

# Developing an Application on Daily Updates on the Construction Site Progress Using Flutter and Dart

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**Abstract-** *The construction business is a vital and ever-changing industry where effective site management is essential to the completion of projects. We describe a mobile application that aims to improve and expedite building site management in response to the shortcomings of conventional approaches. The goal of this project is to introduce a digital solution that gives clear benefits over current approaches in order to improve the way construction projects are planned, carried out, and monitored. By conducting an extensive review of the literature, we determine the shortcomings and difficulties associated with traditional site management techniques. Building on this understanding, our suggested approach makes use of mobile technology to produce a feature-rich, durable, and user-friendly application. With the help of this program, administrators may design and oversee construction sites, delegate work to mechanical and civil teams, and keep track of tasks. The report includes a Gantt chart showing the project's timeframe, hardware and software needs, and a breakdown of each module. Our project seeks to dramatically improve project efficiency, decrease errors, and improve decision-making by providing an integrated platform that overcomes the deficiencies of current construction site management techniques.*

## I. INTRODUCTION

An effective and adaptable tool for streamlining and improving many facets of building project monitoring is a Flutter application for construction site management. Construction industry experts, such as project managers, site engineers, and supervisors, may effectively supervise and coordinate a variety of operations with the help of this smartphone app. It

can help team members collaborate and communicate in real time, track progress and deadlines, give access to project documentation and blueprints, enable communication meetings, grant access to locations, enable day-by-day monitoring, manage resources and equipment, and keep an eye on safety procedures. It's a complete solution for construction site management, as it can also assist with quality control, issue reporting, and financial tracking. An application for building site management built using Flutter, with cross-platform functionality and an intuitive design, guarantees that building projects be carried out more successfully and with fewer mistakes, which eventually results in cost savings. An effective and adaptable tool for streamlining and improving many facets of building project monitoring is a Flutter application for construction site management. Construction industry experts, such as project managers, site engineers, and supervisors, may effectively supervise and coordinate a variety of operations with the help of this smartphone app. It can help team members collaborate and communicate in real time, track progress and deadlines, give access to project documentation and blueprints, enable communication meetings, grant access to locations, enable day-by-day monitoring, manage resources and equipment, and keep an eye on safety procedures. It can also be used for quality assurance, problem reporting, and even financial tracking a complete solution for managing building sites. Construction projects are carried out more successfully and with fewer errors when using a Flutter-based construction site management app, which guarantees cross-platform functionality and an intuitive user interface. This reduces costs and increases project completion rates.

Effective communication among team members is facilitated by the Flutter app, which is an essential

component of building site management. Project plans, blueprints, and other important documents can be shared with others using its features, which include instant messaging, file sharing, and document storage. This real-time communication improves teamwork, lowers mistakes, and avoids delays. Monitoring resources and inventories is another essential facet of construction management. Equipment, supplies, and other resource tracking functions are available in the Flutter app. By guaranteeing that the appropriate resources are accessible when required, this helps to avoid expensive downtime and project delays. The goal of this smartphone software is to enhance productivity, coordination, and efficiency on building sites, which will ultimately result in improved project outcomes. To sum up, a Flutter application for managing construction sites is a complete solution that transforms the way building projects are organized, carried out, and recorded. It is a priceless tool for construction industry experts because of its features, which include resource tracking, safety management, communication tools, project scheduling, and reporting capabilities. This software aids in the timely and cost-effective completion of building projects by increasing productivity and lowering the possibility of mistakes.

## II. LITERATURE SURVEY

A collaborative management platform that allows project participants in different places to share project information via mobile computing devices was introduced by Pena-Mora and Dwivedi [1]. A knowledge library, analysis resources, and various device access were among the elements of the platform designed to support the infrastructure of distributed project management teams.

A concept was created by Bowden et al.[2] to show professionals in the field how mobile IT may enhance building procedures. The industry reacted enthusiastically to the idea, but there were also signs of common obstacles to be addressed.

A framework consisting of an application model and a technical model was presented by Chen and Kamara [3] for the use of mobile computing on building sites. Important elements were recognized

by the application model, including construction sites, mobile computing, workers in the construction industry, and construction information.

By extending the idea of the technology acceptance model, Son et al.[4] looked into the variables that affect the effective use of mobile computing devices in the construction sector. They discovered that user happiness was a key sign of a successful implementation and that usefulness of the tools was more likely to have an impact on satisfaction than user-friendliness.

The usefulness of a bar-code-enabled Personal Digital Assistant (PDA) application to improve information flow in a building supply chain setting was shown by Tserng et al. [5]. The method's benefit was stated to include both a visual control system akin to a Kanban and increased productivity on the job site.

