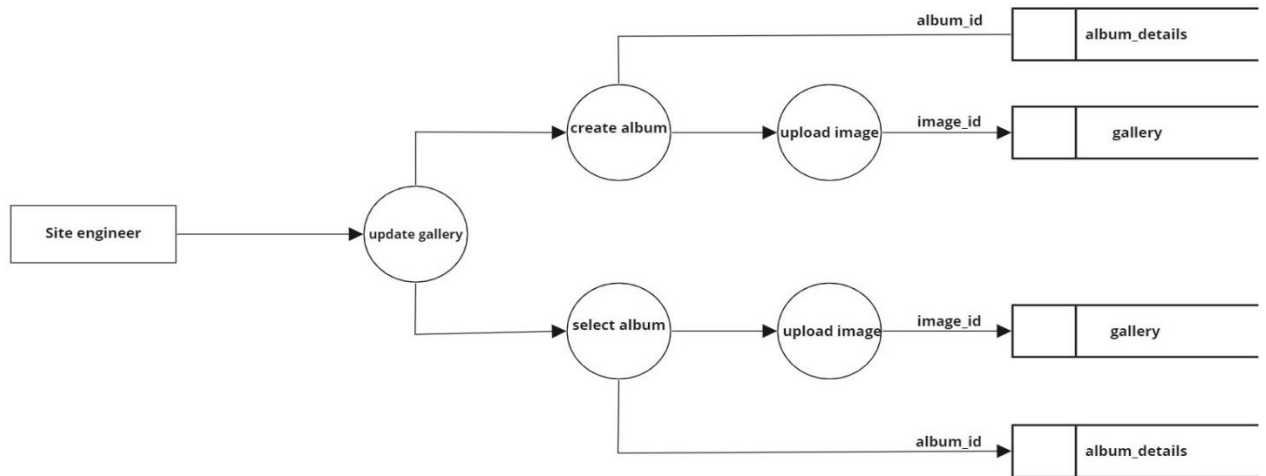


Fig: 5.8 Gallery DFD Level 2

Level 2 (Update expenses)

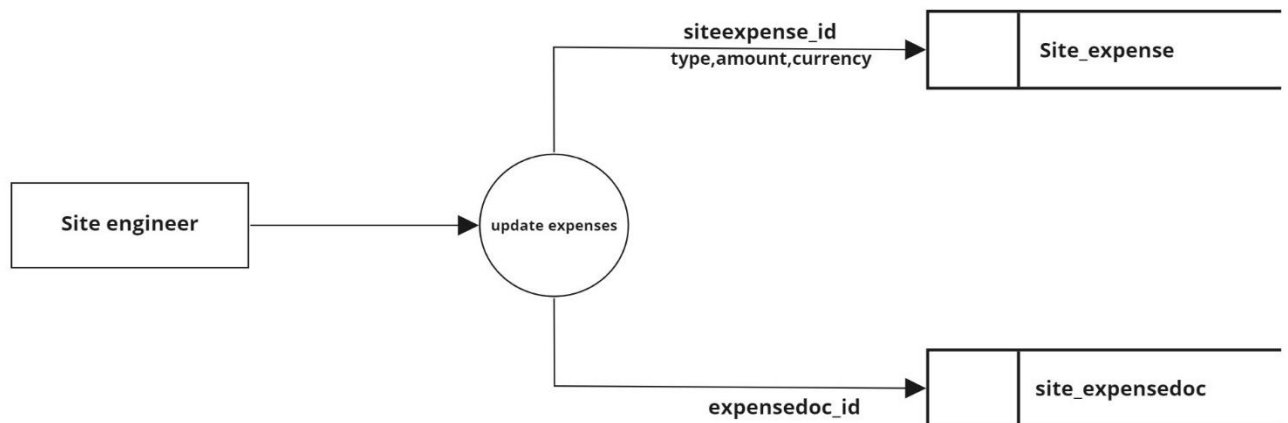


Fig: 5.9 Update expenses DFD Level 2

Level 2 (barcode & Qr code)

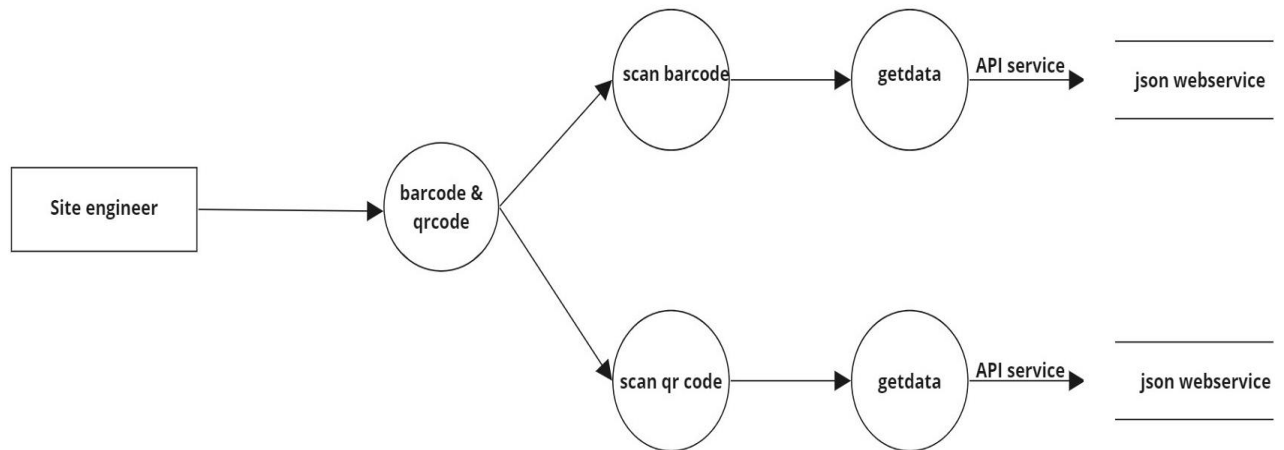


Fig: 5.10 barcode & Qr code DFD Level 2

Level 2 (Ip camera)

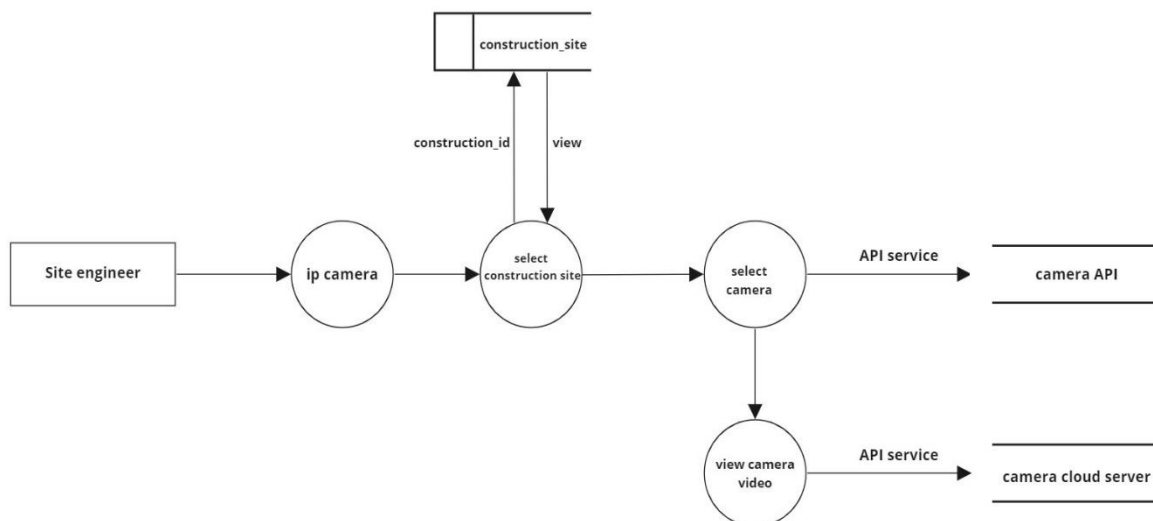


Fig: 5.11 Ip camera DFD Level 2

5.3 DATABASE DESIGN

A database is a collection of inter-related data stored with minimum redundancy, provides better data integrity and security and also to use many users quickly and efficiently. The general objective of database design is to make the data access easy, inexpensive and flexible to the user. Database design is recognized as a standard of management information system which is virtually available for every computer system.

Database design is the process of producing a detailed data model of a database. This data model contains all the needed logical and physical design choices and physical storage parameters needed to generate a design in a data definition language, which can then be used to create a database. A fully attributed data model contains detailed attributes for each entity.

The term database design can be used to describe many different parts of the design of an overall database system. Principally, and most correctly, it can be thought of as the logical design of the base data structures used to store the data. In the relational model these are the tables and views. In an object database the entities and relationships map directly to object classes and named relationships. However, the term database design could also be used to apply to the overall process of designing, not just the base data structures, but also the forms and queries used as part of the overall database application within the database management system

The general theme behind a database is to integrate all the information. A database is the integrated collection of data and provides centralized access to data. Usually the centralized data managing software use relational database concepts and hence called RDBMS.

Design Considerations

The system is analyzed to the requirements and possible tables and fields are determined.

Identifying Keys

Once we have drawn upon the list of possible tables and fields, the next step in the logic database is to identify primary key and foreign key of the table.

Primary Key

The primary key (PK) of a relational table uniquely identifies each record in the table, it can either normal attribute that is guaranteed to be unique or it can be generated by the DBMS. Primary keys may consist of a single attribute or multiple attributes in combination.

Foreign Keys

A foreign key (FK) is a key comprised of a field or multiple field that to the primary key of another table. The concept of maintaining foreign keys is known as “referential integrity”.

Defining Relationship

A relationship is the term used to describe a connection between related tables. Stated another way, it means having shared fields in different tables that allow records to reference records in other tables. There are three possible types of relationships.

(i) One-to-One Relationships

A one-to-one relationship indicates that each record in the table may relate to only one in another table.

(ii) One-to-Many Relationships

In a one-to-many relationship, any record in a table can relate to multiple records in a second table. 34

(iii) Many-To-Many Relationships

With many-to-many relationships many records in one table can link too many records in the second table.

(iv) Normalization

Normalization is a process of simplifying the database design to achieve the optimum structure. The steps in this process are known as normal form. These normal forms are a sequence of rules that are applied to progressively a database design. The higher the normal form of a database, the more efficient its underlying design. This is because, for a database to be simplified into third normal form, it must meet the criteria of first and second normal forms.

(v) First Normal Form

To achieve first normal form, we must eliminate any repeating group. In the first normal form, we simplify our database structure to any repeating group. In other words first normal form include concept that field must be atomic or field represent one type of value for all the records.

(vi) Second Normal Form

To achieve second normal form, we must make sure that the non key fields depends on all the field in primary key every field in the table should be depend upon the entire primary key so that when new records are added, same value will not be repeated from records to records unnecessarily.

