A
Project Report

on

RFID Based Child Tracking System For Crowded Public Spaces

Submitted for the Course of BE in Computer Engineering

by

Mr. Omkar Borade [B401200139]
Mr. Divyesh Chaudhari [B401200147]
Mr. Siddhesh Ghode [B401200156]
Mr. Mayur Jagtap [B401200169]

Under the guidance of

Dr. S. G. Jachak

Department of Computer Engineering

Guru Gobind Singh College of Engineering and Research Center

Nashik-422009

2024-25

GURU GOBIND SINGH COLLEGE OF ENGINEERING AND RESEARCH CENTER

Nashik-422009

2024-2025

Department of Computer Engineering

CERTIFICATE

This is to certify that the PROJECT REPORT entitled

RFID Based Child Tracking System For Crowded Public Spaces

is submitted as fulfilment of the

Project Examination BE in Computer Engineering

BY

Mr. Omkar Borade [B401200139]
Mr. Divyesh Chaudhari [B401200147]
Mr. Siddhesh Ghode [B401200156]
Mr. Mayur Jagtap [B401200169]

Dr. S. G. Jachak	Prof. P. K. Bachhav
Project Guide	Prof. P. C. Patil
	Project Coordinator
Prof. S. G. Shukla	Dr. N. G. Nikam
Head of the Department	*Principal*

SAVITRIBAI PHULE PUNE UNIVERSITY

CERTIFICATE

This is to certify that,

Mr. Omkar Borade [B401200139]

Mr. Divyesh Chaudhari [B401200147]

Mr. Siddhesh Ghode [B401200156]

Mr. Mayur Jagtap [B401200169]

of BE in Computer Engineering was examined in the

Project Examination entitled

RFID Based Child Tracking System For Crowded Public Spaces

on / /

At

Department of Computer Engineering

GURU GOBIND SINGH COLLEGE OF ENGINEERING AND RESEARCH CENTER

Nashik-422009

2024-2025

_____ _____

Internal Examiner *External Examiner*

Acknowledgement

It is a great pleasure to acknowledge those who extended their support, and contributed time for this project work so far.

We would like to thank our project guide **Dr. S. G. Jachak**, for her valuable and skillful guidance, assessment, and suggestions from time to time which improved the quality of work in all respects. We would like to take this opportunity to express our deep sense of gratitude towards her, for her invaluable contribution in the completion of this project.

We are also thankful to **Mr. Sandeep. G. Shukla**, Head of Computer Engineering Department for his timely guidance, inspiration and administrative support without which my work would not have been completed.

We are also thankful to the all staff members of Computer Engineering Department and Librarian, Guru Gobind Singh College of Engineering and Research Center, Nashik.

Also We would like to thank our colleagues and friends who helped us directly and indirectly during this course of work.

Mr. Omkar Borade
Mr. Divyesh Chaudhari
Mr. Siddhesh Ghode
Mr. Mayur Jagtap

Abstract

This project is about creating a system to help parents and guardians track the location of their children in real time using RFID technology. By placing small RFID tags in a child's belongings or wearable devices, the system can detect their movements as they pass by RFID readers set up in places like schools, parks, and malls. Each tag sends a unique ID to the system, which updates the child's location continuously. Parents can check their child's location on a simple mobile app or website and get alerts if the child leaves a safe zone or enters a restricted area, so they can respond quickly if needed. Designed to be low-cost and easy to expand, this system can be used in many settings to give parents peace of mind and help create safer spaces for children. For additional security, GPS may be added for outdoor tracking, making the system suitable for both indoor and outdoor environments.

Keywords:-*RFID technology, Child tracking system, Real-time location monitoring, Safety alerts, Safe zones.*

Abbreviation

Sr No.	Abbriviation	Full Form
1	RFID	Radio Frequency Identification
2	ID	Identification
3	IoT	Internet of Things
4	API	Application Programming Interface

List of Figures

List of Tables

Contents

Chapter 1

Introduction

1.1 Overview

This project creates a system for tracking children's locations in real time using RFID technology. Small RFID tags in their belongings or wearables interact with sensors placed in areas like schools and parks. Parents can view their child's location on a website. It's an affordable and reliable way to help keep kids safe indoors and outdoors.

1.2 Aim

- Keep children safe by helping parents know where they are in real time.
- Use RFID tags placed in kids' bags or clothes to track their movement indoors.
- Show the child's location on a mobile app or website that parents can easily use.
- Send alerts to parents if the child goes outside a safe zone or enters a restricted area.
- Be affordable and easy to expand so it can be used in schools, parks, malls, and more.

1.3 Objectives

- To provide real-time location tracking of children in busy public spaces using RFID technology.

- To alert parents immediately if a child leaves a predefined safe zone or enters a restricted area.
- To create a user-friendly mobile app and web interface for parents to monitor their child's location easily.
- To develop a reliable, low-cost tracking solution that can be implemented across various environments like schools, parks, and shopping malls.

1.4 Organizations of Report

- Introduction (Chapter 1): In this chapter, the overview of existing systems and their problem is discussed. This chapter describes the aim, motivation, and objectives of the software system.
- Literature Survey (Chapter 2): In this chapter, Related work done in the Previous papers have advantages and disadvantages. Related information is available in standard Books, Journals, Transactions, Internet Websites, etc. is discussed.
- Software Requirement Specification (Chapter 3): In this chapter, the detailed description of requirements is specified.
- System Design (Chapter 4): This chapter discusses the proposed system with the help of system architecture, system design, and UML diagrams
- Technical Specifications (Chapter 5): This chapter, discusses the technical details used in the project
- Project Estimation Schedule and Team Structure (Chapter 6): This chapter discusses project estimate, brief of COCOMO model, and related calculation and team structure
- Software Implementation (Chapter 7): This chapter discusses important module and algorithm also business logic and archite
- Software Testing (Chapter 8): This chapter gives a briefing about testing for various modules
- Software Testing (Chapter 9): This chapter discusses about installation and uninstallation of project as well as maintenance

- Conclusion and Future Scope (Chapter 10): This chapter summarizes and concludes the project report and give the future scope.
- Plagiarism Report(Chapter 11): This chapter shows the plagiarism report.

Chapter 2

Literature Survey

1. **J. A. J. Ferreira, R. M. M. Oliveira,RFID Technology in Supply Chain Management: A Review,2022** This paper reviews the applications of RFID technology in supply chain management, focusing on its benefits in inventory control and logistics. [1]
   Merits: Provides a strong foundation on RFID capabilities in inventory control and logistics.

   Useful for understanding large-scale RFID system deployment and management.
   Demerits: Not directly related to child tracking or safety.

   Application domain (supply chain) differs significantly from child monitoring contexts.

2. **K. Kumar, L. Shankar, "Child Safety Systems using RFID and GPS," International Journal of Engineering Research, 2021** This study explores the combined use of RFID and GPS technologies for child safety applications, emphasizing the importance of GPS for outdoor tracking. The integration of both technologies enhances child tracking and ensures parents can access real-time information on their child's location.[2]
   Merits: Directly applicable to child safety systems.
   Highlights the benefits of GPS integration for outdoor tracking.
   Real-time location access is very relevant for concerned parents.
   Demerits: Doesn't explore limitations of GPS such as battery usage or signal loss in dense areas.
   Lacks depth on indoor tracking challenges where GPS might fail.

3. **S. Gupta, M. Agarwal, "RFID-based Location Tracking and Monitoring System," Journal of Wireless Communication, 2020** The paper presents

an RFID-based tracking system focused on monitoring people within a predefined area. It demonstrates RFID's effectiveness for indoor monitoring, as the system reliably tracks and records individuals' movements, which is relevant for safe zone alerts in child-tracking systems. [3]
Merits: Focuses on indoor monitoring, which is crucial for school and mall environments.
Demonstrates reliability in tracking within confined zones.
Demerits: Limited scope — doesn't address mobility or real-time remote access.
Doesn't integrate other tech (e.g., IoT or GPS) for extended functionality.

4. **A. K. Sharma, P. Jain, "RFID in Education: Applications and Implications," Education Technology Journal, 2019**This study discusses the use of RFID technology in educational settings, particularly for student attendance and tracking. The findings support RFID's potential in monitoring children's whereabouts within school premises, which could be crucial for child safety applications. [4]
Merits: Shows successful RFID use for attendance and movement tracking in schools.
Reinforces the feasibility of child monitoring within educational settings.
Demerits: Focused more on administrative applications than safety.
May lack insights into real-time alert systems or emergency use cases.