For the purpose of tracking and exchanging quality data, Wang [6] suggested an RFID-based quality management system. The system was used for the management and inspection

A precast production management system that integrated PDA and RFID was presented by Yin et al. [7]. The system included features including feedback on specimen strength, mold inspection, production process inspection, and examination of incoming materials. Kimoto and associates.

The idea of a telematic digital workbench—a horizontal tabletop user interface that combines wireless communication and mobile computing—was introduced by Dong et al. [8] for the management of building defects. For less information loss during site-to-office communication, defect data gathered by mobile devices on-site is synchronized with the 3D model in the server and displayed in the digital workbench.

At a location where fall accidents frequently happened, Lee et al. [9] installed a wireless telecommunication system and an ultrasonic and infrared sensor-based safety monitoring system. In order to lower the rate. The system included software for data analysis, transmitter sets and receivers for

data transfer, and a mobile sensing device for worker detection in the event of catastrophic accidents on the building site. Pena-Mora together with others.

For managers on building sites, Kimoto et al. [10] created a mobile computing system with PDA. The system helped construction managers with a variety of tasks, including monitoring project progress, reviewing project documentation, confirming the placements of structural elements, and evaluating finished works—all without the need for automatic identification technology.

### III. OBJECTIVES

The following are the project's specific goals:

**Effective Site Management:** The project's goal is to develop a mobile application that acts as a central location for managing construction sites. The aim is to improve overall site efficiency by decreasing time-consuming administrative labour and streamlining the coordination of several tasks, teams, and resources through the provision of a digital platform.

**Real-time Task Assignment:** Based on project requirements and engineer availability, administrators are equipped with a strong task assignment tool that guarantees the proper jobs are assigned to the relevant mechanical and civil teams. This goal enhances resource allocation and supports agile task management.

**Transparent Task Progress Tracking:** The project aims to provide engineers with the ability to monitor and keep track of the status of the tasks they have been allocated in real time.

**Making decisions:** The project understands how important it is to give administrators access to the most recent analytics, task progress reports, and project data. By doing this, it gives managers the knowledge they need to decide wisely, distribute resources efficiently, and deal with project difficulties early on.

**Streamlined Reporting:** One of the main goals of the project is to make it easier for engineers to submit their end-of-day reports. Engineers can provide work specifics, identify difficulties encountered during the

day, and include other pertinent information via the program. This guarantees that crucial data is recorded in an organized way and cuts down on administrative burden.

**Privacy and Security:** Security is the most important issue. In order to fulfill industry requirements for data protection, the project is dedicated to putting strong security measures in place to safeguard private project-related information and safeguard sensitive construction data.

**Role-based Access Control:** The project will implement role-based access control to improve data security and privacy. This will guarantee that engineers and administrators may only access the features and data pertinent to their duties, hence preventing unwanted access.

**Data Analysis and Reporting:** Administrators will be able to track performance, analyze project data, and create reports thanks to this application. This not only facilitates well-informed decision-making but also enables thorough project assessment and performance tracking.

### IV. EXISTING METHOD

Current construction site management techniques frequently combine desktop software, manual procedures, and fragmented communication systems. Compared to a contemporary Flutter application created especially for building site management, these conventional methods are less effective and more error-prone. Task management and project scheduling were traditionally managed with paper-based schedules or desktop programs like Microsoft Project. These techniques frequently lacked tools for collaboration and real-time updating. This made it difficult to adjust to changes and have productive conversations with stakeholders, onsite teams, and subcontractors.

### V. DRAWBACKS

Project managers found it difficult to get and update information while on the construction site due to their limited mobility. Phone conversations, emails, and hard copies of documents were the main means of

communication. This disjointed approach to communication may cause miscommunication, hold ups, and misplace important information. Additionally, it made it challenging to inform all team members and stakeholders about the most recent project advancements.

## VI. PROPOSED METHOD

To guarantee the efficacy and efficiency of a Flutter application for construction site management, a carefully considered suggested approach is necessary. For this building site management application to be implemented successfully, the suggested method calls for the inclusion of a number of essential elements. The program will feature an easy-to-use interface that prioritizes accessibility and intuitive navigation. Regardless of their technological background, engineers, workers, and managers of construction sites should all be able to utilize the app with ease. Because of its simple design, users will be more likely to use the app and be happier overall, making it a necessary part of their everyday routine. Numerous resources are needed on construction sites, such as labor, supplies, and machinery. Users will be able to monitor the allocation, consumption, and availability of the app. Real-time data synchronization and collaboration will be the main features of the program. The app will make it possible for data to be seamlessly synced across multiple platforms and devices by utilizing cloud-based technology.