Full functional dependency indicates that if A and B are attributes of a relation, B is fully functionally dependent on A if B is functionally dependent on A, but not on any proper subset of A, Second normal form (2NF) is a relation that is in first normal form 35 and every non-primary-key attribute is fully functionally dependent on the primary key. The normalization of 1NF relations to 2NF involves the removal of partial dependencies. If a partial dependency exists, we remove the function dependent attributes from the relation by placing them in a new relation along with a copy of their determinant.

(vi)Third Normal Form

To achieve third normal form, we must make sure that the no fields depend on other non-key fields

(vii) Fourth Normal Form

An entity cannot have a one to one relationship between primary key columns and non key columns.

(viii) Fifth normal Form

Break all tables into the smallest possible pieces to eliminate all redundancy within a table. In conclusion, effective database design can help the development team reduce overall development time and costs. Undertaking the process of database design and creating a data model helps the team better understand the user's requirements and thus enables them to build a system that is more reflective of the user's requirements and business rules.

DATABASE NAME: Data Acquisition in Construction Sites with Remote Monitoring

Table Number : 5.1

Table NAME:User_login				Primary key: loginuser_id
Description: Details of user login				
Field	DataType	Size	Constraint	Description
loginuser_id	integer	10	Primary Key	Login id of user
loginuser_name	varchar	20	Not null	Name of the user
loginuser_password	password	20	Not null	Password of user
loginuser_status	varchar	20	Not null	Status of user
loginuser_section id	integer	10	Not null	Section id of user
loginuser_latitude	integer	10	Not null	Latitude of the user
loginuser_longitude	integer	10	Not null	Longitude of the user
loginuser_recovery mail	varchar	20	Not null	Recovery email of the user
loginuser_login attempt	varchar	20	Not null	No of attempts
loginuser_active session	varchar	20	Not null	Active session of user

Table Number : 5.2

Table NAME: quick_update				Primary key: quick update_id
Description: Details of updation				
Field	DataType	Size	Constraint	Description
quick update_id	integer	10	Primary Key	Id of the quick update
quick update_date	date		Not null	To update date
quick update_time	integer	10	Not null	To update time
quick update_heading	varchar	20	Not null	To update heading

quick update_desc	varchar	20	Not null	To update description
quick update_latitude	integer	10	Not null	To update latitude
quick update_longitude	integer	10	Not null	To update longitude
quick update_location note	varchar	20	Not null	To update location note
Construction_id	integer	10	Foreign Key	Id of the constuction
quick update_message	varchar	20	Not null	To update message

Table Number : 5.3

Table NAME: quick_images			Primary key: quick images_id	
Description:Details of images				
Field	DataType	Size	Constraint	Description
quick images_id	integer	10	Primary Key	Id of the image
quick images_path	varchar	20	Not null	Path of the image
quick images_type	varchar	10	Not null	Type of the image
quick images_size	integer	10	Not null	Size of the image
quick images_status	varchar	20	Not null	Status of the image
quick update_id	integer	10	Foreign Key	Id of the quick update

Table Number : 5.4

Table NAME:quick_issues			Primary key:quick issues_id	
Description:Details of the quick issues				
Field	DataType	Size	Constraint	Description
quick issues_id	integer	10	Primary Key	Id of the quick issues
quick issues_type	varchar	20	Not null	Type of the quick issues
quick issues_desc	varchar	20	Not null	Description of the quick issues

quick issues_priority	varchar	20	Not null	Priority of the quick issues
quick issues_status	varchar	20	Not null	Status of the quick issues
quick update_id	integer	10	Foreign Key	Id of the quick update

Table Number : 5.5

Table NAME: quick issue_images				Primary key: issueimage_id
Description:				
Field	DataType	Size	Constraint	Description
issueimage_id	integer	10	Primary Key	Id of the issue image
issueimage_path	Varchar	20	Not null	Path of the issue image
issueimage_type	Varchar	20	Not null	Type of the issue image
issueimage_status	Varchar	20	Not null	Status of the issue image
issueimage_size	integer	10	Not null	Size of the issue image
quick issues_id	integer	10	Foreign Key	Id of the quick issues

Table Number : 5.6

Table NAME:Todo_list				Primary key: tdo_id
Description: Details daily work				
Field	DataType	Size	Constraint	Description
tdo_id	integer	10	Primary Key	Id of Todo Work
tdo_title	Varchar	20	Not null	Title of Todo Work
tdo_date	date		Not null	Date of Todo Work
tdo_worktype	Varchar	20	Not null	Worktype of Todo Work
tdo_priority	Varchar	20	Not null	Priority of Todo Work

tdo_document	Varchar	20	Not null	Document of of Todo Work
tdo_image	Varchar	20	Not null	Image of Todo Work
tdo_employeetype	Varchar	20	Not null	Employee type of Todo Work
Construction_id	integer	10	Foreign Key	Id of construction site

Table Number : 5.7

Table NAME:Todo_update			Primary key: todoupdate_id	
Description:Details of daily updation				
Field	DataType	Size	Constraint	Description
todoupdate_id	integer	10	Primary Key	Id of Todo update
todo_id	integer	10	Foreign Key	Id of Todo Work
todoupdate_reply message	Varchar	20	Not null	Reply message of Todo update
todoupdate_status	Varchar	20	Not null	Status of Todo update
todoupdate_image	Varchar	20	Not null	Image of Todo update
todoupdate_document	Varchar	20	Not null	Document of Todo update
loginuser_id	integer	10	Foreign Key	Id of user

Table Number : 5.8

Table NAME:work_report			Primary key: Workreport_id	
Description:Details of daily work report				
Field	DataType	Size	Constraint	Description
Workreport_id	integer	10	Primary Key	Id of workreport
Workreport_date	date		Not null	Date of of workreport

Workreport_time	integer	10	Not null	Time of workreport
Workreport_subject	Varchar	20	Not null	Subject of workreport
Workreport_report	Varchar	20	Not null	Report of workreport
Workreport_status	Varchar	20	Not null	Status of workreport
Workreport_employee number	integer	10	Not null	Employee number of workreport
Workreport_type	Varchar	20	Not null	Type of workreport
loginuser_id	integer	10	Foreign Key	Id of user
Construction_id	integer	10	Foreign Key	Id of construction site

Table Number : 5.9

Table NAME: Workreport_images				Primary key: reportimages_id
Description:Details of work report images				
Field	DataType	Size	Constraint	Description
reportimages_id	integer	10	Primary Key	Id of report images
reportimages_path	Varchar	20	Not null	Path of report images
reportimages_type	Varchar	20	Not null	Type of report images
reportimages_size	integer	10	Not null	Size of report images
reportimages_status	Varchar	20	Not null	Status of report images
Workreport_id	integer	10	Foreign Key	Id of workreport

Table Number : 5.10

Table NAME:work report_doc				Primary key: reportdoc_id
Description:details of work report document				
Field	DataType	Size	Constraint	Description
reportdoc_id	integer	10	Primary Key	Id of Reportdoc
reportdoc_path	Varchar	20	Not null	Path of Reportdoc
reportdoc_type	Varchar	20	Not null	Type of Reportdoc
reportdoc_size	integer	10	Not null	Size of Reportdoc
reportdoc_status	Varchar	20	Not null	Status of Reportdoc
Workreport_id	integer	10	Foreign Key	Id of workreport

Table Number : 5.11

Table NAME:Workreport_issue				Primary key: reportissue_id
Description:Details of work report issue				
Field	DataType	Size	Constraint	Description
reportissue_id	integer	10	Primary Key	Id of work report issue
reportissue_type	Varchar	20	Not null	Type of work report issue
reportissue_message	Varchar	20	Not null	Message of work report issue
Workreport_id	integer	10	Foreign Key	Id of workreport
reportissue_status	Varchar	20	Not null	Status of work report issue
reportissue_priority	Varchar	20	Not null	Priority of work report issue
reportissue_image	Varchar	20	Not null	Image of work report issue

Table Number : 5.12

Table NAME:workreport_messaage				Primary key: report message_id
Description: Details of work report message				
Field	DataType	Size	Constraint	Descrption
report message_id	integer	10	Primary Key	Id of report message
report message_subject	Varchar	20	Not null	Subject of report message
report message_designation	Varchar	20	Not null	Designation of report message
report message_message	Varchar	20	Not null	Message of report message
report message_type	Varchar	20	Not null	Type of report message
Workreport_id	integer	10	Foreign Key	Id or workreport

Table Number : 5.13

Table NAME: construction_site				Primary key: construction_id
Description:Details of construction site				
Field	DataType	Size	Constraint	Description
construction_id	integer	10	Primary Key	Id of construction site
construction_name	Varchar	20	Not null	Name of construction site
Client_id	integer	10	Foreign Key	Id of client
construction_city	Varchar	20	Not null	City of construction site
construction_location	Varchar	20	Not null	Location of construction site
construction_address	Varchar	20	Not null	Address of construction site
construction_construction type	Varchar	20	Not null	Type of construction site
construction_work type	Varchar	20	Not null	Work type of construction site
construction_work desc	Varchar	20	Not null	Work Description of construction site
construction_date of start	date		Not null	Date of start of construction site

construction_latitude	integer	10	Not null	Latitude of construction site
construction_longitude	integer	10	Not null	longitude of construction site
construction_total area	integer	10	Not null	total area of construction site
construction_land type	Varchar	20	Not null	land type of construction site
construction_total floors	integer	10	Not null	Total floors of construction site
construction_description	Varchar	20	Not null	Description of construction site

Table Number : 5.14

Table NAME: site_doc			Primary key: Sitedoc_id	
Description:Details of site document				
Field	DataType	Size	Constraint	Descrption
Site doc_id	integer	10	Primary Key	Id of site document
Site doc_type	Varchar	20	Not null	Type of of site document
Site doc_name	Varchar	20	Not null	Name of site document
Site doc_date	date		Not null	Date of site document
Site doc_desc	Varchar	20	Not null	Description of site document
Site doc_size	integer	10	Not null	Size of site document
Site doc_status	Varchar	20	Not null	Status of site document
construction_id	integer	10	Foreign Key	Id of construction

Table Number : 5.15

Table NAME:client				Primary key: client_id
Description:Details of client				
Field	DataType	Size	Constraint	Description
client_id	integer	10	Primary Key	ID of client
client_fname	Varchar	20	Not null	First name of client
client_Lname	Varchar	20	Not null	Second name of client
client_primary mobile	integer	10	Not null	Mobile number of client
client_primaryWhatsapp	integer	10	Not null	Whatsapp number of client
client_primary email	Varchar	20	Not null	Email id of client
client_ address	Varchar	20	Not null	Address of client
client_location	Varchar	20	Not null	Location of client
client_city	Varchar	20	Not null	City of client
client_state	Varchar	20	Not null	State of client
client_photo	Varchar	20	Not null	Photo of client
client_identitycard	Varchar	20	Not null	Identity card of client
client_secondary mobile	integer	10	Not null	Secondary mobile number of client
client_secondary email	Varchar	20	Not null	Secondary email of client
client_secondary whatsapp	Varchar	20	Not null	Secondary whatsapp number of client