5. **R. Singh, L. Yadav, "An Efficient System for Tracking People Using RFID Technology," IEEE Transactions on IoT, 2022** This paper reviews the efficiency of RFID systems in tracking individuals across various environments. The system provides continuous updates on the location of tagged individuals, which could be useful for monitoring children in public areas like parks and malls.[5]
Merits: Explores tracking across different environments (indoors and outdoors).
Emphasizes continuous location updates, ideal for dynamic public settings.
Demerits: Doesn't mention privacy or data protection concerns.
Efficiency is claimed but not thoroughly compared to alternative systems.

6. **D. Patel, S. Mehta, "RFID and IoT in Child Tracking Solutions," International Journal of Advanced Research in Electronics, 2021**The authors discuss integrating RFID with IoT for real-time child monitoring. This approach allows data to be accessed remotely via mobile applications, ensuring parents can view their child's location and receive instant alerts, similar to the proposed project. [6]

Merits: Integrates RFID with IoT for better scalability and remote access.
Mobile alerts and real-time monitoring enhance child safety features.
Demerits: Potential security risks of IoT platforms are not discussed.
Lacks hardware and cost analysis for practical implementation.

7. **B. Cho, M. Lee, "Wearable RFID Devices for Child Safety," Journal of Embedded Systems, 2020** This paper examines wearable RFID devices designed specifically for children. The study finds that these devices improve location accuracy and ease of monitoring, highlighting the feasibility of wearable RFID tags in child-tracking systems for safe and effective monitoring. [7]
Merits: Targets wearable tech, which is highly suitable for kids.
Improves accuracy and usability for parents and guardians.
Demerits: Doesn't discuss comfort, wearability, or risk of tampering/removal by children.
Limited insight into device maintenance (e.g., battery life).

8. **L. Wang, J. Zhang, "Real-Time Tracking Using RFID in Public Spaces," IEEE Access, 2022** This research explores the application of RFID technology in public spaces for real-time tracking. The findings indicate that RFID can be effectively used for monitoring individuals' movements, making it a suitable choice for tracking children in busy environments like shopping centers. [8]
Merits: Demonstrates real-time tracking in complex, high-traffic environments.
Useful for public area deployment (parks, malls).
Demerits: Doesn't explore data overload or processing delays in dense environments.
May not address accuracy issues in areas with signal interference.

9. **H. Chen, X. Wu, "RFID-Based Safe Zone Alert System," International Journal of Sensor Networks, 2019** This study investigates the development of an RFID-based alert system that notifies users when someone enters or exits predefined safe zones. The approach is directly applicable to child safety systems by allowing parents to receive alerts if their child moves outside set boundaries.[9]
Merits: Introduces the concept of geo-fencing with RFID — ideal for child safety.
Alert mechanism is valuable for parents' peace of mind.
Demerits: Not clear how quickly alerts are triggered or how reliable the system is.
Doesn't account for false alarms or boundary misreadings.

10. **M. Brown, T. Wilson, "The Role of RFID in Location-Based Safety Solutions," Proceedings of the International Conference on RFID, 2020**
TThe authors review the role of RFID technology in various location-based safety applications, finding it particularly valuable for tracking and managing movement in controlled areas. Their conclusions support RFID's use in applications where continuous tracking and safety alerts are essential, aligning well with child-tracking requirements. [10]
Merits: Broadens the scope to other safety solutions, helping validate RFID's reliability.
Good contextual support for using RFID in movement management.
Demerits: Lacks specific implementation details for children or family environments.
Conclusions are general — less focused on child-specific scenarios.

2.1 Conclusion From Literature Survey

- The literature survey highlights the substantial potential of RFID technology in the development of child tracking and safety systems. A wide range of studies confirms that RFID offers reliable indoor tracking capabilities, particularly within environments such as schools, malls, and residential areas. The integration of complementary technologies such as GPS and IoT further enhances system effectiveness, enabling outdoor tracking, real-time monitoring, and remote access through mobile applications.

  Key advancements include the use of wearable RFID devices, real-time location updates, and safe zone alert mechanisms, all of which contribute to improving child safety in both controlled and dynamic public environments. These systems ensure that parents or guardians are promptly notified if a child exits a predefined area, thereby facilitating rapid responses in potentially unsafe situations.

  However, the survey also identifies several limitations, including signal interference in certain environments, limited range for passive RFID systems, privacy and data security concerns, and challenges related to device maintenance and cost. Moreover, a lack of standardized frameworks across implementations suggests a need for more unified and interoperable solutions.

Chapter 3

Software Requirement Specification

3.1 Introduction

3.1.1 Purpose and Scope of Document

The purpose of this project is to ensure the safety of children by providing real-time tracking of their location in public spaces. It aims to help parents monitor their child's movements and receive alerts if they leave safe zones. The system is designed to be affordable, reliable, and easy to use for widespread implementation in various environments.

3.1.2 Overview of responsibilities of Developer

The developers working on this project will be responsible for designing and implementing the child-tracking system using RFID technology. They will focus on creating the hardware setup, including RFID tags and readers, as well as the software for the mobile app and web interface. Additionally, developers will work on integrating real-time location tracking, alert notifications, and ensuring the system's scalability and reliability across various environments like schools, parks, and malls. Collaboration and testing will be key to ensuring the system works seamlessly and is user-friendly for parents and caregivers.

3.2 Functional Requirements

- User-friendly interface for seamless input and management of tracking data.
- Real-time tracking tools to monitor child movements and status updates.
- Secure data storage to ensure accurate tracking and transparency
- Role-based permissions to manage user access and functionalities effectively

3.3 External Interface Requirements

3.3.1 User Interfaces:

The user interface will consist of a web dashboard that allow parents to easily view their child's real-time location and receive alerts if they exit safe zones.

3.3.2 Hardware Interfaces:

The hardware interface includes RFID tags placed on children's belongings or wearable devices, and RFID readers positioned in various locations to detect and track the child's movement.

3.3.3 Software Interfaces:

The software interface will handle the interaction between the RFID hardware, the server, and the web application, processing location data and sending alerts.

3.3.4 Communication Interfaces:

The communication interface will ensure data is transmitted securely between the RFID tags, readers, server, and the mobile app through wireless protocols like Wi-Fi or Bluetooth.

3.4 Non Functional Requirements

- Performance: Capable of handling a high volume of tracking data and user interactions simultaneously.
- Scalability: Designed to adapt to a growing user base and increasing amounts of data.
- Security: Ensures the protection of sensitive information related to child tracking
- Usability: Features an intuitive interface for ease of navigation by all users.

3.5 System Requirements

3.5.1 Database Requirements:

Firebase is a platform developed by Google that provides a range of cloud-based services to support mobile and web application development. It offers real-time database capabilities, allowing developers to store and sync data instantly across all connected clients. Firebase also includes authentication services for secure user login, along with storage solutions for managing files and data. Additionally, it provides tools for analytics, cloud messaging, and hosting, making it a comprehensive solution for building and managing applications.

3.6 Analysis Models: SDLC model to be applied

Waterfall approach was first SDLC Model to be used widely in Software Engineering to ensure success of the project. In "The Waterfall" approach, the whole process of software development is divided into separate phases. In this Waterfall model, typically, the outcome of one phase acts as the input for the next phase sequentially. The sequential phases in Waterfall model are

- **Requirement Gathering and analys is** All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification document.
- **System Design** The requirement specifications from first phase are studied in this phase and the system design is prepared. This system design helps in specifying hardware and system requirements and helps in defining the overall system architecture.

- **Implementation** With inputs from the system design, the system is first developed in small programs called units, which are integrated in the next phase.
- **Integration and Testing** All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures.
- **Deployment** of system Once the functional and non-functional testing is done; the product is deployed in the customer environment or released into the market.

