PRESIDENCY UNIVERSITY

Private University Estd. in Karnataka State by Act No. 41 of 2013

BANGALORE

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

A Project Report

On

"App Based Valuation Reports of Mobile Assets"

Batch Details

Sl. No.	Roll Number	Student Name
1	20211CSE0413	SUSHMA M MADDIN
2	20211CSE0421	SINCHANA A U
3	20211CSE0437	K H SRUJAN GOWDA
4	20211CSE0444	CHETHA SHREE R

School of Computer Science

Presidency University, Bengaluru.

Under the guidance of,

Dr. Pajany M

School of Computer Science,

Presidency University, Bengaluru

<u>CONTENTS</u>

1. INTRODUCTION

The problem domain focuses on the valuation of mobile assets, which include movable items such as cars, trucks, heavy machinery, and other equipment often used in industries like logistics, construction, and agriculture. These assets undergo wear and tear over time, requiring regular evaluations for sales, insurance claims, and financing purposes.

Traditional asset valuation methods present several challenges:

- **Manual Data Collection:** Inspectors need to physically visit the site, record data manually, and prepare reports, which is time-consuming and error-prone.
- **Subjectivity in Valuation:** Different inspectors may provide varying assessments for the same asset, leading to inconsistent valuations.
- **Paper-Based Documentation:** Reports are often generated as hard copies, which can be easily lost, damaged, or tampered with.
- **Lack of Real-Time Data:** The time lag between inspections, reporting, and decision-making delays critical processes like auctions, sales, or insurance settlements.

The chosen problem statement aims to address these issues by developing an **App-Based Valuation System for Mobile Assets**, leveraging modern technology to:

- Automate the inspection process.
- Standardize data collection and valuation metrics.
- Eliminate paper-based processes.
- Ensure secure and instant report generation and sharing.

By addressing these main points, the solution aims to increase the efficiency, accuracy, and scalability of mobile asset valuation processes. This innovation opens new possibilities for industries dependent on accurate asset assessment, allowing them to make more informed decisions in real time.

2. LITERATURE REVIEW

Existing mobile applications for valuation and inspection, such as insurance apps (e.g., Allstate Digital Locker and Progressive Insurance App) and industry-specific tools like Procore and CoreLogic, offer several advantages. They streamline processes by providing easy data collection, photo capture, real-time reporting, and cloud integration, making inspections more efficient and accessible. Many of these apps are user-friendly, enable collaboration, and reduce the reliance on manual paperwork. However, these apps also have significant limitations. They often lack automated valuation algorithms, are highly specialized for certain industries (e.g., real estate, automotive, agriculture), and may require manual data entry, which can introduce inefficiencies and inconsistencies. Additionally, most existing apps focus on specific functions like maintenance tracking or claims processing, without offering comprehensive support for mobile asset valuation across different sectors. This highlights the need for a more versatile and automated solution that addresses the broader requirements of mobile asset inspection, valuation, and reporting.

Paper Title	Advantages	Disadvantages	Improvements for Your Project
Future of Real Estate AVM (Oxford)	Highlights increased speed and efficiency in valuations.	Reliance on high-quality data; less adaptability for unique cases.	Implement a data verification layer to ensure data quality.
Comparative Methods for AVMs (Springer)	Insights into flexible parametric and non-parametric methods.	Complexity in selecting optimal methods; risk of over-fitting.	Utilize a hybrid approach combining methods for better adaptability.
Impact of Big Data on AVMs (MBA)	Big data enhances accuracy and prediction strength.	Managing extensive data can be challenging.	Integrate scalable cloud-based data management solutions.
AI in Real Estate Valuation (Springer)	AI improves valuation accuracy and automation.	The "black box" nature reduces transparency and trust.	Use Explainable AI (XAI) for more understandable outputs.
AI-Based AVMs (NUS)	AI/ANN models are highly accurate and reduce manual intervention.	Opaque decision processes can affect trust and compliance.	Integrate XAI to make model outputs more transparent.
TAQEEM's AI in Valuation	Captures complex property relationships and aids informed decision-making.	Limited adoption due to interpretability concerns.	Include transparent explanations of algorithm decisions.
Emerging Technologies in Real Estate	Enhances predictive capabilities using deep learning and NLP.	High computational and data integration costs.	Leverage cloud solutions for efficient data handling.

3. OBJECTIVES

Based on the research gaps identified in the literature review, the following objectives are set for the development of an app-based valuation system for mobile assets:

1. **Automate Mobile Asset Valuation**

   Develop an automated valuation system that eliminates manual data entry and subjective assessments by leveraging algorithms to provide accurate and consistent valuations for mobile assets across various industries.