Table Number : 5.16

Table NAME:album_details				Primary key: album_id
Description:Details of Album				
Field	DataType	Size	Constraint	Description
album_id	integer	10	Primary Key	Id of album
album_name	Varchar	20	Not null	Name of album
album_desc	Varchar	20	Not null	Description of album
album_date of create	date		Not null	date of creation of album
album_status	Varchar	20	Not null	status of album
album_total image	integer	10	Not null	Total image of album
album_viewer	Varchar	20	Not null	viewer of album
construction_id	integer	10	Foreign Key	Id of construction

Table Number : 5.17

Table NAME: gallery				Primary key: image_id
Description:Details of Gallery images				
Field	DataType	Size	Constraint	Description
image_id	integer	10	Primary Key	Id of the image
image_name	Varchar	20	Not null	Name of the image
image_desc	Varchar	20	Not null	Description of the image
image_type	Varchar	20	Not null	Type of the image
image_size	integer	10	Not null	Size of the image
image_status	Varchar	10	Not null	Status of the image
image_date of creation	date		Not null	Date of creation of the image

album_id	integer	10	Foreign Key	Id of the album
loginuser_id	integer	10	Foreign Key	Id of the user

Table Number : 5.18

Table NAME: Site_expense				Primary key: siteexpense_id
Description:Details of site expense				
Field	DataType	Size	Constraint	Description
siteexpense_id	integer	10	Primary Key	Id of site expense
siteexpense_head	Varchar	20	Not null	Head of site expense
siteexpense_type	Varchar	20	Not null	Type of site expense
siteexpense_desc	Varchar	20	Not null	Description of site expense
siteexpense_date of expense	date		Not null	Date of expense of site expense
siteexpense_date of update	date		Not null	date of update of site expense
siteexpense_amount	integer	10	Not null	Amount of site expense
siteexpense_currency	integer	10	Not null	Curreny of site expense

Table Number : 5.19

Table NAME: Site_expensedoc				Primary key:expensedoc_id
Description:Details of site expense document				
expensedoc_id	integer	10	Primary Key	Id of expensedoc
expensedoc_type	Varchar	20	Not null	Type of expensedoc
expensedoc_size	integer	10	Not null	Size of expensedoc
expensedoc_extension	Varchar	20	Not null	Extension of expensedoc
expensedoc_path	Varchar	20	Not null	Path of expensedoc
siteexpense_id	integer	10	Foreign Key	Id of site expense

Table Number : 5.20

Table NAME:user_doc				Primary key: userdoc_id
Description: Details of user documents				
Field	DataType	Size	Constraint	Descrption
userdoc_id	integer	10	Primary Key	Id of userdoc
userdoc_type	Varchar	20	Not null	type of document
userdoc_name	Varchar	20	Not null	Name of document
userdoc_docpath	Varchar	20	Not null	path of document
userdoc_docextension	Varchar	20	Not null	extension of document
userdoc_status	varchar	20	Not null	status of document

Table Number : 5.21

Table NAME:user primary_details				Primary key: userreg_id
Description:Details of user Registration				
Field	DataType	Size	Constraint	Description
userreg_id	integer	10	Primary Key	Id of user
userreg_fname	Varchar	20	Not null	Fname of user
userreg_Lname	Varchar	20	Not null	Lname of user
userreg_gender	Varchar	20	Not null	Gender of user
userreg_date of birth	date		Not null	Date of birth of user
userreg_date of join	date		Not null	Date of join of user
userreg_primary email	Varchar	20	Not null	primary Email of user
userreg_primary mobile no	integer	10	Not null	primary Mobile no of user
userreg_secondary mobile no	integer	10	Not null	secondary mobile no of user
userreg_whatsapp number	integer	10	Not null	Whatsapp no of user
userreg_primary mobile status	integer	10	Not null	Primary mobile status no of user
userreg_secondary mobile status	Varchar	20	Not null	Secondary mobile status no of user
userreg_pe email status	Varchar	20	Not null	personal email of user
userreg_offical email	Varchar	20	Not null	Official email of user
userreg_off email status	Varchar	20	Not null	Email status of user
userreg_securirty pin	integer	10	Not null	Security pin of user
userreg_address	Varchar	20	Not null	Address of user
userreg_city	Varchar	20	Not null	City of user

userreg_location latitude	integer	10	Not null	Latitude of user
userreg_location longitude	integer	10	Not null	Longitude of user
userreg_state	Varchar	20	Not nullS	State of user
userreg_photo	Varchar	20	Not null	Photo of user
userreg_idcard	Varchar	20	Not null	Idcard of user
userreg_blood group	Varchar	20	Not null	Blood group of user

5.4 INPUT DESIGN

The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps are necessary to put transaction data into a usable form for processing can be achieved by inspecting the computer to read data from a written or printed document. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy. In the input designing we had considered the following things

- What data should be given as input?
- How the data should be arranged or coded?
- The dialog to guide the operating personnel in providing input.
- Methods for preparing input validations and steps to follow when errors occur. It is achieved by creating user friendly screens for the data entry to handle large
- volume of data.
- The goal of designing input is to make data entry easier and to be free from errors. The data entry screen is designed in such a way that all the data manipulates can be
- performed. It also provides record viewing facilities Input design is the process of converting a user oriented description of the input into a computer based system This design is important to avoid errors in the data input process and show the correct direction to the management for getting correct information from the computerized system.

When the data is entered it will check for its validity Data can be entered for its Validity. Mostly input data can be selected from a list of dataitems Appropriate messages are provided as when needed so that the user will not be in maize of instant. Thus the objective of input is to create an input lay out that is easy to follow. For example in user registration form all the fields except some optional fields must be enter, otherwise display appropriate error message.

5.5 OUTPUT DESIGN

Output design is one of the most important features of the information system. When the output is not of good quality, the users will be averse to use the newly designed system and may not use the system. There are many types of outputs, all of which can be either highly useful or can be critical to the users, depending on the manner and degree to which they are used. Outputs from computer system are required primarily to communicate the results of processing to users. They are also used to provide a permanent hard copy of the results for later consultation

Table Number: 5.22

PROCESS	INPUT DESIGN	OUTPUT DESIGN
Login page for site engineer	Enter username and password	Site engineer login successfully
Add quick updates	Add details in the corresponding field	Quick updates successful
Add expenses	Add details in the corresponding field	Expenses updated successfully
Add daily report	Update in the corresponding fields	Daily report updated successfully
Todo list details	Lists of Todo jobs	Viewing successfully
Construction site details	List of construction sites	Viewing successfully
Client details	Display client details	View client details
Update work report issues	Update the issues	Updated successfully
Add pictures in gallery	Upload pictures	Successfully uploaded
View site location	List of site location	View the site Location
Scan QR code	Display QR code	Scan successful and show details
Scan Bar code	Display Bar code	Scan successful and show details
View Ip cameras	List of Site with ip camera	Viewing successful

Table 5.22 Input Output Design

5.5PROGRAM DESIGN

(i) Site engineer

Step 1: START

Step 2: Site engineer has a username and password to login.

Step 3: Site engineer can view profile

Step 4: Site engineer can add quick updates

Step 5: Site engineer can view Todo work

Step 6: Site engineer can add daily report

Step 7: Site engineer can add site expenses

Step 8: Site engineer can view client details

Step 9: Site engineer can view construction sites

Step 10: Site engineer can upload images

Step 11: Site engineer can scan Qr code & barcode

Step 12: Site engineer can view sites through Ip camera

Step 13: Site engineer can locate sites

Step 14: Site engineer can report work report issues

Step 15: STOP

CHAPTER 6

6. FUNCTIONAL AND NON-FUNCTIONAL REQUIREMENTS

6.1 FUNCTIONAL REQUIREMENTS

In software engineering, a functional requirement defines a function of a software system or its component. A function is described as a set of inputs, the behavior, and outputs. Functional requirements may be calculations, technical details, data manipulation and processing and other specific functionality that define what a system is supposed to accomplish. Generally, functional requirements are expressed in the form "system must do requirement ".

Functional requirements for each of the uses cases described below :

- Site engineer should login with his credentials for doing any activity, To view profile or list of activities and the amount of the work can be viewed.
- User of the application needed android /ios mobile-apk file/ipa file ,Internet connection and Permissions :GPS,SMS, Internet, Storage permission, Physical Activity, camera.

6.2 NON-FUNCTIONAL REQUIREMENTS

A non-functional requirement is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviours. Non-functional requirements are “system shall be requirement ". Non-functional requirements are often called qualities of a system. Other terms for non-functional requirements are "constraints", "quality attributes”, “quality goals”, "quality of service requirements" and "non-behavioural requirements.

Some of the non-functional requirements are mentioned below:

- **Usability:** The system shall have a clean interface with only needed features, clear terminology and tool tips wherever necessary. Warning or alerts shall be specified in clear way.

- **Efficiency:** The system shall respond to different searches being conducted like searching particular product, search quantity, etc. in a very fast way.
- **Interoperability:** The system shall be able to interact with other systems.
- **Portability:** the system shall be independent of the specific technological platform used to implement it.
- **Reliability:** It defined as a measure of the time between failures occurring in a system (measure show frequently the system fails), so that the system shall operate without any failures for a particular period of time.
- **Availability:** It measures the percentage of time the system is in its operational state so that the system shall be available for use 24 hours per day and 365 days per year

CHAPTER 7

7.TESTING

7.1 TESTING STRATEGIES

An engineered product can be tested in one of these two ways.

These testing strategies include:

- Black box testing
- White box testing

White box testing

White-box testing is a method of testing the application at the level of the source code. White-box testing (also known as clear box testing, glass box testing, transparent box testing, and structural testing) is a method of testing software that tests internal structures or workings of an application, as opposed to its functionality. In white-box testing an internal perspective of the system, as well as programming skills, are chooses inputs to exercise paths through the code and determine the expected outputs.

Black box testing

Black-box testing is a method of software testing that examines the functionality of an application without peering into its internal structures or workings. This method of test can be applied virtually to every level of software testing: unit, integration, system and acceptance. It is sometimes referred to as specification-based testing.

7.2 UNIT TESTING

In computer programming, unit testing is a software method by which individual units of source code, sets of one or more computer program modules together with associated control data, usage procedures are tested to determine whether they are fit for use intuitively, one can view a unit as the smallest testable part of an application. In procedural programming a unit could be an entire module, but it is more commonly an individual function or procedure. In object-oriented programming, a unit is often an entire interface, such as a class, but could be an individual method. Unit tests are short code fragments created by programmers or occasionally by white box testers during the development process. If forms the basis for component testing.

7.3 INTEGRATION TESTING

This is the final step in testing. In this case all the modules were combined and given the test data. The combined module works successfully without any side effect on other programs. Everything was found to be working correctly. In this the entire system was tested as a whole with all modules. This form of testing is popularly known as Black Box testing or system testing. Black Box testing methods focus on the functional requirement of the software. That is, Black Box testing enables the software engineer to derive sets of input conditions that will fully exercise all functional requirements for a program. Black Box testing attempts to find errors in the following categories; incorrect or missing functions, interface errors, errors in data structures or external database access, performance errors and initialization errors and termination errors.