3.7 Implementation Plan

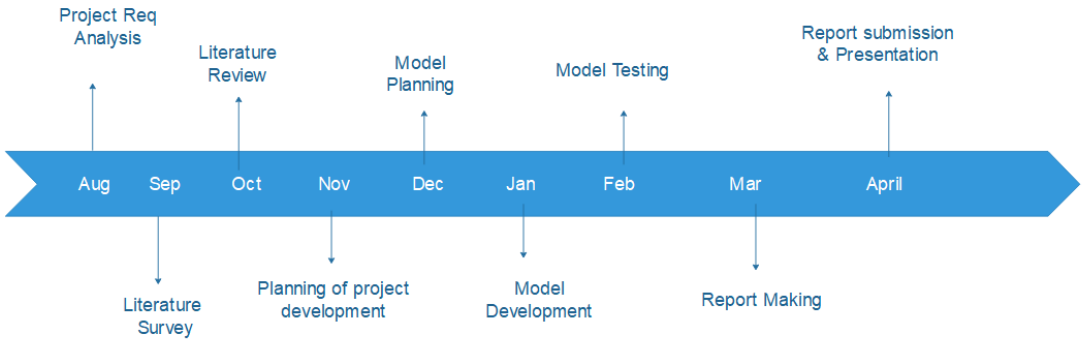


Figure 3.1: System Implementation Plan

Chapter 4

System Design

4.1 System Architecture

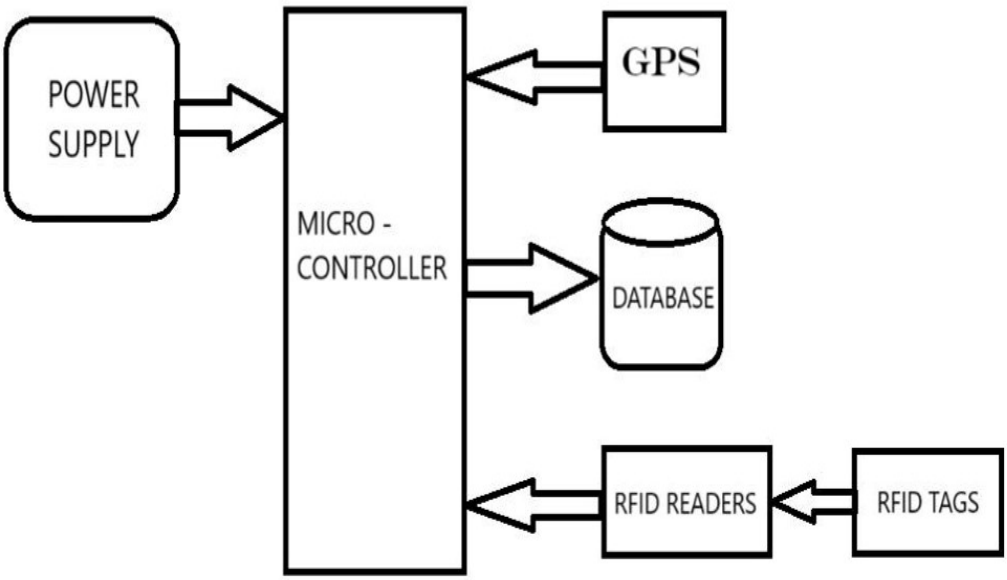


Figure 4.1: System Architecture

4.2 UML Diagrams

4.2.1 Use Case Diagram

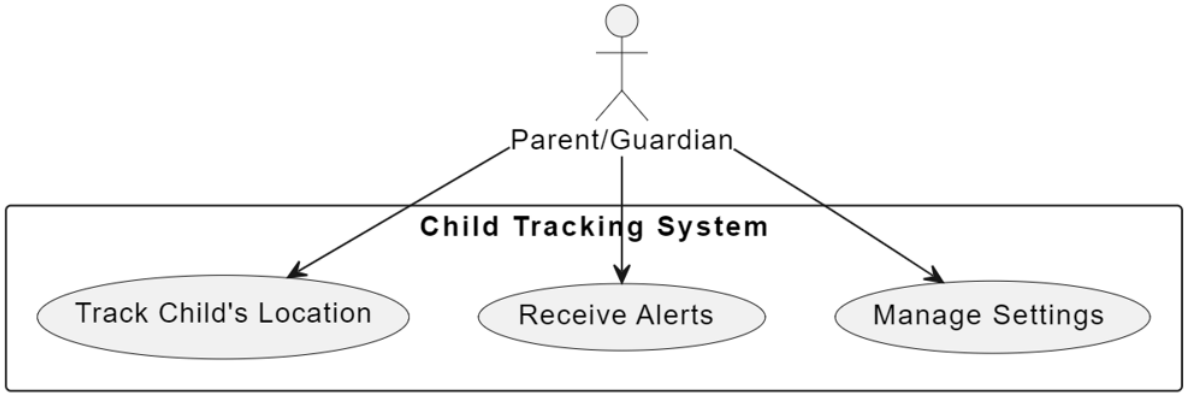


Figure 4.2: Use Case Diagram

4.2.2 Class Diagram

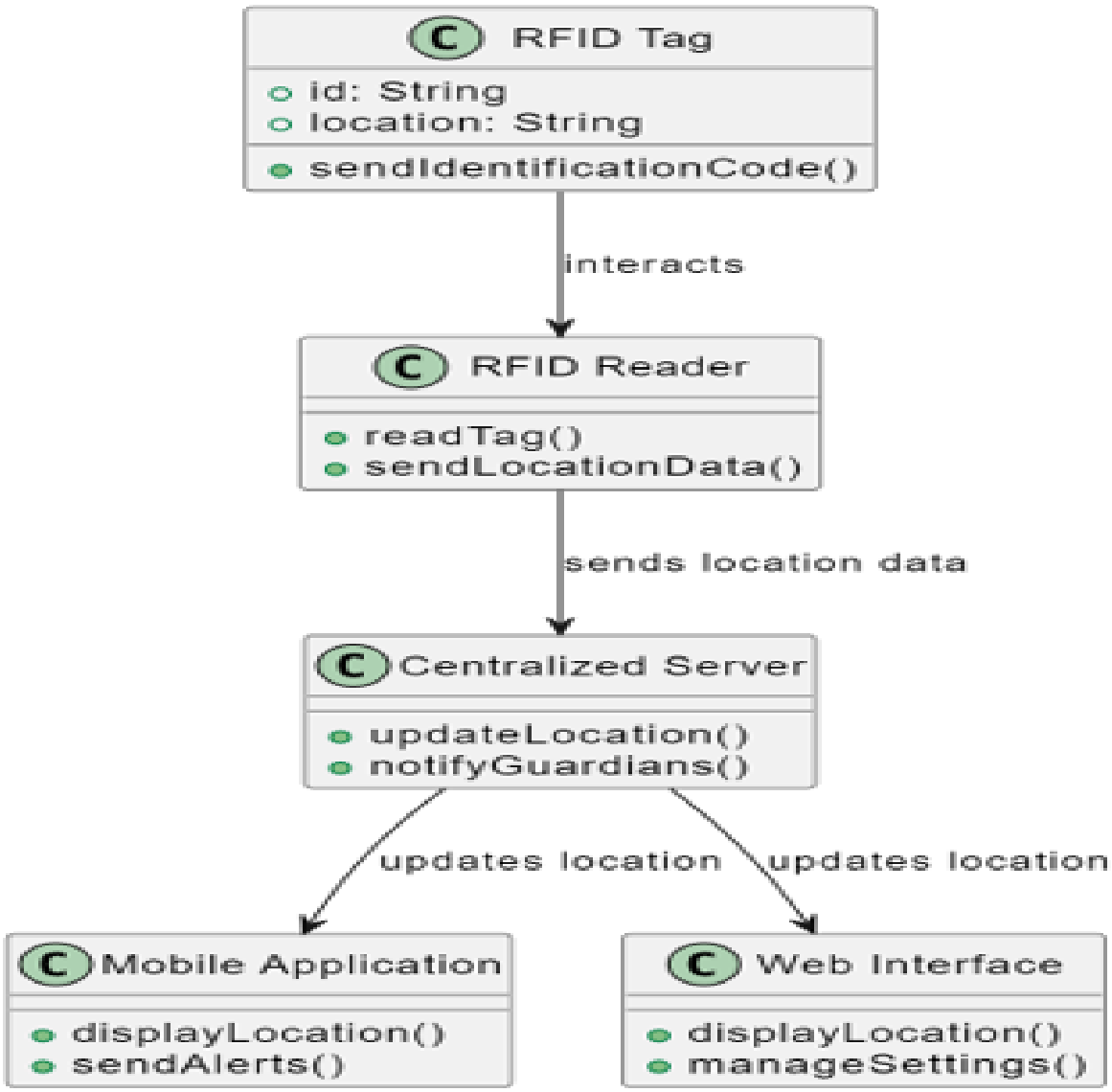


Figure 4.3: Class Diagram

4.2.3 Sequence Diagram

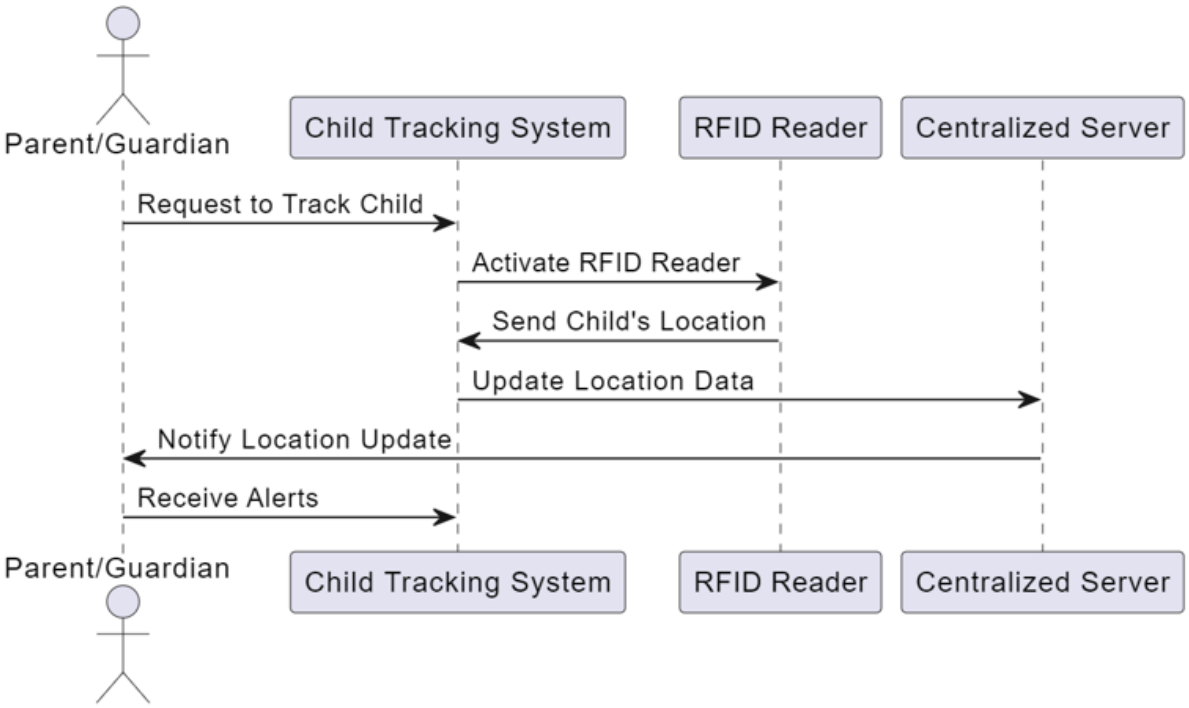


Figure 4.4: Sequence Diagram

4.2.4 Object Diagram

Object Diagrams.

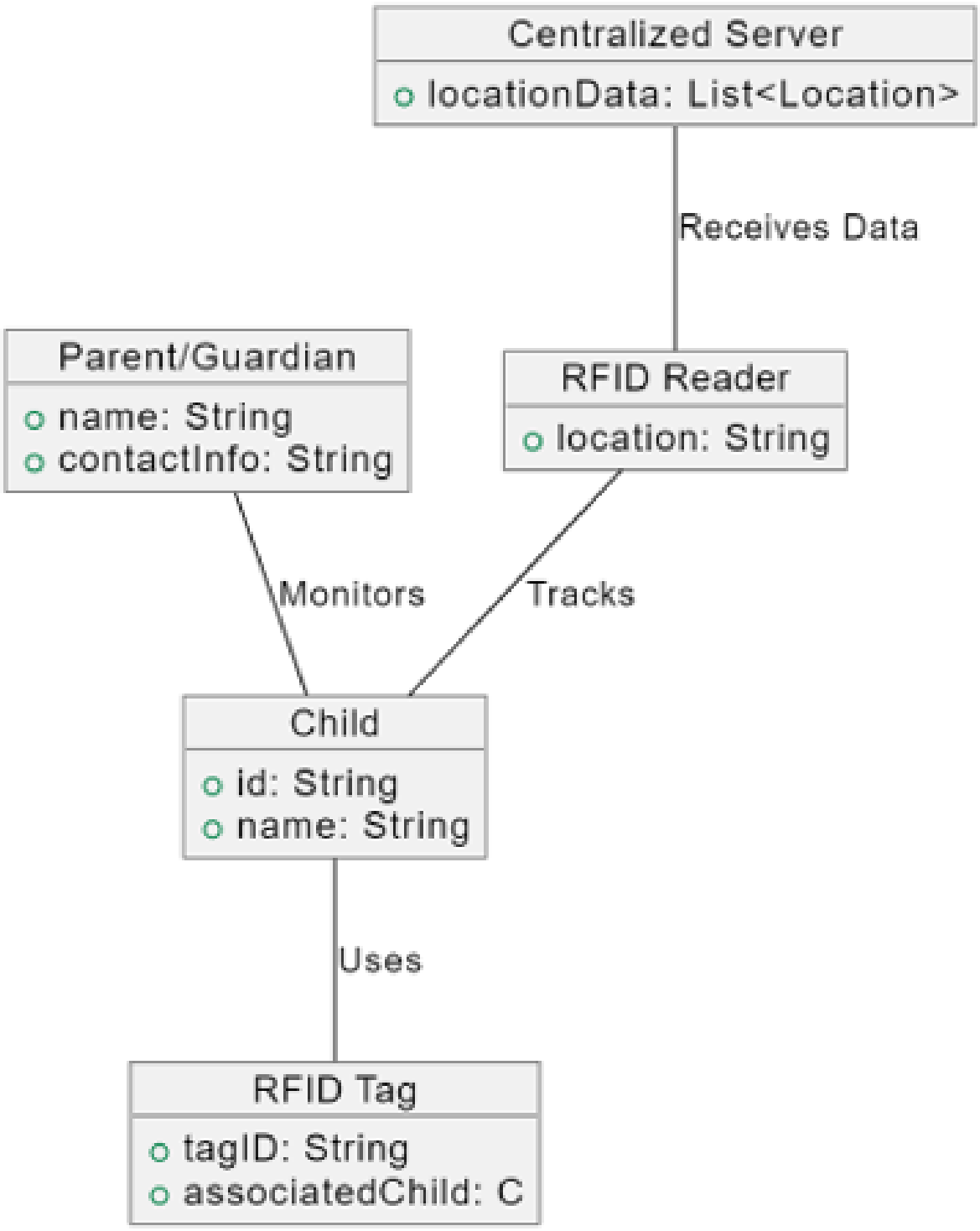


Figure 4.5: Object Diagram

Chapter 5

Technical Specifications

5.1 Technology details used in the project

- Python 3.10: Python 3.10 is a version of the popular programming language Python. It's user-friendly and great for beginners, yet powerful enough for advanced projects like web development, data analysis, and AI. New features in Python 3.10 include better error messages (so debugging is easier), a simpler way to handle multiple conditions in match-case statements (like a more advanced switch statement), and performance improvements.

- Rasberry Pi: Raspberry Pi is a small and affordable computer that's about the size of a credit card. Even though it's tiny, it works just like a regular computer—you can connect a monitor, keyboard, and mouse to it, and use it to browse the internet, watch videos, write documents, or even learn to code. It was originally created to help students learn programming, but today it's used by people of all ages for many creative and practical projects.

  One of the best things about the Raspberry Pi is that it can be used in electronics and DIY projects. You can connect it to sensors, cameras, lights, and other components to build things like smart home systems, robots, weather stations, and more. Because it uses very little power and is easy to program, it's perfect for making low-cost tech solutions like the child tracking system in your project.

  Raspberry Pi runs a version of Linux called Raspberry Pi OS, but it can also support other operating systems. It has USB ports, HDMI output, Wi-Fi, Bluetooth, and even pins (called GPIO pins) that help it interact with other electronic devices. Overall, Raspberry Pi is a great tool for learning, experimenting, and building smart systems at a low cost.