Everyone working on the construction project will always have access to the most recent information, including task assignments, project schedules, and safety procedures, thanks to this real-time data exchange. Collaboration tools like file sharing and instant messaging will improve team member communication even further, encouraging improved coordination and teamwork. Strong task management and project scheduling features will be implemented by the program. Tasks, due dates, and dependencies can be outlined in-depth project schedules that project managers can design. Task assignments to particular teams or people will be possible through the app, and everyone will be kept informed about their duties through automatic notifications and reminders.

## VII. METHODOLOGY

### • FLUTTER

Google's portable UI toolkit, Flutter, allows developers to create stunning natively built desktop, web, and mobile applications from a single codebase. Flutter is open source, free, and compatible with existing code, and it's utilized by developers and organizations globally.

You can make excellent native apps for iOS and Android with the Flutter mobile app SDK. With Google's new Fuchsia operating system, it's also the main method for creating cross-platform applications. You can create stunning, responsive, and quick user interfaces with ease thanks to the Flutter framework. Additionally, the framework is flexible, making it simple to add new features and functionalities.

You'll be working with what's known as a "widget" when developing a Flutter application.

### • DART

Google developed the programming language known as Dart. It is intended for desktop, mobile, and online application development. Dart is renowned for its efficiency, productivity, and emphasis on features that are developer-friendly. Google developed the flexible and developer-friendly programming language Dart. It is excellent at creating desktop, mobile, and web apps.

Dart's productivity and performance features are its strongest points. With its support for both static and dynamic typing, developers have more options when it comes to working with data types. Because the language is object-oriented, code may be ordered and efficiently structured through the use of classes, inheritance, and polymorphism. Dart VM, a virtual machine devoted to swiftly running Dart code, is one of its distinguishing features. This makes it especially well-suited for web apps and other software.

Creating a management system for building sites Planning, designing, implementing, testing, and deploying a Flutter application with Android Studio all follow a methodical process.

Below is a brief synopsis of the main actions in this process:

1. Scheduling the Project:

Establish the goals and scope of the building site management software first. Determine which features and functionalities are essential, taking into account the requirements of building industry experts.

2. prerequisites Collaborate with engineers, project managers, and construction workers to gather specific needs as part of the gathering process. Be aware of their procedures, problems, and goals.

3. Design of the System: Make a system architecture and UI design for the application. Take into account the database design, data models, and app's navigation structure.

4. Technology Stack Selection: - Select Android Studio as the main integrated development environment (IDE) and Flutter as the development framework. Cross-platform programming is made possible with Flutter, guaranteeing compatibility with both iOS and Android.

5. Progress: Start using Flutter to code the features and functionalities of the app. For Flutter development, Android Studio offers a powerful environment that includes code editing, debugging, and UI design.

6. User Interface Design: - Provide an easy-to-use interface that makes managing construction sites more efficient. Create the screens and other parts of the program using the widget library provided by Flutter.

7. Database Integration: - Put in place a database system to hold schedules, safety records, resource information, and project details. For data storage, Firebase or SQLite can be integrated.

8. Real-Time Communication: - Use frameworks like Firebase Cloud Messaging or WebSocket to implement real-time communication features like file sharing and instant messaging.

9. Geolocation Services: - Utilize geolocation services to monitor workers and equipment on building sites. For this, make use of the Flutter geolocation package.

10. Safety Management: - Provide tools for entering safety rules, reporting safety issues, and performing safety inspections. Make an organized database to hold information on safety.

11. Task Management: - Build a task management module that allows project managers to create

timetables, assign tasks, and track progress. Put notification systems in place to inform all parties involved.

12. Testing and Quality Assurance: - Thoroughly check the app's performance, security, and functionality. Any problems or errors that surface during testing should be addressed and fixed.

13. Testing for User Acceptance: Participate in user acceptance testing with stakeholders and end users to get input and make the required adjustments.

14. Implementation: - Get the app ready to be released on the Google Play Store. Observe the app submission standards with regard to screenshots, descriptions, and icons.

15. Documentation and Training: - To guarantee that construction experts can utilize the app efficiently, provide thorough documentation and training materials.

16. Updating and Maintenance: - Keep the app up to current with the most recent Flutter and Android versions, responding to user comments, and issuing updates.

## VIII. MODULES

Module 1: User Management: This module gives administrators the ability to create, edit, and remove user profiles in addition to managing user accounts and roles. To guarantee that users have the proper access privileges, it incorporates role-based access control.

Task Assignment for Module 2: For administrators to allocate work to the mechanical and civil teams, task assignment is an essential module. Task descriptions, deadlines, priorities, and the distribution of tasks according to the availability and skill of the engineers are all included.

Module 3: Task Progress Tracking: Using this module, engineers can monitor the status of the jobs they have been allocated in real time. They can add details about work finished, label tasks as "in progress" or "completed," and amend task statuses.