7.4 SYSTEM TESTING

Testing is a set activity that can be planned and conducted systematically. Testing begins at the module level and work towards the integration of entire computers based system. Nothing is complete without testing, as it is vital success of the system.

Testing Objectives:

There are several rules that can serve as testing objectives, they are

- Testing is a process of executing a program with the intent of finding an error
- A good test case is one that has high probability of finding an undiscovered error.
- A successful test is one that uncovers an undiscovered errors.

A test case is a specification of the inputs, execution conditions, testing procedure, and expected results that define a single test to be executed to achieve a particular software testing objective, such as to exercise a particular program path or to verify compliance with a specific requirement. Test cases underlie testing that is methodical rather than haphazard. A battery of test cases can be built to produce the desired coverage of the software being tested. Formally defined test cases allow the same tests to be run repeatedly against successive versions of the software, allowing for used to design test cases. The tester effective and consistent regression testing

7.5 TESTING RESULTS

Sl no.	Test case	Input	Expected output	Actual Results	Result
1	Login Page(Site Engineer)	Username, Password	Site Engineer Dashboard	As Expected	Pass
2	Add Quick Updates	Construction Site, Image, Issues, Description	Details Added	As Expected	Pass
3	Add Expenses	Type, Date, Description, Message	Details Added	As Expected	Pass
4	Add Daily Report	Report, Image, Issues, Message	Daily Report Added Successfully	As Expected	Pass
5	Todo Lists	Update as Pending or Completed	Updated Successfully	As Expected	Pass
6	Gallery	Upload Image	Uploaded Successfully	As Expected	Pass
7	Work Report	Update Issues, Image	Updated Successfully	As Expected	Pass
8	Clients	Name, Phone No, Email Id	Viewed Successfully	As Expected	Pass
9	Construction Sites	Name Of The Client, Location	Viewed Successfully	As Expected	Pass
10	Scan Qr & Barcode	Shows Scanner	Shows The Data	As Expected	Pass
11	Locate Sites	Show Route Map , Locate Sites	Location Showed Successfully	As Expected	Pass
12	Ip Camera	Construction Site, Camera Name	Viewed Successfully	As Expected	Pass

Table number 7.1

CHAPTER 8

8.1 RESULTS AND DISCUSSION

8.1 RESULTS (SALIENT FEATURES)

The main motivation and objective of Data Acquisition in Construction Sites with Remote Monitoring is to enhance and upgrade the existing system by increasing its efficiency and effectiveness. The software improves the working methods by replacing the existing manual system with new features. Enabling the user experiencing a friendly user interface.

The proposed system incorporated with the following features:

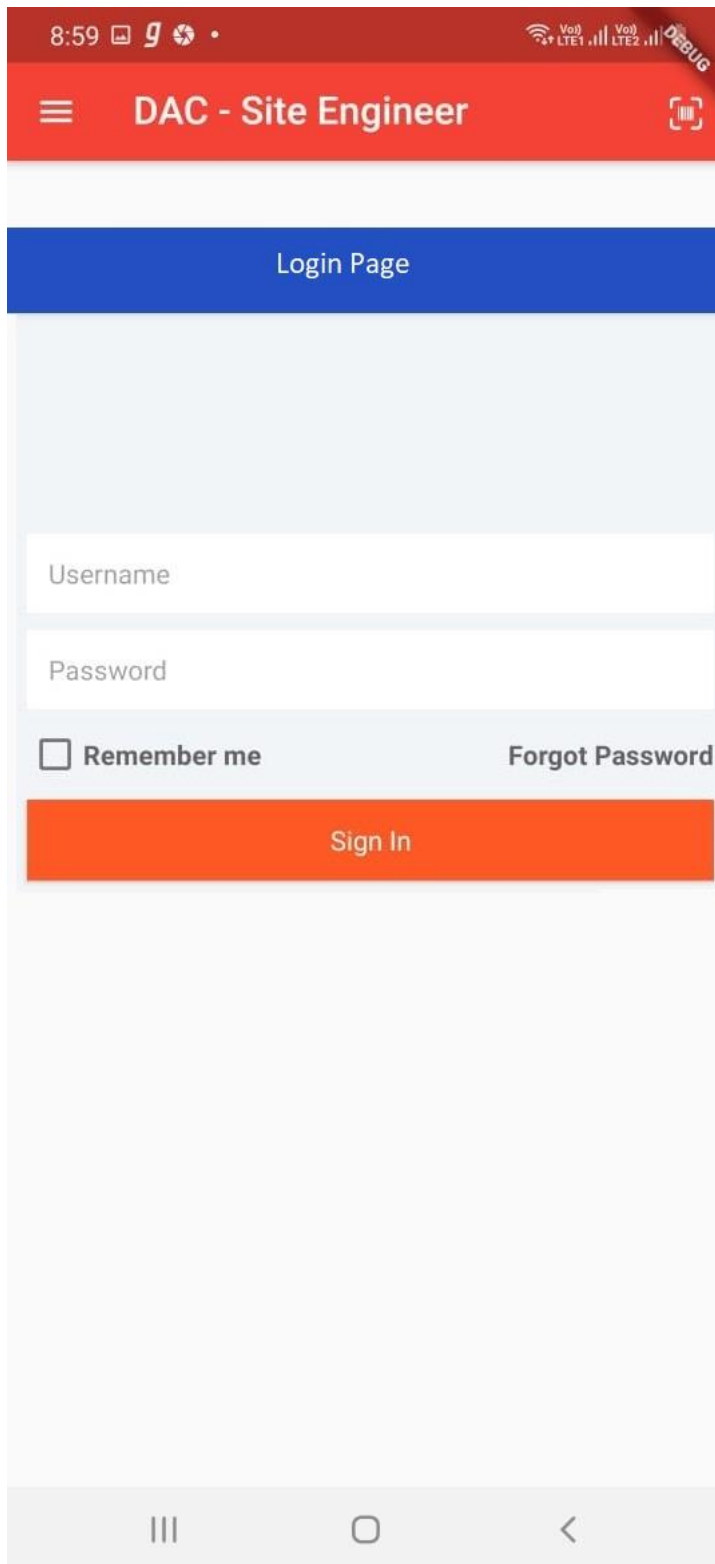
- Improved efficiency.
- Flexibility.
- Improved accuracy.
- Simplifies complex task.
- High scalability.
- User friendly and customized.
- Technologically updated.
- Less waiting time.
- Update feedback /complaints & rate.

Table above in chapter 7 summarizes the results of tests conducted. The table gives the main characteristics of each action, its expected output and actual output obtained .The table gives

- The number of tests conducted
- Description of the test.
- Who conducted the test
- What was the expected output
- What is the actual output
- Was a pass or fail.

8.2 SCREEN SHOTS

(i) Site Engineer Login



The screenshot displays a mobile application interface for a Site Engineer login. At the top, a red header bar contains a hamburger menu icon, the text "DAC - Site Engineer", and a QR code icon. Below the header is a blue bar with the text "Login Page". The main content area is light gray and contains two white input fields for "Username" and "Password". Below these fields is a checkbox labeled "Remember me" and a link labeled "Forgot Password". A large orange button labeled "Sign In" is positioned below the "Remember me" checkbox. The bottom of the screen shows a standard Android navigation bar with three icons: a square, a circle, and a triangle.

8:59 9 • VoLTE1 VoLTE2 Debug

≡ DAC - Site Engineer

Login Page

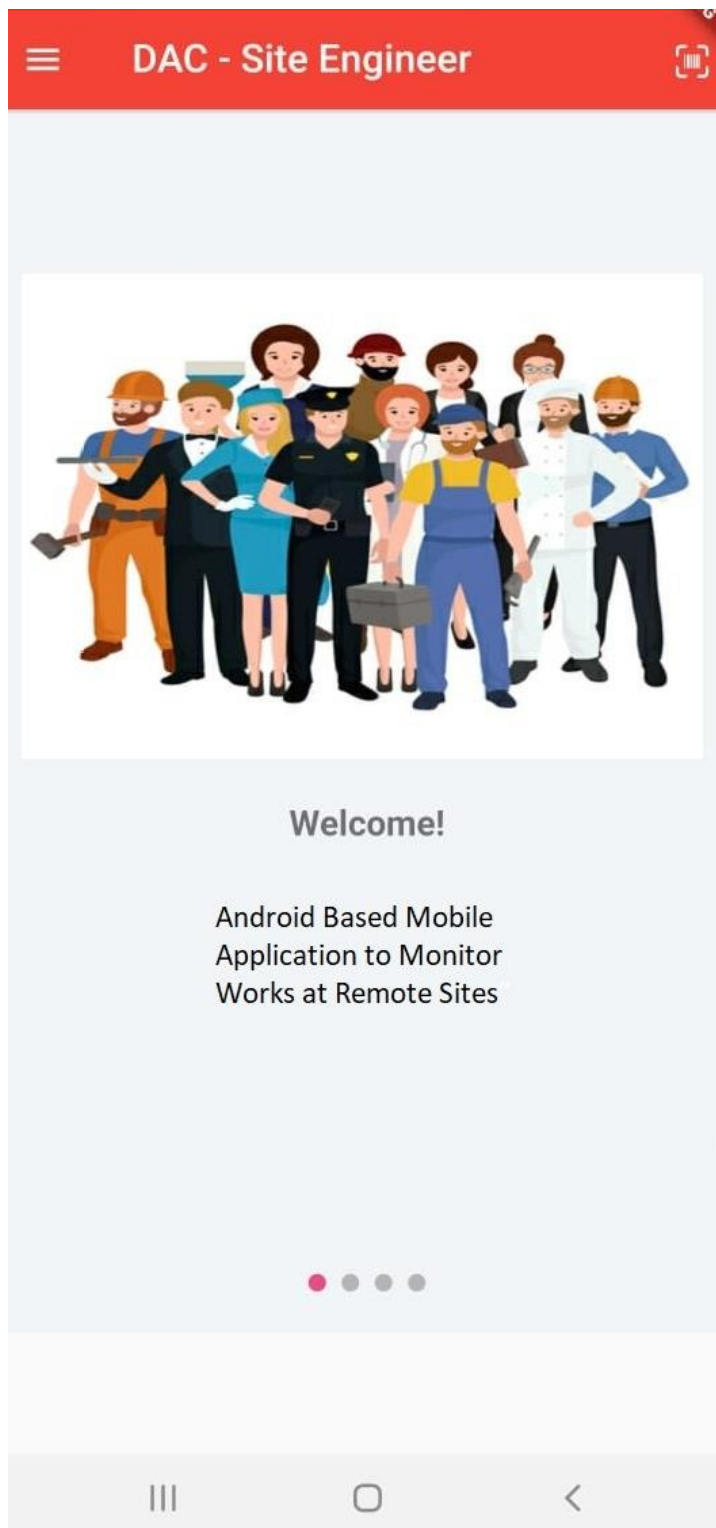
Username

Password

☐ Remember me [Forgot Password](#)

Sign In

(ii) **Site engineer dashboard**



(iii) Profile of site engineer

1:30

VoLTE1 VoLTE2 4G


Debug

≡

DAC - Site Engineer

Profile

status : Online



Nexon vander

nexonv1985@gmail.com

[download document](#)