2. **Integrate Real-Time Data Capture and Reporting**

   Create an app that allows users to capture real-time data, such as photos and asset details, through mobile devices, and instantly generate standardized reports that can be shared securely via cloud-based platforms.

3. **Enhance Flexibility and Customization for Multiple Industries**

   Design a flexible app that can be customized to support different asset types, including vehicles, machinery, and equipment, across industries such as automotive, construction, agriculture, and facilities management.

4. **Ensure Data Security and Regulatory Compliance**

   Implement advanced data security features, including encryption and digital signatures, to ensure the authenticity of reports and compliance with industry standards and regional regulations for asset valuation and reporting.

EXPERIMENTAL DETAILS/METHDOLOGY
Hardware and Software Details
Software:
- **Frontend**: React Native (Mobile)
- **Backend**: Node.js, Express.js
- **Database**: MongoDB
- **Cryptography**: RSA, ECDSA for digital signatures
- **PDF Generation**: Libraries like jsPDF\
- **Cost Estimation Algorithms**: Using TensorFlow or scikit-learn for developing and hosting cost estimation algorithms.

Hardware:
- **Mobile Device**: Android/iOS devices for app testing
- **Server**: Cloud-hosted backend (e.g., AWS, Heroku)

4. METHODOLOGY
DESIGN PROCEDURE:

The design procedure for the app-based valuation system of mobile assets involves several key phases, from initial system planning to final implementation. Below is a structured approach:

1. Requirement Analysis

- User Needs Identification: Identify the core user base, which could include appraisers, inspectors, insurance companies, asset sellers, and buyers. Gather specific requirements for different asset types (vehicles, machinery, etc.) and industries.
- Functional Requirements: Define the key functionalities such as data capture (photos, asset details), automated valuation algorithms, report generation, digital signatures, and real-time cloud storage.
- Non-Functional Requirements: Ensure scalability, security (encryption, authentication), and compliance with local regulations for data protection and asset valuation standards.

2. System Architecture Design

- Mobile App Interface: Design a user-friendly mobile interface allowing users to input asset details, capture photos, and sign documents digitally.
- Backend System: Develop a robust backend that integrates data storage, valuation algorithms, and reporting tools. The backend will also manage user authentication and data encryption for security.
- API Integration: Incorporate APIs for integration with third-party services, such as insurance platforms, auction houses, and financial institutions, to streamline report sharing and valuations.

- Cloud Storage: Implement cloud storage for real-time data access and report retrieval, ensuring the system is scalable for large volumes of data.

3. Data Capture and Automation

- Photographic Input and Geotagging: Design features that allow users to take high-quality photos of assets with geotagging and timestamps for location and time verification.
- Inspection and Valuation Algorithms: Develop and integrate machine learning models or rule-based algorithms that can automatically assess asset condition, depreciation, and market value based on inputs like photos, asset details, and historical data.
- Predefined Checklists: Create customizable checklists for asset inspection to ensure that key details are consistently captured, reducing subjectivity in evaluations.

4. Report Generation

- Automated Report Creation: Design the system to automatically generate valuation reports in PDF format after the inspection, including photos, valuation details, and digital signatures.
- Customization and Sharing: Ensure that reports can be customized according to industry-specific needs and shared securely via email or cloud links with stakeholders.

