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. 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 Construction company has to wait, to know the expenditures and the progress of work made by the various construction site. This process is very much time consuming and it involves a lot of manual work to be carried out. 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 helps 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 the 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 feathure which can over come 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 credentilas 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 inorder 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 acces 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

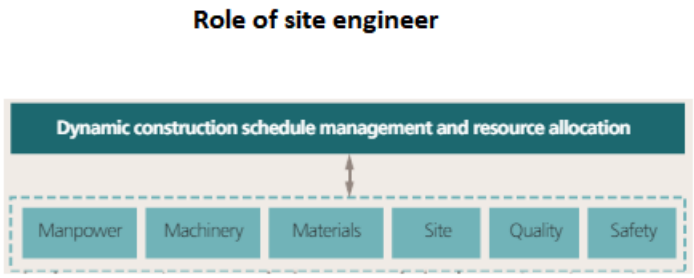
Thus, the proposed system is an Android Based Mobile Application to Monitor Works at Remote Sites". It has been proposed for the betterment of the construction company. By developing this application, the Construction Company can easily record their progress of various works and their day-to-day expenditures 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 feathures.

- 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 p 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 be retried 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 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 consistent 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 continuous communication with customers to gather all requirements.

A good SRS defines the 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 creates 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 desterilizing.
- 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-browers.

- 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

4.3.6 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.

4.3.7 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.

4.3.8 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.

4.3.9 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

4.3.10 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.