Fname : Nexon

Lname : Vander

Gender : male

dob : 06/01/1990

join date : 09/1/2021


blood group : B+

ID Card

Download

official email : nexonv1985@gmail.com

personal email : nexon006@gmail.com



primary mobile : +44 7911 456000

secondary mobile : +44 7911 895456


Address : Louis apparel ,West Hyde

Rickmansworth

WD3 9XX

city : West Hyde

current location

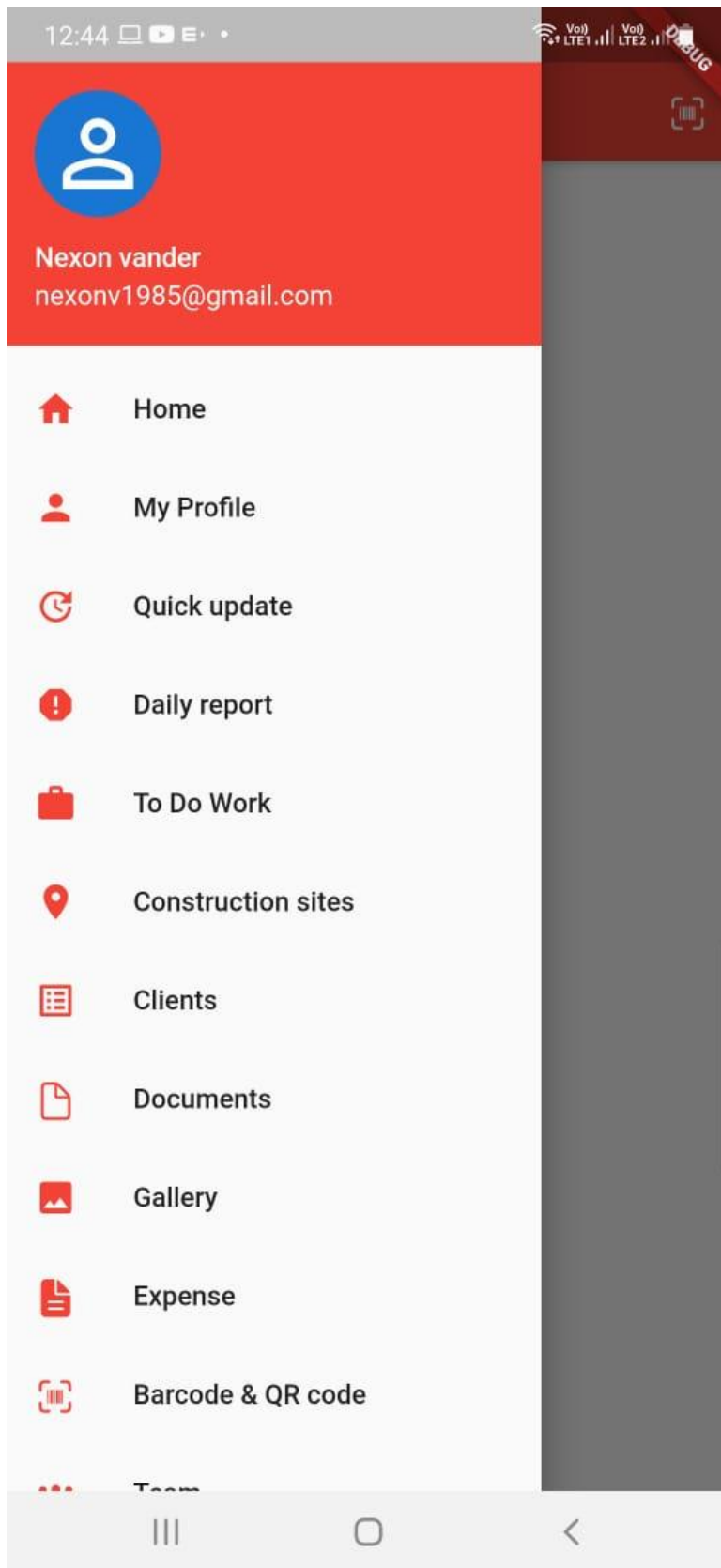


III

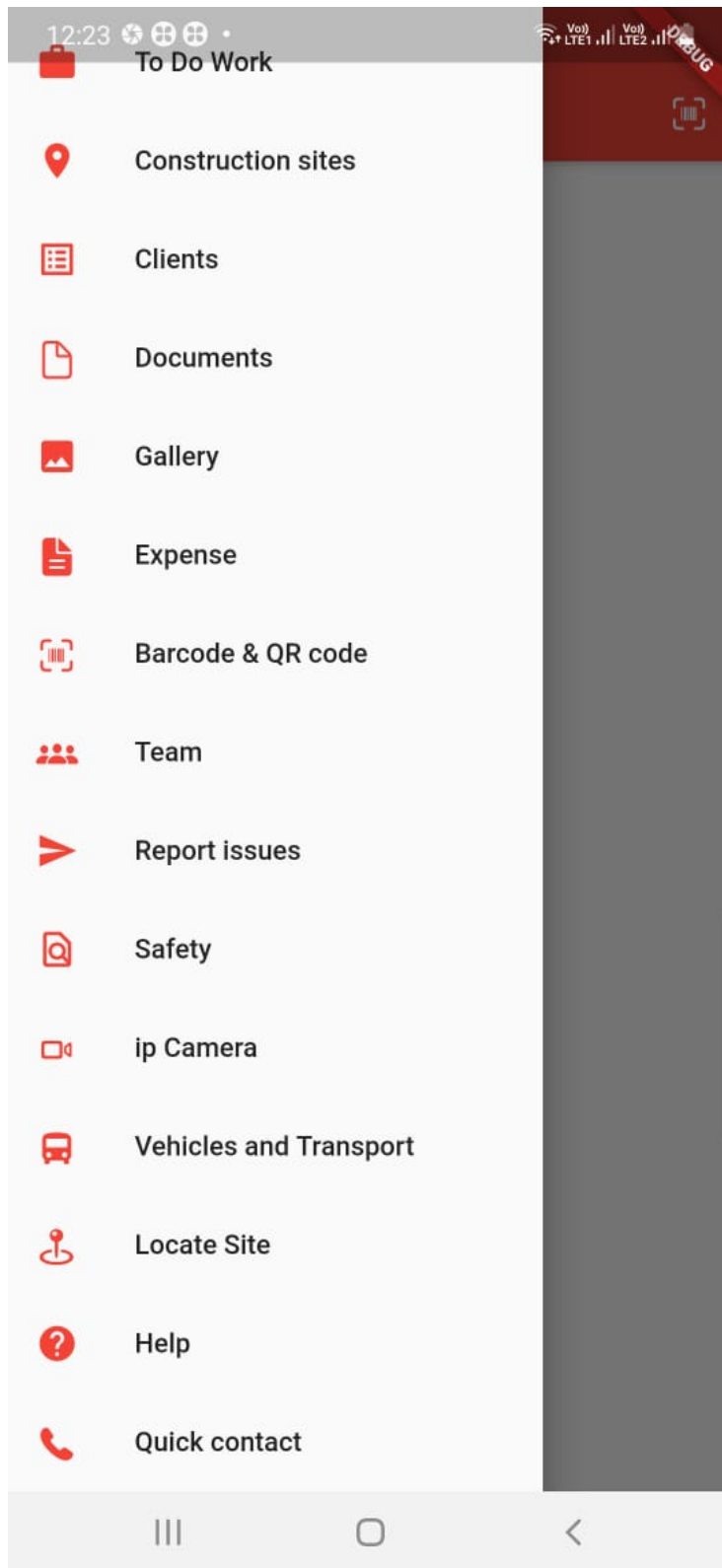
O

<

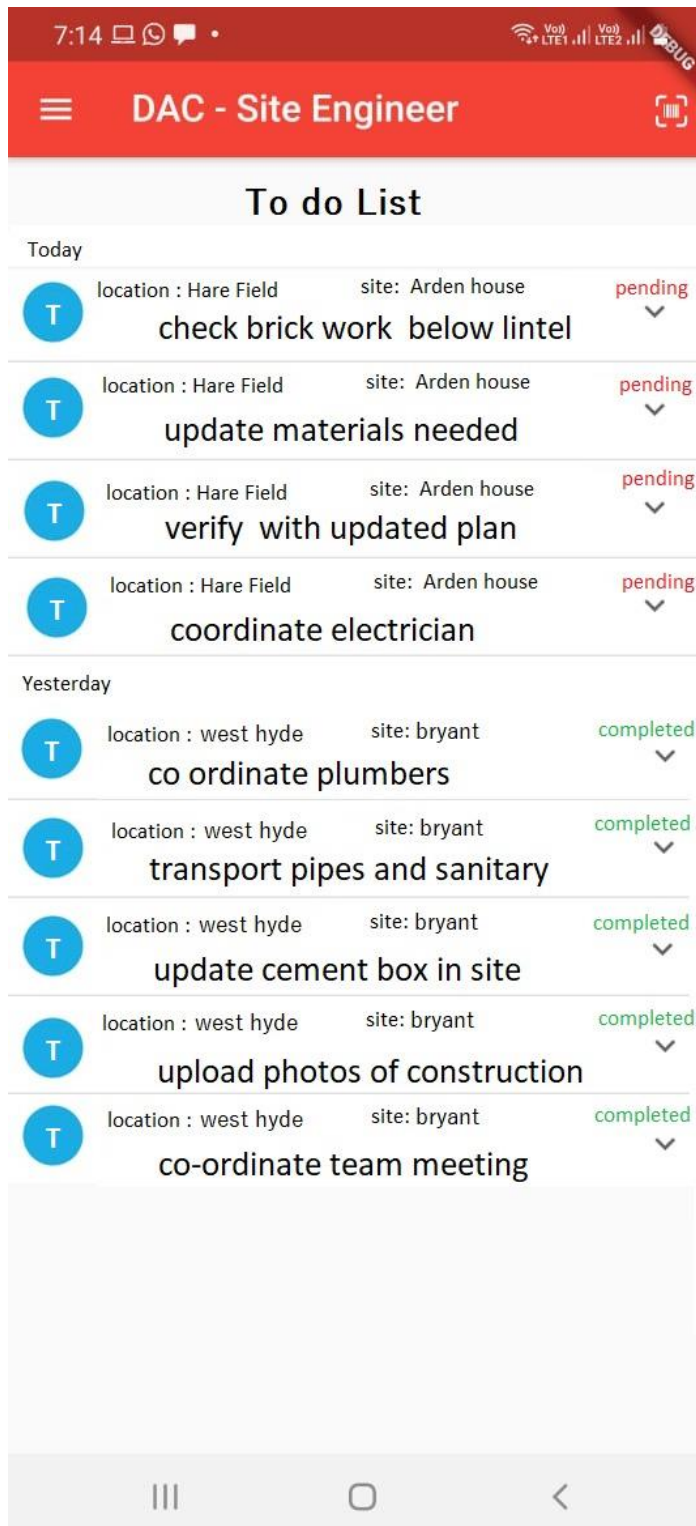
(iv) menu



(v) menu



(vi) Todo Works



(vii) Quick updates

The screenshot displays the 'DAC - Site Engineer' mobile application interface. At the top, a red header bar contains a menu icon, the title 'DAC - Site Engineer', and a QR code icon. Below the header, the section 'Add Quick Updates' is visible. The form includes several input fields: a dropdown menu for 'select construction site', text boxes for 'update heading' and 'update comments', an 'update images' section with three image placeholders and a plus sign, a dropdown for 'select issue type', a dropdown for 'issue priority', a text box for 'issue description', and an 'issue images' section with three image placeholders and a plus sign. The bottom of the screen shows a standard Android navigation bar with icons for the app drawer, home, and back.