5. Security and Compliance

- Digital Signatures and Encryption: Incorporate digital signature functionality for both inspectors and clients to authenticate reports, along with data encryption to secure sensitive asset information.
- Regulatory Compliance: Ensure that the app adheres to data protection regulations (e.g., GDPR) and complies with relevant valuation standards in different industries and regions.
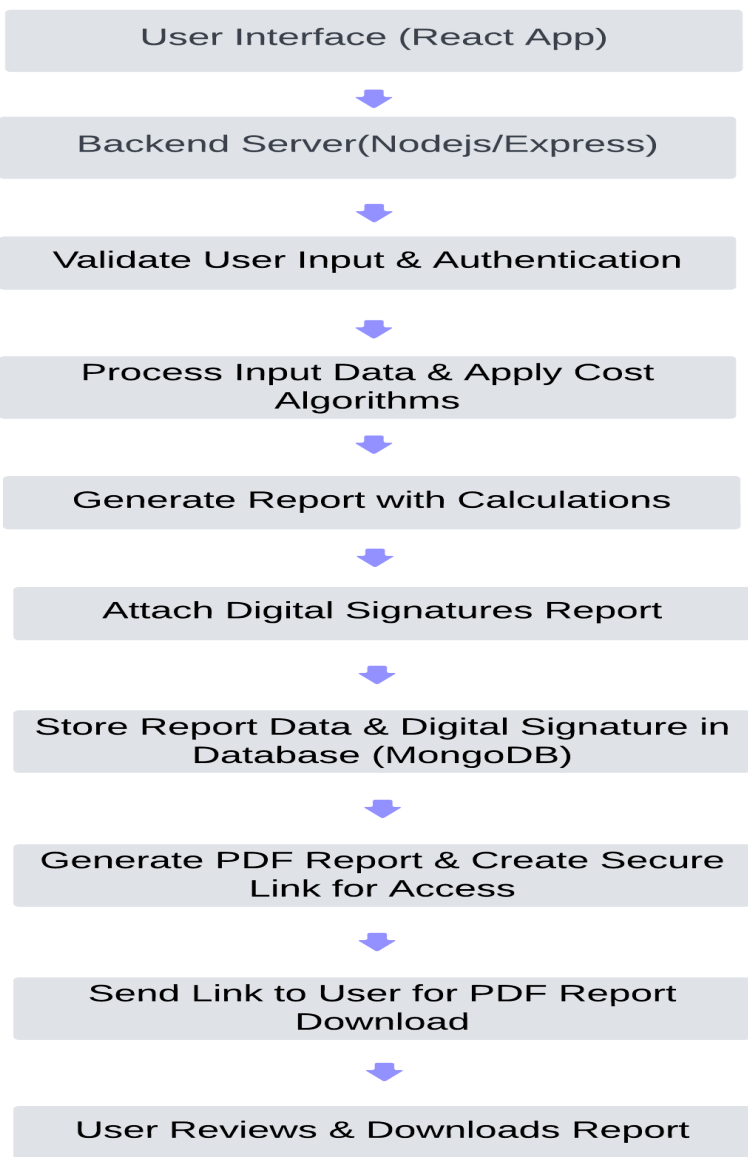
6. Testing and Validation

- User Testing: Conduct beta testing with various user groups from different industries to validate the app's performance, user experience, and valuation accuracy.
- Algorithm Validation: Test the valuation algorithms with real-world data to ensure accuracy and consistency across various asset types and conditions.

7. Final Deployment

- App Store Launch: Once testing is completed and feedback is incorporated, deploy the app on major platforms like iOS and Android, ensuring smooth installation and updates.
- Ongoing Maintenance and Updates: Implement a process for regular app maintenance, updates for new features, security patches, and algorithm improvements based on user feedback and market needs.

ARCHITECTURE DIAGRAM:

User Interface (React App)

⬇

Backend Server(Nodejs/Express)

⬇

Validate User Input & Authentication

⬇

Process Input Data & Apply Cost Algorithms

⬇

Generate Report with Calculations

⬇

Attach Digital Signatures Report

⬇

Store Report Data & Digital Signature in Database (MongoDB)