- Firebase: Firebase is a platform developed by Google that helps you build and manage web and mobile apps more easily. It provides many tools and services that developers can use without having to create everything from scratch. For example, it offers real-time databases, user authentication, cloud storage, and hosting—all in one place. This makes it easier and faster to build apps that are secure, scalable, and connected to the cloud.

  One of the most popular features of Firebase is its Realtime Database. This allows apps to store and sync data instantly across all users. So, if a child's location changes in your tracking app, Firebase can update it in real time on the website. Firebase also includes Authentication, which helps you add secure login systems using email, phone number, or even Google or Facebook accounts.

  Firebase works well with Android apps, iOS apps, and web apps, which makes it perfect for projects like child tracking systems. It's cloud-based, so you don't need to manage your own servers. Overall, Firebase is a powerful, beginner-friendly platform that helps developers focus more on building features and less on managing backend systems..

5.2 Advantages

- Parents can monitor their child's location in real time, providing peace of mind.
- Immediate notifications if a child leaves a safe zone or enters restricted areas, helping prevent potential dangers.
- RFID technology is cost-effective, making the system accessible for widespread use.

5.3 Limitations

- RFID signals have a limited range, which may require additional readers in larger areas.

5.4 Applications

- Schools
- Parks
- Public Events

Chapter 6

Project Estimation Schedule and Team Structure

6.1 Project Estimation

Here the prediction is made about the size of total project. Effective software project estimation is one of the most challenging and important activity in software development once you have on estimate size of your product you can desire the effort estimate.

6.1.1 Estimation of KLOC:

Effort (E)=2.4X(KLOC) 1.05 For KLOC = 2
KLOC=2:
E= 2.4 X (2) 1.05 = 4.92 person-months
E=2.4X(2) 1.05 =4.92 person-months

Constants for Basic COCOMO model for Organic projects
a = 2.4
b = 1.05
c = 2.5
d = 0.38
KLOC = 2 Given KLOC
$\text{total}_c ost = 18000$

Calculate Effort in person-months
effort = a * (KLOC b)

Calculate Development Time in months
time = c * (effort d)

Calculate Average Monthly Salary
averagemonthlysalary = totalcost / effort

Print the results
print(f"Effort (person-months): effort:.2f")
print(f"Development Time (months): time:.2f")
print(f"Average Monthly Salary (INR/month):
$average_monthly_salary : .2f$")

Output
Effort (person-months): 4.92
Development Time (months): 6.70
Average Monthly Salary (INR/month): 3658.54
Total Cost :- 18000 INR

6.1.2 Number of Persons

Total Four persons are required to complete the project successfully within given time span.

6.1.3 Project Resources

Hardware Resources Required

Table 6.1: Hardware Resources Required

Sr,No	Parameter	Minimum Requirement
1	Processor	i5
2	Speed	1.1GHZ
3	Ram	512MB
4	Hard Disk	150GB
5	Keyboard	Standard keyword

Software Resources Required

Platform :

1. Operating System : 11
2. Programming Language : Python 3.10
3. Software Version : 2.3.2
4. Tools : Rasbien
5. Data Base : Firebase

6.2 Feasibility

The feasibility of the project is analysed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.Dimensions of Software Feasibility are as follows:

- Technology:
  Is project technically feasible?
  Is it within state of art?
  Can defect be reduce to a level matching application's need?

- Finance:
  Is it financially feasible?
  Can development be completed at a cost the software organization and its client or market can afford?

- Time:
  Will project's time to market beat competition?

- Resources:
  Does the organization have resources needed to success?

Two key considerations involved in the feasibility analysis are:
1. Technical Feasibility. 2. Cost Feasibility.

6.2.1 Technical Feasibility

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement,as only minimal or null changes are required for implementing this system. Technical feasibility assessment can be done through following ways: 1)NP-Complete. 2) NP-Hard. 3)Satisfiability.

6.2.2 Cost 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.

6.3 Project Schedule

6.3.1 Project task set

Major Tasks in the Project stages are:

- Task 1: Requirement Analysis (Base Paper Explanation).
- Task 2: Project Specification (Paper Work).
- Task 3: Technology Study and Design.
- Task 4: Coding and Implementation (Module Development).

6.3.2 Timeline Chart

Sr. No.	Reporting Date	Project Activity	Guide Changes And Suggestions
1.	26-Jun-2024	Decide Project Group Member.	Create group.
2.	01-Jul-2024	Search & submitted 3 project topics with IEEE papers	Search more relevant paper papers.
3.	08-Jul-2024	Discussed 5 PPT analysis of IEEE papers.	Detail more study.
4.	15-Jul-2024	3 IEEE papers presentation and selected paper	Change in topic name.
5.	22-Jul-2024	Created and submitted synopsis of project	Focus on Literature.
6.	05-Aug-2024	Literature survey and info gathering of selected topic paper.	Details literature with comparison.

Table 6.2: Timeline chart continue

Sr. No.	**Reporting Date**	**Project Activity**	**Guide Changes And Suggestions**
7.	12-Aug-2024	30% project completion and presentation.	H/W & S/W PPT corrections.
8.	19-Aug-2024	Draw UML Diagram of Project	Some changes in sequence and class diagrams.
9.	26-Aug-2024	50%project completion and presentation.	Changes in System architecture.
10.	02-Sep-2024	Making Journal paper in IJSRD.	Changes in Introduction, Literature and Plagiarism
11.	02-Sep-2024	Made Project report in Word	Changes in Introduction, Literature and Plagiarism
12.	22-Nov-2024	Checked Project Report & Made Changes in that.	Changes in project plan, Plagiarism
13.	29-Nov-2024	Finally Made Project report in Latex	Completed.
14.	01-Dec-2024	Project Report Submitted	Completed.
15.	06-Dec-2024	Finally Submitted hard copy of project report in the college.	Completed.

Table 6.3: Timeline chart continue

Sr. No.	**Reporting Date**	**Project Activity**	**Guide Changes And Suggestions**
16.	26-Jan-2025	Start Development	completed
17.	20-Feb-2025	Make PPT	Changes in PPT.
18.	05-March-2025	PPT Presentation	Good Presentation
19.	15-March-2025	Make II Sem Report	Add II Sem Assignments
20.	22-March-2025	100% Development	Completed

Table 6.4: Team Structure with Role Assignments

No.	**Name**	**Assigned Role**
1	Mr. Omkar Borade	Frontend Development
2	Mr. Divyesh Chaudhari	Backend Development
3	Mr. Siddhesh Ghode	IoT Development
4	Mr. Mayur Jagtap	Frontend Development

Chapter 7

Software Implementation

7.1 Introduction

To build this child tracking system, we start by attaching RFID tags to the child's bag, ID card, or wearable item. These tags have a unique ID number that helps identify each child. Then, we place RFID readers in different locations like school gates, classroom entrances, parks, or malls. When the child walks near a reader, it detects the RFID tag and reads the ID.

This information is sent to a small computer like a Raspberry Pi, which acts as the controller. The Raspberry Pi connects to the internet and sends the tag data along with the location to Firebase, which stores and updates the child's location in real time.

The parent or guardian can use a website connected to Firebase to see where the child is. If the system detects that the child has entered a restricted area or left a safe zone, it will immediately send an alert to the parent's phone.

If outdoor tracking is needed, GPS can be added to provide the exact location when the child is outside. The whole system is designed to be low-cost, easy to set up, and expandable to work in different places, giving parents peace of mind and helping keep children safe.

7.2 Modules

- RFID Tag Module: This module includes small RFID tags that are attached to the child's belongings, like their school bag, ID card, or even worn as a wristband. Each tag has a unique identification number (UID) that helps the system recognize which child is being tracked. The tags don't need a battery and work automatically when they pass near an RFID reader.

- RFID Reader Module: This module contains RFID readers placed at different key locations such as school gates, classrooms, parks, or malls. When a child with an RFID tag passes by, the reader detects the tag's unique ID and sends that information to the next module. This is the part of the system that captures the child's movement.

- Raspberry Pi Processing Module: This module uses a Raspberry Pi, which acts like the brain of the system. It collects data from the RFID readers, identifies the tag, and determines the child's location. The Raspberry Pi processes the information and sends it to the Firebase database through an internet connection. It can also be programmed to check if the child is in a safe zone or not.