11:45 VoLTE1 VoLTE2

DAC - Site Engineer

Add Quick Updates

select construction site

update heading

update comments

update images

select issue type

issue priority

issue description

issue images

(viii) Daily report

5:56 M PWS • VoLTE1 VoLTE2

≡ DAC - Site Engineer

Daily Report

Date : 15/06/2021 Type: daily report

Construction site : Arden House

Subject : Brick work completed below lintel

- Report
- Documents
- Images
- Issues
- Messages

(ix) Expenses

DAC - Site Engineer

Add Expense

Expense for _____

Select Type ▼DayMonth▼Year







Description _____

Amount _____ currency ▼

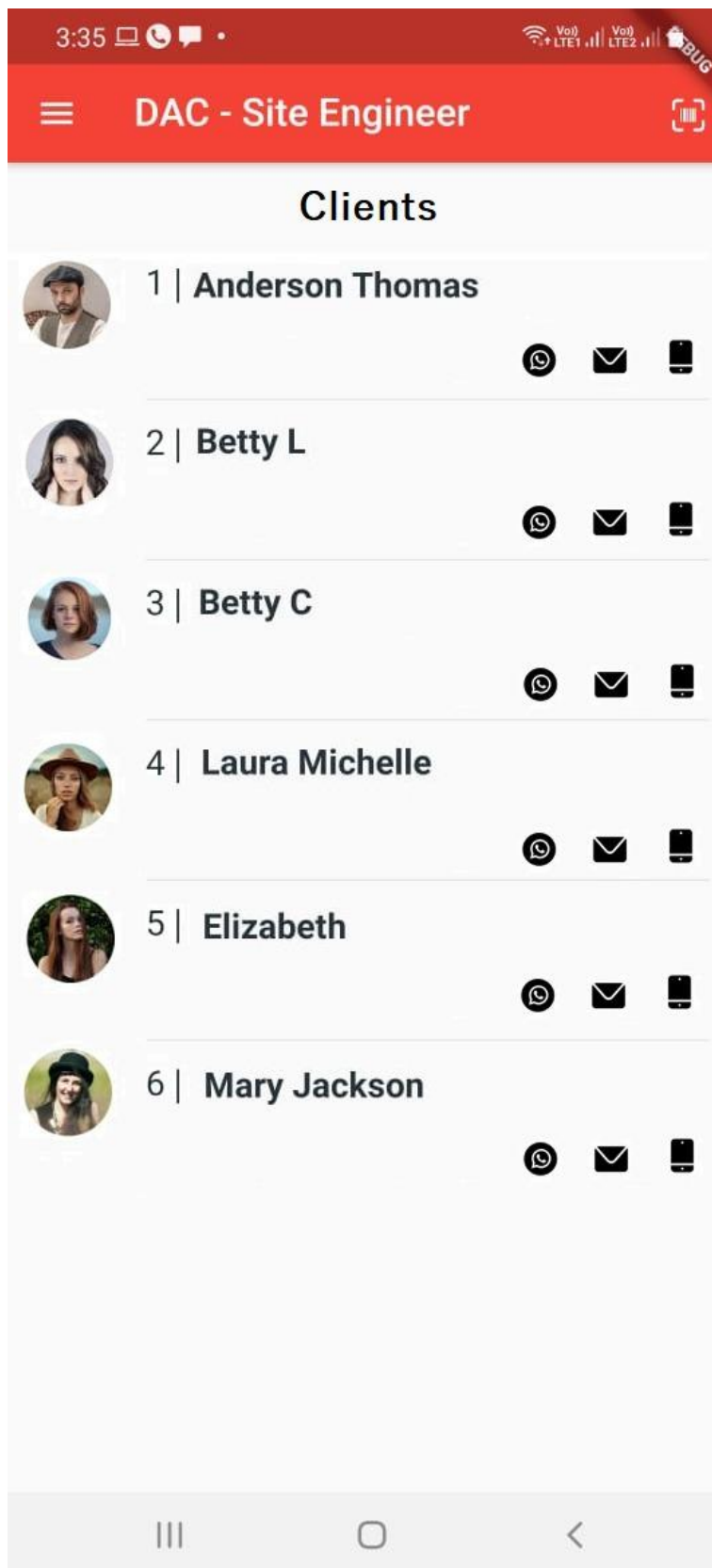
+ upload file _____

SAVE

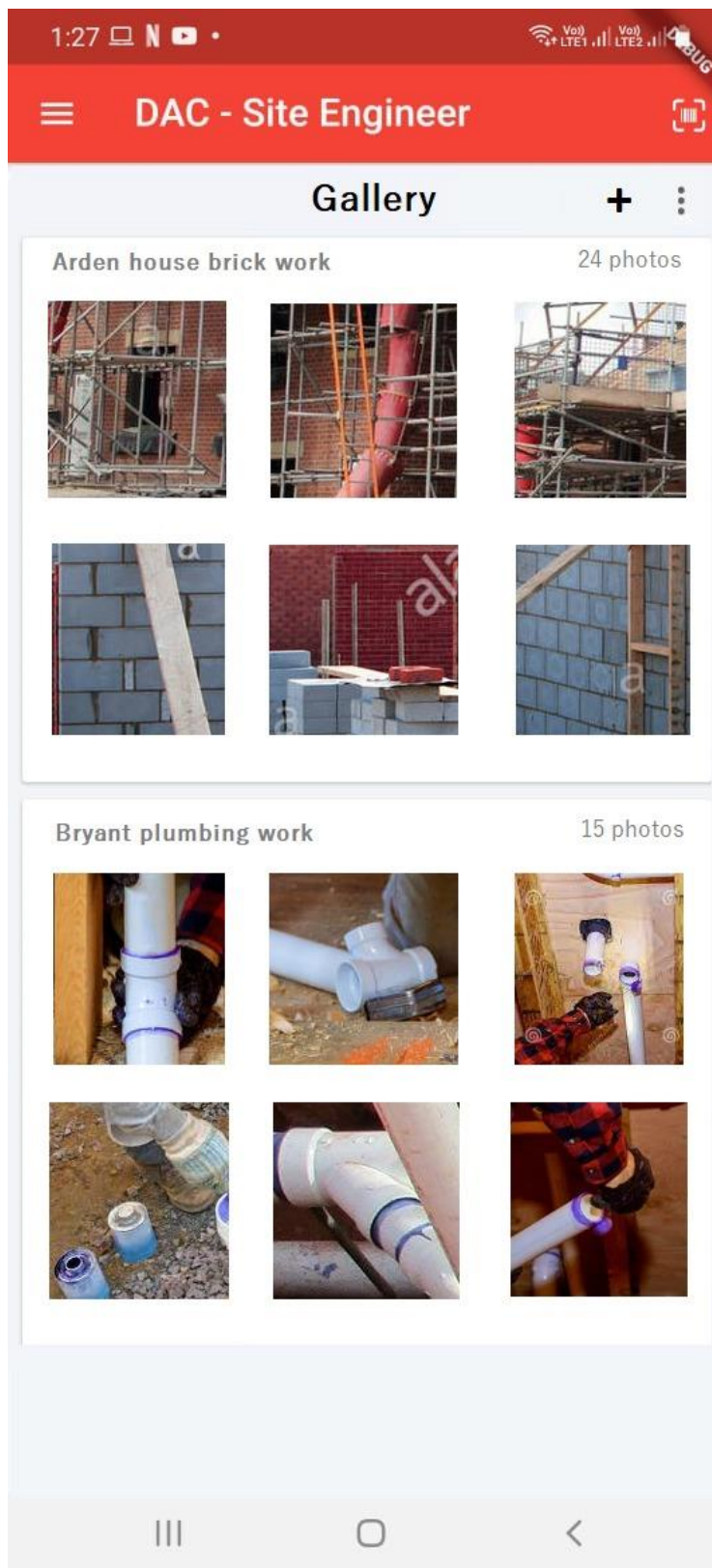
(x) Construction site details

Construction Sites		
	Betty L Arden House	04/1/2021
location : Hare Field		
	Anderson Thomas Bryant	20/8/2020
location : West hyde		
	Betty C Flauden	16/2/2021
location : Bovington		
	Laura Michelle Chiltern	25/3/2021
location : Hare Field		
	Elizabeth Steven	22/4/2021
location : West hyde		
	Mary Jackson Letchworth	17/5/2021
location : Denham		