Module 4: Documentation and Reporting: For engineers, this module simplifies the reporting procedure. They can submit daily reports with specifics about the tasks they completed, the difficulties they encountered, and extra notes.

Module 5: Notifications and Communication: This module facilitates teamwork and communication

between engineers, administrators, and team members. It has task-specific discussion threads, in-app messaging, and notifications for assignments and updates.

**Module 6: Site Administration:** This module allows administrators to design, oversee, and manage construction projects. It contains start and finish dates, site information, location specifics, and all necessary project papers.

**Module 7: Team Management:** This module gives administrators the ability to form and oversee both civil and mechanical teams. Additionally, it permits the assignment of engineers to particular teams in accordance with their availability and area of competence.

**Module 8: Data Analysis and Reporting:** This module gives administrators the capabilities to monitor team and project performance, evaluate project data, and produce thorough reports that help them make well-informed decisions.

## IX. HARDWARE AND SOFTWARE SYSTEM

Flutter is a cross-platform user interface toolkit that enables apps to interact directly with underlying platform services and to reuse code across operating systems like iOS and Android. The idea is to share as much code as possible while empowering developers to create high-performance apps that feel right at home across many platforms. In order to enable stateful hot reloading of modifications without requiring a complete recompile, Flutter apps are developed in a virtual machine (VM). Flutter apps are built straight to machine code—either ARM or Intel x64 instructions—or to JavaScript if they are intended for the web before being released. The framework features a robust ecosystem of third-party packages that enhance the core functionality, and it is available for free under a permissive BSD license.

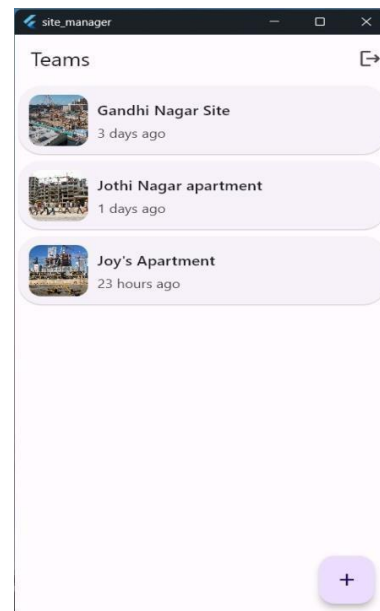
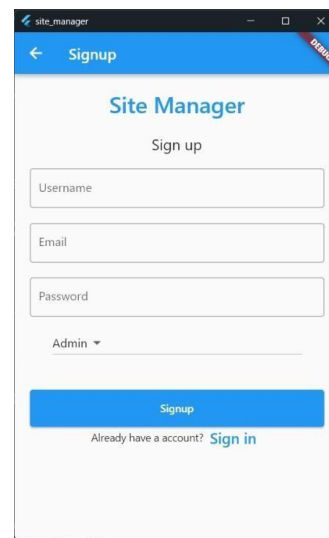
Synchronize data to the local database to enable offline access. For accessing SQLite databases, use tools such as SQFlite or Moor. When an internet connection is available, sync data to the cloud.

Show project locations on maps and activate geofencing notifications for when employees arrive and depart the site. able to use Mapbox or Google Maps APIs. Take pictures or videos and attach them

to documents such as safety violations, inspection reports, and site shots. Apply the video\_player and image\_picker plugins. Use the BLoC pattern to handle states. aids in separating UI from business logic.

To see key indicators like project progress, costs, resource allocation, etc., use charts and reports. Turn on push notifications to get reminders and alerts. Employ Cloud Messaging on Firebase. Encourage the use of dark mode for accessibility. Dark themes are supported natively by Flutter.

## X. OUTCOMES



## CONCLUSION

Flutter application for construction site management offers to the construction sector in the end. Stress how the software facilitates communication amongst the many parties involved in a building project and how it increases productivity and streamlines operations. You said how the Flutter app's user-friendly UI makes it simple for staff members to view and edit information in real-time, whether they are on-site or off. Emphasize any unique features that distinguish your program and solve the particular difficulties encountered in managing construction sites. Regarding the application's future scope, think about talking about possible extensions and improvements. This can entail combining cutting-edge technology like machine learning for predictive analytics and augmented reality for on-site visualization. Stress how the application is scalable to allow for upcoming developments in the construction sector. Mention the possibility of collaborating with other platforms or technologies relevant to the sector as well. To provide a more complete solution, this may entail integrating with project management tools, BIM (Building Information Modelling) software, or even forming partnerships with manufacturers of construction equipment. In order to maintain the Flutter application at the forefront of innovation in construction site management, the future scope section should ultimately exude a feeling of elasticity and readiness to adopt evolving technology.

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