- Firebase Cloud Database Module Firebase is used to store and manage all the data in the cloud. It receives the child's tag ID, time, and location from the Raspberry Pi and updates it in real time. Since it's cloud-based, it can be accessed from anywhere. Firebase also helps with sending alerts or notifications if the child leaves the safe zone or enters a restricted area.

7.3 Business Logic

- The business logic of this system is based on tracking a child's movement in real time using RFID and optionally GPS, and then processing that information to keep parents informed and alerted. When a child carrying an RFID tag walks near an RFID reader, the system reads the tag's unique ID and sends it to a small computer (like a Raspberry Pi). The Raspberry Pi checks where the reader is located and uses that information to figure out the child's current location.

- Once the location is known, it is sent to the Firebase cloud database. The business logic checks if the child is inside a safe zone (like school or home) or if they have entered a restricted zone (like outside the school boundary or unknown areas). If everything is normal, the system just updates the location. But if the child moves into a restricted area or leaves a safe zone, the system immediately triggers an alert and sends it to the parent's mobile app or website.

- The logic also handles user access, so only authorized parents or guardians can see the data. It makes sure that every action—such as tracking, storing, and alerting—is done quickly and securely. This way, the system ensures that parents always know where their child is and can take quick action in case of an emergency.

The business logic also makes the system easy to scale, so it can be used in schools, parks, malls, or even across cities.

Chapter 8

Software Testing

8.1 Introduction

Software testing is an activity aimed at evaluating an attribute or capability of a program or system and determining that it meets its required results. It is more than just running a program with the intention of finding faults. Every project is new with different parameters. No single yardstick maybe applicable in all circumstances. This is a unique and critical area with altogether different problems. Although critical to software quality and widely deployed by programs and testers. Software testing steel remains an art, due to limited understanding of principles of software. The difficulty stems from complexity of software. The purpose of software testing can be quality assurance, verification and validation or reliability estimation. Software testing is a trade-off between budget,time and quality. In this chapter there is relevant explanation on testing strategies use to test the system, and test cases.

8.2 Types of Testing

Testing Strategy used for testing the system are as follows,

1. Manual Testing
2. Automated Testing
3. Unit Testing
4. Integration Testing
5. Regression Testing

8.2.1 Manual Testing

Manual and Automated test are the types of software testing. We are doing a manual test for testing our system that is without using any automated tool or any script. In this type tester takes over the role of an end user and test the software to identify any unexpected behavior or bug. There are different stages for manual testing like unit testing, integration testing, system testing and user acceptance testing. Testers use test plan, test cases or test scenario to test the software to ensure the completeness of a testing. Manual testing also includes exploratory testing as a testers explore the software to identify the errors in it.

8.2.2 Automated Testing

Automation testing which is also known as Test Automation is when the tester writes scripts and uses software to test the software. This process involves automation of a manual process. Automation testing is used to re-run the test scenarios that were performed manually, quickly and repeatedly.

8.2.3 Unit Testing

In case of unit testing, each software component, software modules or software subsystem is tested independent of any other components involved in the whole software system. That is individual software modules or software components are tested in unit testing. The main agenda behind unit testing is to verify and validate each and every unit of the software system by checking its working and performance and comparing it with the software specification. The significant control paths are tested and verified to discover errors within the boundary of the module and the component level design used for the same.

8.2.4 Integration Testing

Integration testing is a kind of testing meant for building the software architecture along with finding out the errors related with the interfacing. After successful execution of unit testing, software subsystem will be collected together and combined together in order to build the whole software system as it is specified and define at high level design. Facial Emotion Recognition Using Convolutional Neural Network Integration testing is an efficient procedure for verification of the structure of a software system and validation of order of execution of software system while conducting tests to determine errors allied with interfacing.

8.2.5 Regression Testing

During the software development procedure, whenever the software system is modified by means of editing, removing, adding source code, software developers need to be sure that the new version of the software is good as earlier version. Tests that focus on the software modules that have been modified or altered and focus on overall functionality of the software system when the software functions are likely to be affected by the modifications or change.

8.3 Software testing

Software testing can also provide an objective, independent view of the software to allow the business to appreciate and understand the risks of software implementation. Test techniques include the process of executing a program or application with the intent of finding software bugs (errors or other defects), and verifying that the software product is fit for use. Software testing involves the execution of a software component or system component to evaluate one or more properties of interest. In general, these properties indicate the extent to which the component or system under test:

- Meets the requirements that guided its design and development,
- Responds correctly to all kinds of inputs,
- Performs its functions within an acceptable time,
- It is sufficiently usable,
- Can be installed and run in its intended environments, and
- Achieves the general result its stakeholders desire.

As the number of possible tests for even simple software components is practically infinite, all software testing uses some strategy to select tests that are feasible for the available time and resources. As a result, software testing typically (but not exclusively) attempts to execute a program or application with the intent of finding software bugs (errors or other defects). The job of testing is an iterative process as when one bug is fixed, it can illuminate other, deeper bugs, or can even create new ones.

8.4 Black Box Testing

This testing methodology looks at what are the available inputs for an application and what the expected outputs are that should result from each input. It is not concerned with the inner workings of the application, the process that the application undertakes to achieve a particular output or any other internal aspect of the application that may be involved in the transformation of an input into an output. Most black-box testing tools employ either coordinate based interaction with the applications graphical user interface (GUI) or image recognition. An example of a black-box system would be a search engine. You enter text that you want to search for in the search bar, press "Search" and results are returned to you. In such a case, you do not know or see the specific process that is being employed to obtain your search results, you simply see that you provide an input – a search term – and you receive an output – your search results.

8.4.1 Black-box

There are many advantages to black-box testing. Here are a few of the most commonly cited:

1. Ease of use: Because testers do not have to concern themselves with the inner workings of an application, it is easier to create test cases by simply working through the application, as would an end user.

2. Quicker test case development: Because testers only concern themselves with the GUI, they do not need to spend time identifying all of the internal paths that may be involved in a specific process, they need only concern themselves with the various paths through the GUI that a user may take.

3. Simplicity: Where large, highly complex applications or systems exist black-box testing offers a means of simplifying the testing process by focusing on valid and invalid inputs and ensuring the correct outputs are received.
But, for all of the benefits of black-box testing, many attempts to create black-box test systems resulted in several drawbacks that caused people to question the viability of the black-box approach.

Some of the most commonly cited issues were:

1. Script maintenance: While an image-based approach to testing is useful, if the user interface is constantly changing the input may also be changing. This makes script maintenance very difficult because black-box tools are reliant on the method of input being known.

2. Fragility: Interacting with the GUI can also make test scripts fragile. This is because the GUI may not be rendered consistently from time to time on different platforms or machines. Unless the tool is capable of dealing with differences in GUI rendering, it is likely that test scripts will fail to execute properly on a consistent basis.

3. Lack of introspection: Ironically, one of the greatest criticism of black-box testing is that it isn't more like white-box testing; it doesn't know how to look inside an application and therefore can never fully test an application or system. The reasons cited for needing this capability are often to overcome the first two issues mentioned. The reality is quite different.

8.5 White Box Testing

This testing methodology looks under the covers and into the subsystem of an application. Whereas black-box testing concerns itself exclusively with the inputs and outputs of an application, white-box testing enables you to see what is happening inside the application. White box testing provides a degree of sophistication that is not available with black-box testing as the tester is able to refer to and interact with the objects that comprise an application rather than only having access to the user interface. An example of a white-box system would be in-circuit testing where someone is looking at the interconnections between each component and verifying that each internal connection is working properly. Another example from a different field might be an auto-mechanic who looks at the inner-workings of a car to ensure that all of the individual parts are working correctly to ensure the car drives properly.

8.5.1 White-box

Like black-box testing, there are distinct advantages to white-box testing. Here are a few of the most commonly cited:

1. Introspection: Introspection, or the ability to look inside the application, means that testers can identify objects programmatically. This is helpful when the GUI is changing frequently or the GUI is yet unknown as it allows testing to proceed. It also can, in some situations, decrease the fragility of test scripts provided the name of an object does not change.

2. Stability: In reality, a by-product of introspection, white-box testing can deliver greater stability and reusability of test cases if the objects that comprise an application never change.

3. Thoroughness: In situations where it is essential to know that every path has been thoroughly tested, that every possible internal interaction has been examined, white-box testing is the only viable method.

As such, white-box testing offers testers the ability to be more thorough in terms of how much of an application they can test. Despite these benefits, white-box testing has its drawbacks.