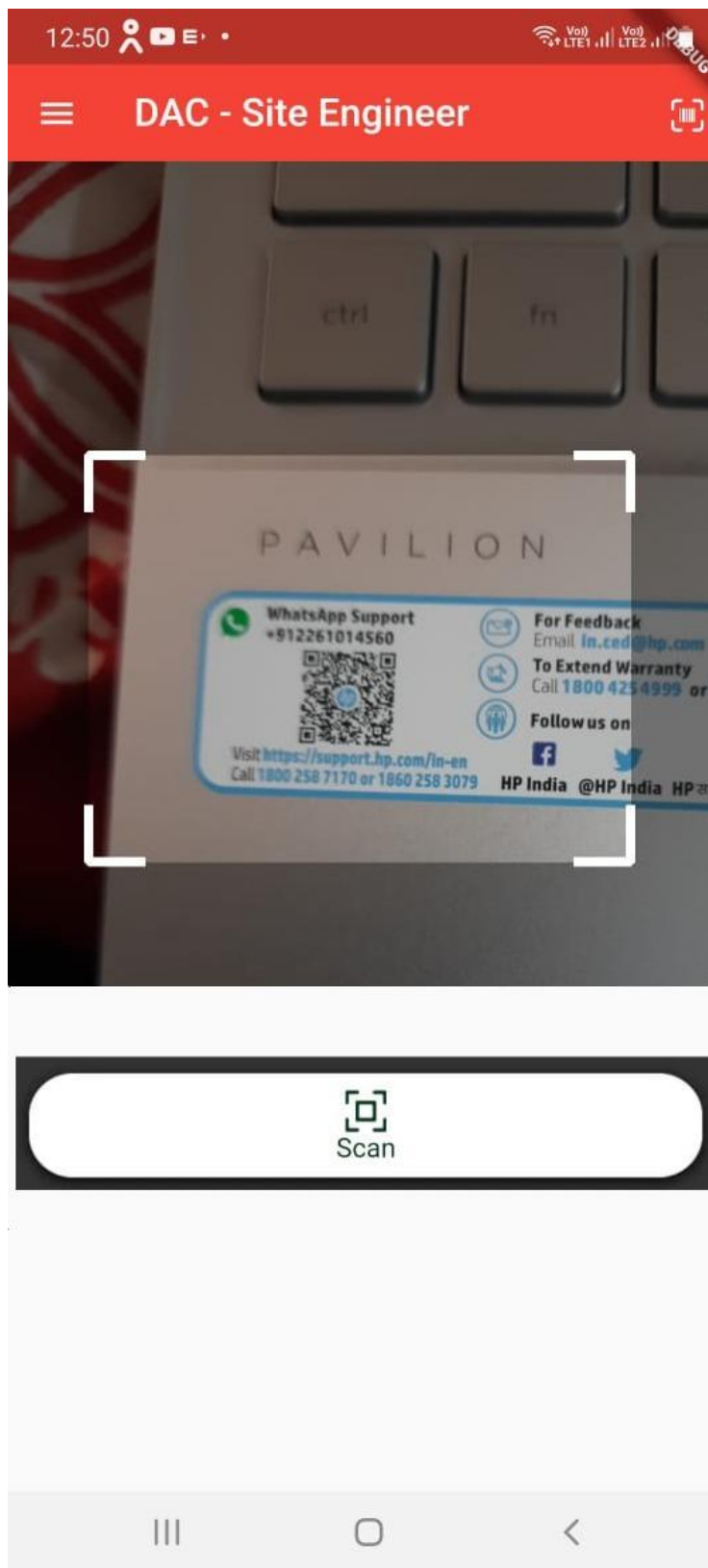
(xi) Clients details



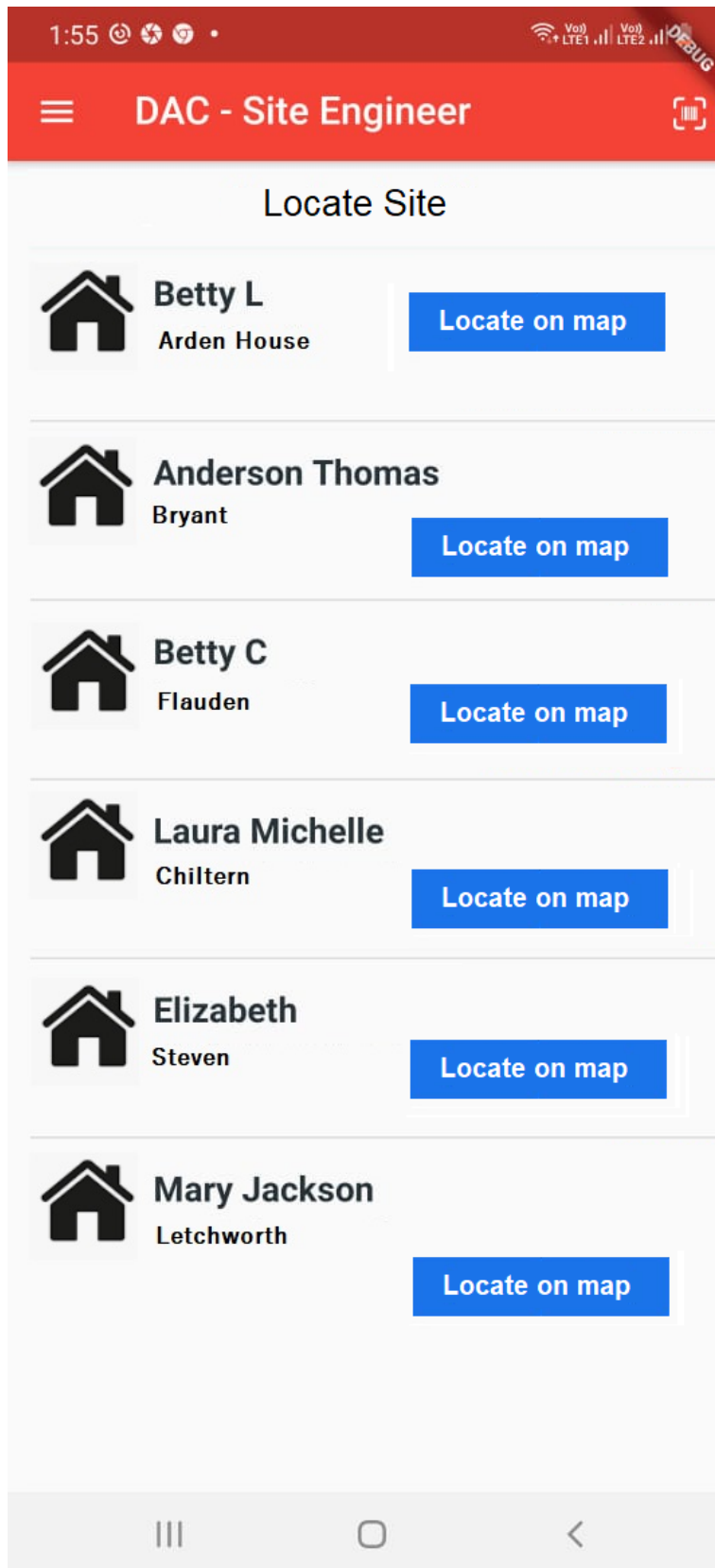
(xii) Gallery



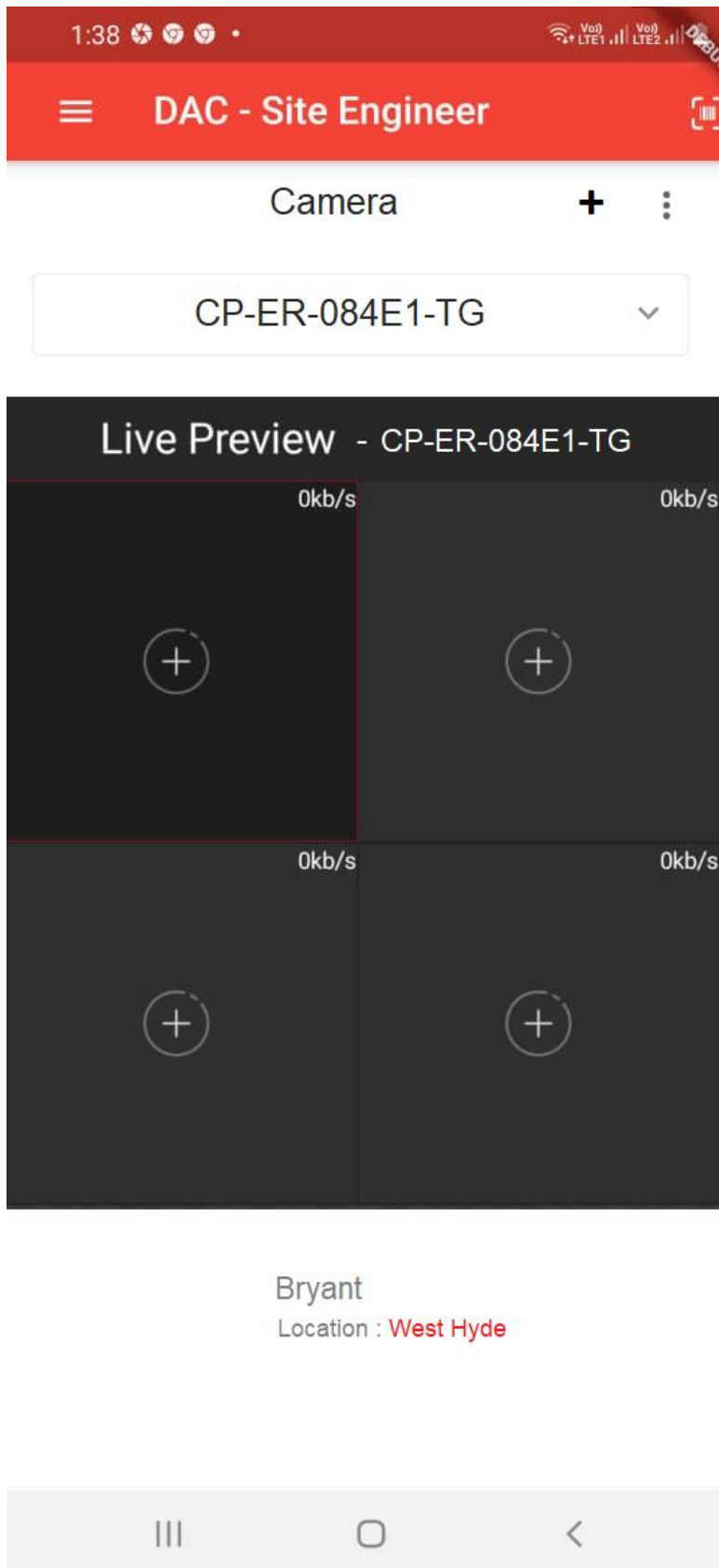
(xiii) Scanner



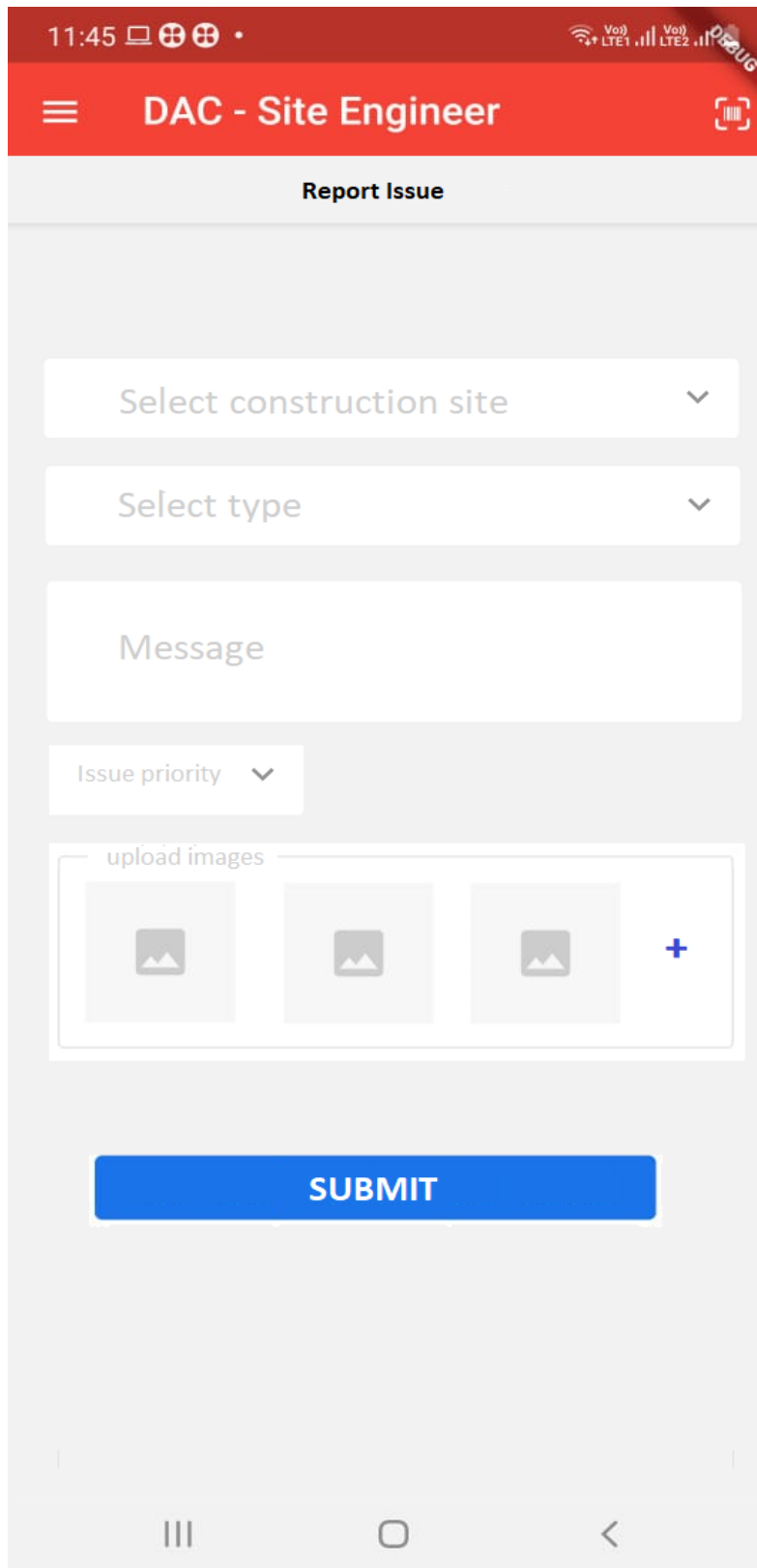
(xiv) locate sites



(xv) Ip camera



(xv) report issue



The image shows a mobile application interface for reporting an issue. At the top, a red header bar contains a menu icon, the text "DAC - Site Engineer", and a QR code icon. Below the header, the title "Report Issue" is centered. The form consists of several input fields: a dropdown for "Select construction site", a dropdown for "Select type", a text area for "Message", and a dropdown for "Issue priority". Below these is an "upload images" section with three image placeholders and a plus sign. At the bottom is a blue "SUBMIT" button. The status bar at the very top shows the time 11:45, battery level, and network status.

11:45 100% VoLTE1 VoLTE2

≡ DAC - Site Engineer

Report Issue

Select construction site ▼

Select type ▼

Message

Issue priority ▼

upload images

+

SUBMIT

CHAPTER 9

9. CONCLUSION

9.1 SYSTEM IMPLEMENTATION

Implementation means converting a new design into iteration .During implementation there should be a strong interaction between the developer of the software and the users. Implementation involves installing hardware terminals and training the operating staff. In this phase, user training is critical for minimizing reluctance to change and giving the new system a chance to prove its worth. The new system may be totally new replacing the existing system, or it may be the modifications of existing system. In either case proper implementation is essential to provide a reliable system to meet organizational requirements.

The implementation involves following things:

- Careful planning.
- Investigation of the system considerations.
- Design the method to achieve the changeover.
- Evaluation of change over method.

Implementation of a new system requires the operating staff installing the software and creating computer files. There are many ways in which this can be achieved. The most common methods are the following.

- Direct change over
- Parallel running
- Pilot running change over The creation of the designed system takes place in the implementation phase.

This phase activities do the following:

- Development of phase overview
- Preparing for implementation
- Computer program development
- Development phase report and overview

It also performs activities like writing, testing, debugging and documenting the programs.

There are three types of implementations:

- Implementation of a computer system to replace a manual system. The problems encountered are converting files, training users, creating accurate files and verifying printouts for integrity.
- Implementation of a new computer system to replace an existing one. This is usually a difficult conversion. If not properly planned, there can be many problems. Some large computer systems have taken as long as a year to convert.
- Implementation of a modified application to replace the existing one, using the same computer. This type of conversion is relatively easy to handle, provided there are no major changes in the files. Every system requires periodic evaluation after implementation. This is to review the performance of the system and to evaluate against established standard or criteria. A study is conducted for measuring the performance of the system against pre-defined requirements. This study results a post-implementation review that determines how well the system continues to meet the performance specification.

The project “**Data Acquisition in Construction Sites with Remote Monitoring** “is tested properly and at the same time, users can be well trained in the new procedure. Proper implementation of the current system meets the requirements. The new application is implemented successfully with proper installation.

9.2 CONCLUSION

Considering the globalization of Mobile application we developed an application for site engineer who works on the company. This application “ **Data Acquisition in Construction Sites with Remote Monitoring**” gives process of work monitoring in any Construction Company. the company performs various works at different location at the same time hence all works are recored in manual in the current scenario, hence this application provides such a platform inorder to update all the daily tasks that has been done a site by a site engineer. Due to rapid advancements in technology, the smart phones have proved to be an imperative source of communication and now have become an integral part of our daily lives. In Current system , people are facing problems , To overcome this problem, it's immensely important to design and develop a platform in order to bridge the communication gap between the technical workers and end-users which can provide an easy and understandable interface for both using the current trends of technology. To serve in this context, an mobile app based system is developed . We have developed an app for the provision for the site engineer to update the work flow of a construction site. Normal Testing of the completed UI is done. Now load testing is conducted for efficacy and functionality of the developed system.