⬇

Generate PDF Report & Create Secure Link for Access

⬇

Send Link to User for PDF Report Download

⬇

User Reviews & Downloads Report
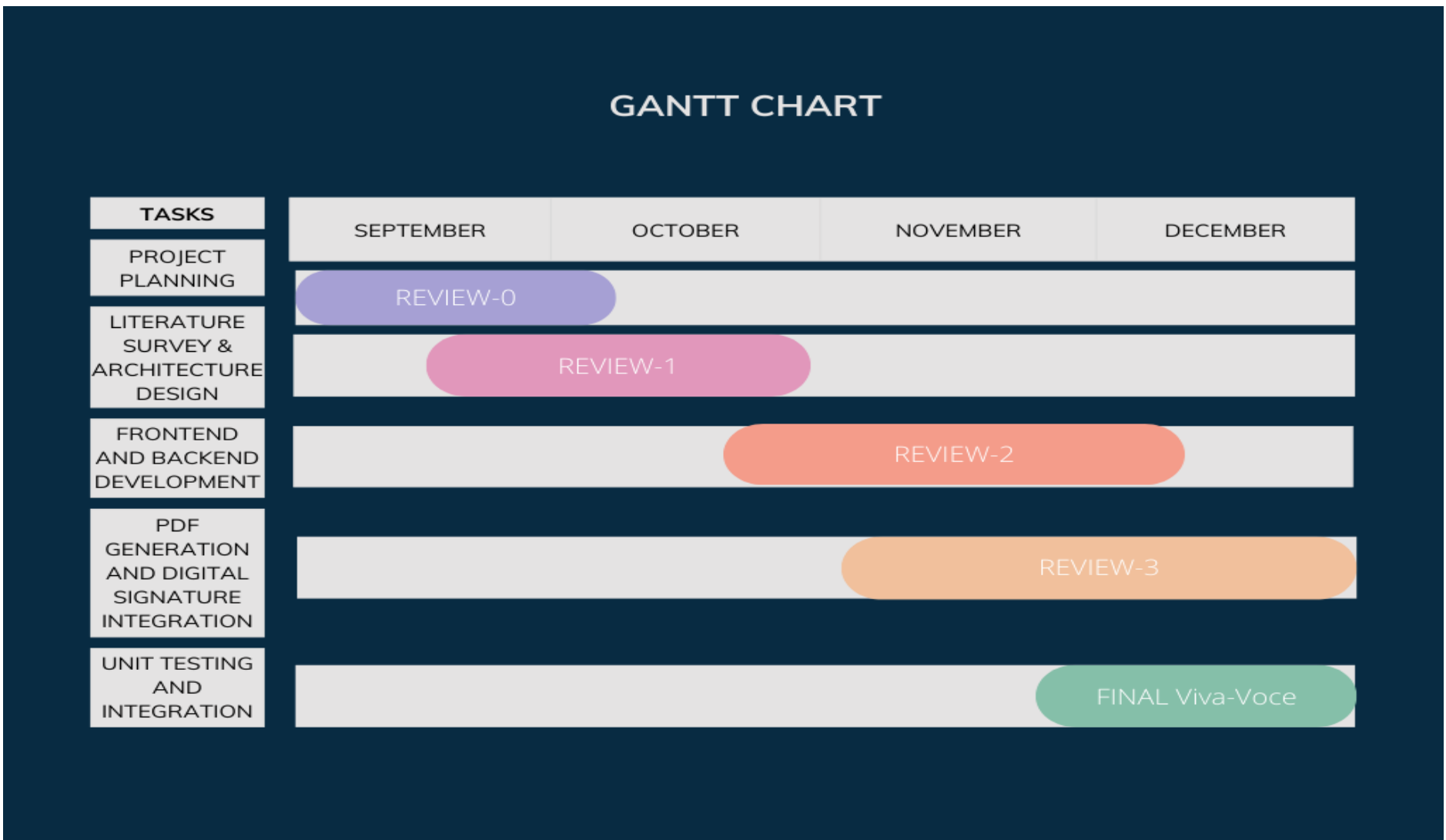
5. OUTCOMES

The app-based valuation system for mobile assets will automate the valuation process, improving efficiency, accuracy, and consistency. By using machine learning and predefined algorithms, it will provide reliable, data-driven valuations. The app will enable real-time data capture and instant report generation, speeding up processes like insurance claims and asset sales. Enhanced security features, such as digital signatures and encryption, will ensure compliance with industry regulations. The system will be customizable for various industries, making it adaptable and scalable for diverse users, from large organizations to small businesses and individual users.

6. TIMELINE OF THE PROJECT/ PROJECT EXECUTION PLAN

GANTT CHART

TASKS	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
PROJECT PLANNING	REVIEW-0			
LITERATURE SURVEY & ARCHITECTURE DESIGN		REVIEW-1		
FRONTEND AND BACKEND DEVELOPMENT			REVIEW-2	
PDF GENERATION AND DIGITAL SIGNATURE INTEGRATION				REVIEW-3
UNIT TESTING AND INTEGRATION				FINAL Viva-Voce

7. CONCLUSION

The app-based valuation system for mobile assets offers a transformative solution to the challenges of traditional asset valuation processes. By automating data collection, valuation, and report generation, the system enhances efficiency, accuracy, and transparency. It reduces reliance on manual interventions and subjective assessments, delivering consistent and reliable results across industries. The integration of real-time data capture, digital signatures, and cloud-based storage ensures that the valuation process is faster, more secure, and compliant with regulatory standards. Furthermore, the app's flexibility and scalability make it adaptable for a wide range of industries, from automotive to construction and agriculture. This innovation has the potential to streamline asset management, improve decision-making, and increase the overall effectiveness of valuation practices, setting a new standard for mobile asset evaluation.

REFERENCES

1. The Role of Automated Valuation Models (AVMs)
https://www.researchgate.net/publication/348785878_The_Digital_Transformation_of_the_Valuation_Sector_in_the_World_of_Algorithms

2. Review paper (5mins read)
https://capeanalytics.com/blog/incorporating-ai-into-the-real-estate-appraisal-process/

3. Post
https://www.matellio.com/blog/automated-valuation-model-for-real-estate/