Some of the most commonly cited issues are:

1. Complexity: Being able to see every constituent part of an application means that a tester must have detailed programmatic knowledge of the application in order to work with it properly. This high-degree of complexity requires a much more highly skilled individual to develop test case.

2. Fragility: While introspection is supposed to overcome the issue of application changes breaking test scripts the reality is that often the names of objects change during product development or new paths through the application are added. The fact that white-box testing requires test scripts to be tightly tied to the underlying code of an application means that changes to the code will often cause white-box test scripts to break. This, then, introduces a high degree of script maintenance into the testing process.

3. Integration: For white-box testing to achieve the degree of introspection required it must be tightly integrated with the application being tested. This creates a few problems. To be tightly integrated with the code you must install the white-box tool

on the system on which the application is running. This is okay, but where one wishes to eliminate the possibility that the testing tool is what is causing either a performance or operational problem, this becomes impossible to resolve. Another issue that arises is that of platform support. Due to the highly integrated nature of white-box testing tools many do not provide support for more than one platform, usually Windows®. Where companies have applications that run on other platforms, they either need to use a different tool or resort to manual testing.

8.6 Testcase

No	Behaviour Description	Property
1	Unique Test case ID	TC001
2	Test Case Name	Verify the login
3	Prerequisites	User is on the login page.
4	Test Case Description	Enter Valid ID and Valid Password
5	Input	Valid email and password
6	Expected Result	Should successfully Login
7	Actual Result	Logged In Successfully!
8	Pass/Fail	Pass

Table 8.1: Test Case for Valid Id and Password

No	Behaviour Description	Property
1	Unique Test case ID	TC002
2	Test Case Name	Verify the login
3	Prerequisites	User is on the login page.
4	Test Case Description	Enter Invalid ID and Invalid Password
5	Input	Invalid ID and password
6	Expected Result	Should not be Logged in.
7	Actual Result	Could not LogIn
8	Pass/Fail	Pass

Table 8.2: Test Case for Invalid Id and Password

No	Behaviour Description	Property
1	Unique Test case ID	TC003
2	Test Case Name	Verify the location details
3	Prerequisites	Internet connection
4	Test Case Description	Valid coordinates of the location are shown.
5	Input	None
6	Expected Result	Should show correct latitude and longitude
7	Actual Result	Correct Details are shown
8	Pass/Fail	Pass

Table 8.3: Test Case for Web interface

No	Behaviour Description	Property
1	Unique Test case ID	TC004
2	Test Case Name	Read the RFID tag
3	Prerequisites	User should have a RFID tag.
4	Test Case Description	Ensure that the tag is read successfully.
5	Input	RFID tag
6	Expected Result	Should be able to read the tag
7	Actual Result	Read the tag successfully
8	Pass/Fail	Pass

Table 8.4: Test Case for RFID Functionality

No	Behaviour Description	Property
1	Unique Test case ID	TC005
2	Test Case Name	Read the RFID Tag
3	Prerequisites	User should have RFID tag
4	Test Case Description	Ensure the tag inside pocket or bag is read successfully.
5	Input	RFID tag
6	Expected Result	Should be able to read the tag
7	Actual Result	Failed to read the tag
8	Pass/Fail	Fail

Table 8.5: Test Case for RFID Functionality

No	Behaviour Description	Property
1	Unique Test case ID	TC006
2	Test Case Name	Image capturing
3	Prerequisites	The tag is read.
4	Test Case Description	Clear image of the tag holder should be captured
5	Input	None
6	Expected Result	Clear image
7	Actual Result	Clear image captured
8	Pass/Fail	Pass

Table 8.6: Test Case for image capture

No	Behaviour Description	Property
1	Unique Test case ID	TC007
2	Test Case Name	Real time tracking
3	Prerequisites	User should have a rfid tag
4	Test Case Description	Location is updated as the child moves.
5	Input	None
6	Expected Result	The latest location details to be updated
7	Actual Result	Location keeps updating
8	Pass/Fail	Pass

Table 8.7: Test Case for real time tracking

Chapter 9

Result

9.1 Snapshots

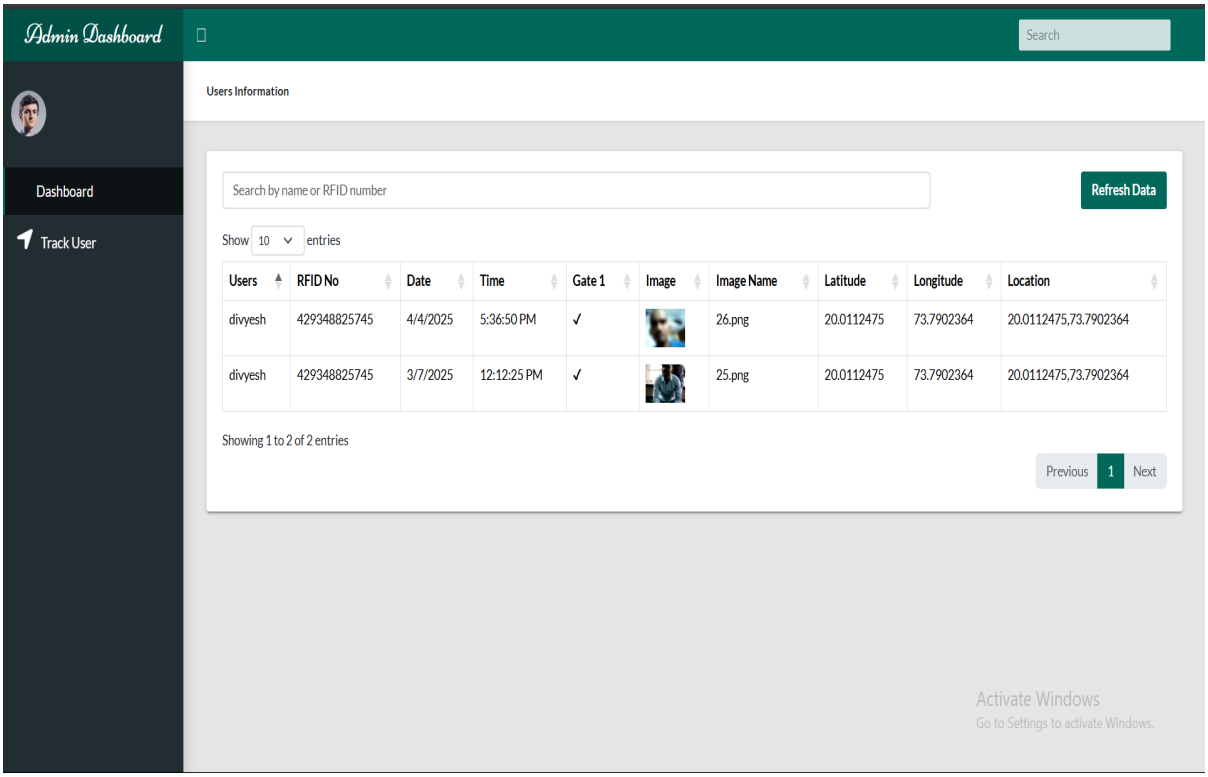


Figure 9.1: Homepage

Chapter 10

Deployment and Maintenance

10.1 Deployment and Maintenance

Deployment is when we take the finished app and put it online for everyone to use. First, we choose a cloud hosting service like AWS or Heroku that can run our app 24/7. We upload all our code and set up the database on their servers. Then we connect our domain name (like healthtracker.com) so people can find it easily. Before going live, we do final tests to make sure everything works perfectly. Once ready, we "flip the switch" to make the app public. The whole process takes careful planning to avoid downtime or errors during launch.

After deployment, we regularly maintain the app to keep it running smoothly. This includes fixing any bugs users report, updating software libraries for security, and adding new features based on feedback. We monitor server performance to handle more users as the app grows. Regular backups protect against data loss. Maintenance also includes checking that the AI predictions stay accurate as we get more medical data. The team schedules these updates during low-traffic times to minimize disruption for users. Good maintenance keeps the app secure, fast and useful over time.

10.2 Installation

10.2.1 Python

- Download

  Visit the Python official website.

- Run the Installer

  Windows:

Check "Add Python to PATH" (important!).

- Click Install Now.
- Verify Installation

  Open Command Prompt (Windows)
- python –version
- Windows

  Go to Control Panel / Programs / Uninstall a program.