9.3 FUTURE ENHANCEMENT

Over the last years the work updates in the construction sites has been recorded manually. Here the application which is developed for the site engineers who works for the construction company can update the work progress of a construction site. Our application comprises of several features to update the work flow of the site. As future enhancement of the system we will introduce live video streaming for clients, while they can see these the visuals of their site. It will lead to improve the communication between the site engineer and the clients and the use of live stream will help the interaction more flexible. Using AI Work flow analysis can be done in the future. It will help the flow of work in the construction site. By introducing new modules that uses machine learning which can be used for material requirement for work, the amount of raw material can be analysed using this feature. These are few features which can be integrated with this system to make it more flexible in future.

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APPENDICES I

1.SCRUM MODEL

i.Git

Git is a version-control system for tracking changes in computer files and coordinating work on those files among multiple people. It is primarily used for source-code management in software development, but it can be used to keep track of changes in any set of files. As a distributed revision-control system, it is aimed at speed, data integrity, and support for distributed, nonlinear workflows.

ii.Git Repositories

A Git repository contains the history of a collection of files starting from a certain directory. The process of copying an existing Git repository via the Git tooling is called cloning. After cloning a repository the user has the complete repository with its history on his local machine. Of course, Git also supports the creation of new repositories. If you want to delete a Git repository, you can simply delete the folder which contains the repository. If you clone a Git repository, by default, Git assumes that you want to work in this repository as a user. Git also supports the creation of repositories targeting the usage on a server.

iii.Scrum

Scrum is an agile way to manage a project, usually software development. Agile software development with Scrum is often perceived as a methodology; but rather than viewing Scrum as methodology, think of it as a framework for managing a process. In the agile Scrum world, instead of providing complete, detailed descriptions of how everything is to be done on a project, 77 much of it is left up to the Scrum software development team. This is because the team will know best how to solve the problem they are presented. In the agile Scrum world, 94 | P a g e instead of providing complete, detailed descriptions of how everything is to be done on a project, much of it is left up to the Scrum software development team. This is because the team will know best how to solve the problem they are presented. Within agile development, Scrum teams are supported by two specific roles. The first is a Scrum Master, who can be

thought of as a coach for the team, helping team members use the Scrum process to perform at the highest level. The product owner (PO) is the other role, and in Scrum software development, represents the business, customers or users, and guides the team toward building the right product.

iv. Git History

vishnu852 / Data-Acquisition-in-Construction-Sites-with-Remote-Monitoring

Unwatch 1 Unstar 1 Fork 0

<> Code Issues Pull requests Actions Projects Wiki Security Insights Settings

main 1 branch 0 tags

Go to file Add file Code

vishnu852 Api services

a#f7be9 2 days ago 49 commits

.github	update the response	4 days ago
bin	flutter tools	4 days ago
packages	api service	2 days ago
.gitignore	future genrated files	4 days ago
DAC_siteengineer.sql	version	5 days ago
DAC_siteengineer.sql.zip	version	5 days ago
Data Acquisition in Construction Sites...	Add files via upload	29 days ago
README.md	Add files via upload	5 days ago
build.gradle	extend version	2 days ago
code.java	Add files via upload	4 days ago
construction.dart	Add files via upload	29 days ago

About

The construction company performs various works at various geological points. Currently, for these works the construction company will be having the site supervisors, who will be taking care of the various sites. The site supervisors currently furnishes only their weekly or monthly expenditure details and progress of works, because of this the C...

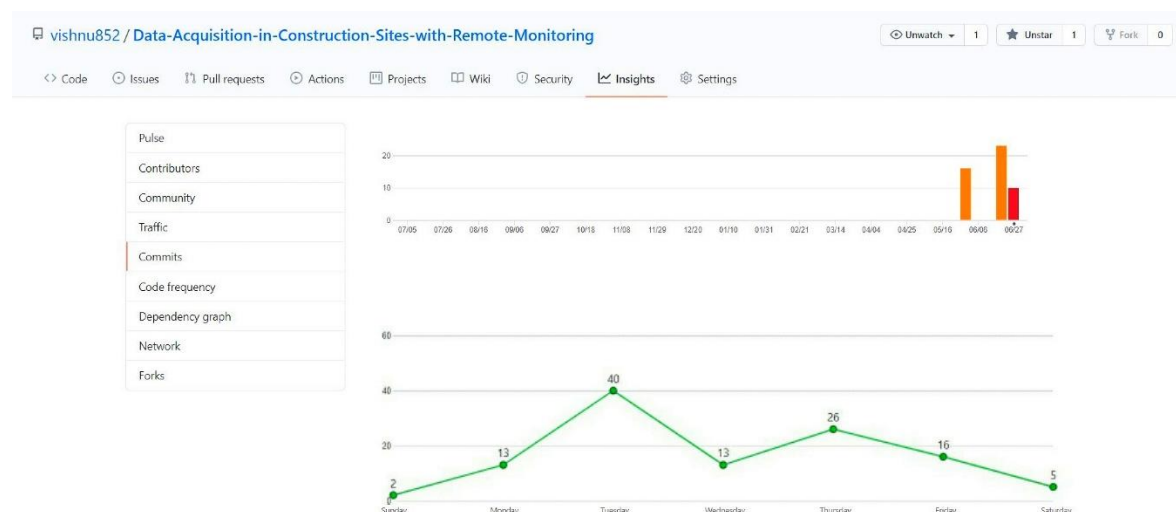
gh

Readme

Releases

No releases published

Create a new release



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3. ABBREVIATIONS AND NOTATION

1. **DFD** (Data Flow Diagram) is a graphical representation of the "flow" of data through an information system, modeling its process aspects. A DFD is often used as a preliminary step to create an overview of the system without going into great detail, which can later be elaborated. DFDs can also be used for the visualization of data processing (structured design).
2. **DB** A database is an organized collection of data, generally stored and accessed electronically from a computer system. Where databases are more complex they are often developed using formal design and modeling techniques