Chapter 11

Conclusion and Future Scope

11.1 Conclusion

We have made significant strides in developing the Real-Time Child Tracking System using RFID technology, successfully implementing features that enhance child safety and location monitoring. The system architecture supports effective data management and user-friendly interactions. With secure data transmission established, parents can easily monitor their child's position through a mobile application or web interface. Moving forward, our focus will be on integrating additional safety features such as GPS tracking and conducting comprehensive testing to ensure system reliability. This strategic approach positions us to deliver a robust solution that meets the safety needs of children in various environments.

11.2 Future Scope

In the future, this child tracking system can be improved and expanded in many ways to make it even more helpful and secure. One major improvement could be the use of GPS and IoT sensors for full outdoor tracking, so parents can see the exact location of their child even when they are outside RFID zones—like during school trips or while traveling. The system could also be upgraded with AI-based behavior analysis, which would learn the child's usual movement patterns and quickly detect anything unusual, such as unexpected routes or delays. Another idea is to add voice or video communication features so parents can call or send a voice message directly through the app if they get an alert.

References

[1] J. A. J. Ferreira and R. M. M. Oliveira, "RFID Technology in Supply Chain Management: A Review," 2022.

[2] K. Kumar, L. Shankar, "Child Safety Systems using RFID and GPS," International Journal of Engineering Research, 2021

[3] S. Gupta, M. Agarwal, "RFID-based Location Tracking and Monitoring System," Journal of Wireless Communication, 2020

[4] A. K. Sharma, P. Jain, "RFID in Education: Applications and Implica- tions," Education Technology Journal, 2019

[5] R. Singh, L. Yadav, "An Efficient System for Tracking People Using RFID Technology," IEEE Transactions on IoT, 2022

[6] D. Patel, S. Mehta, "RFID and IoT in Child Tracking Solutions," Inter- national Journal of Advanced Research in Electronics, 2021

[7] B. Cho, M. Lee, "Wearable RFID Devices for Child Safety," Journal of Embedded Systems, 2020

[8] L. Wang, J. Zhang, "Real-Time Tracking Using RFID in Public Spaces," IEEE Access, 2022

[9] H. Chen, X. Wu, "RFID-Based Safe Zone Alert System," International Journal of Sensor Networks, 2019

[10] M. Brown, T. Wilson, "The Role of RFID in Location-Based Safety Solutions," Proceedings of the International Conference on RFID, 2020

[11] RFID-Based Intelligent Security System for School Children. ISSN (ONLINE): 2250-0758, ISSN (PRINT): 2394-6962

[12] Smart Parking Applications Using RFID Technology Print ISBN:978-975-01566-0-1 DOI: 10.1109/RFIDEURASIA.2007.4368108

[13] A UHF RFID based System for Children Tracking DOI: 10.1109/JIOT.2018.2841809 Electronic ISSN: 2327-4662 Identificatio

[14] M. Bonuccelli, F. Lonetti, and F. Martelli, "Instant collision resolution for tag identification in rfid networks," Ad Hoc Networks, vol. 5, no. 8, p. 1220″ U1232, 2007.

[15] X. Lin, R. Lu, D. Kwan, and X. S. Shen, "React: An rfid based privacy-preserving children tracking scheme for large amusement parks," Computer Networks, vol. 54, no. 15, pp. 2744– 2755, 2010.

[16] C. Chen, "Design of a child localization system on rfid and wireless sensor networks," Journal of Sensors, vol. 2010, 2010.

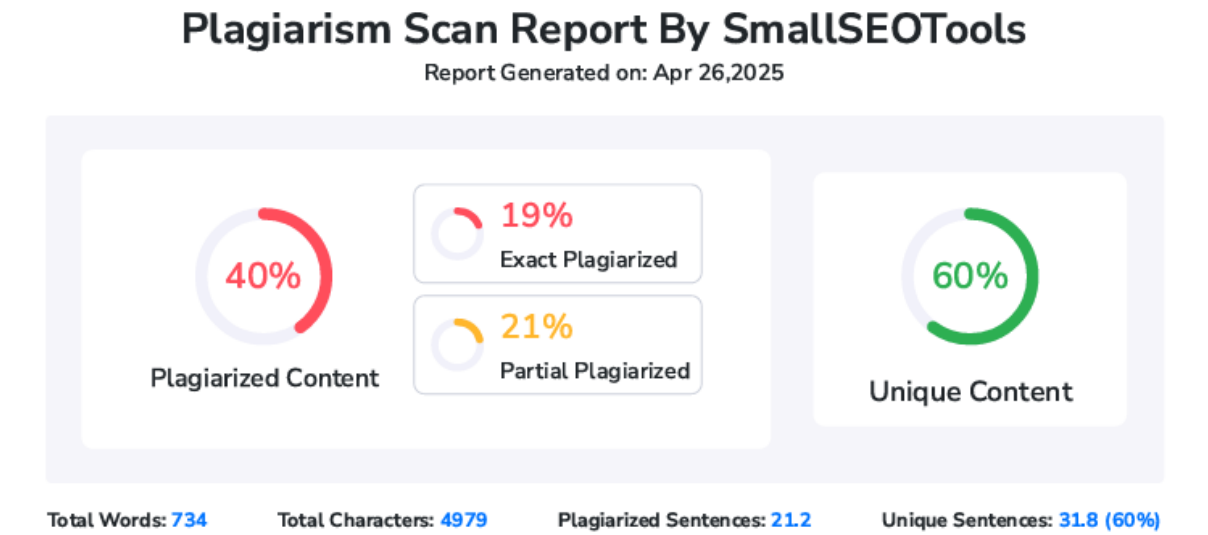
[17] A. Gupta and V. Harit, "Child safety tracking management system by using gps, geofencing android application: An analysis," in 2016 Second International Conference on Computational Intelligence Communication Technology (CICT), Feb 2016, pp. 683–686.

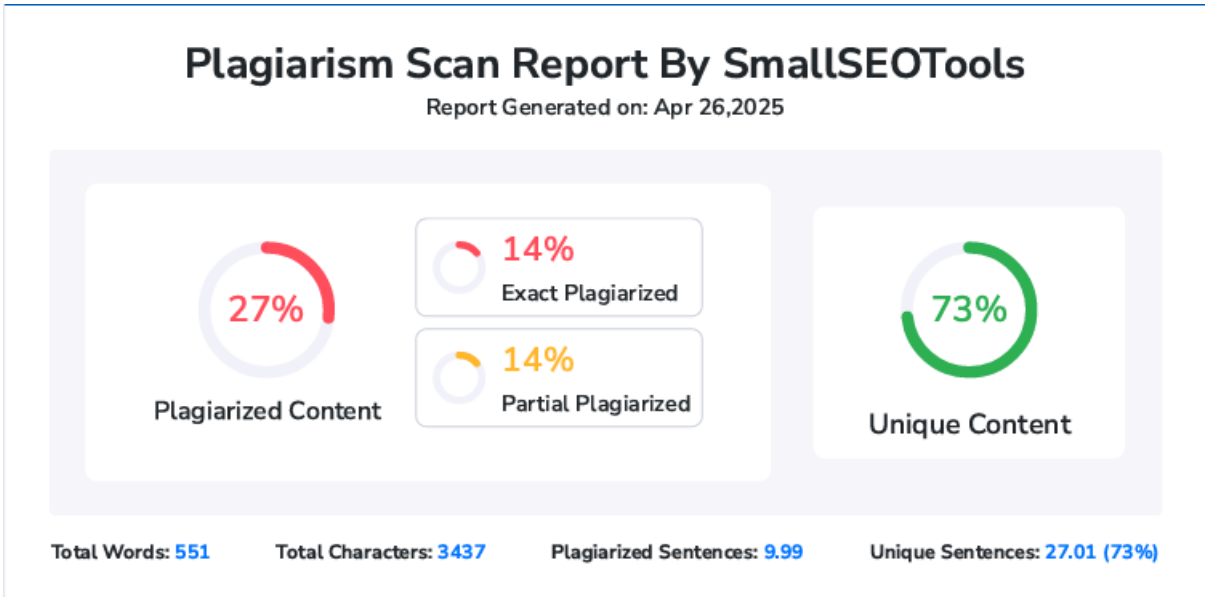
[18] R. Velayutham, M. Sabari, and M. S. Rajeswari, "An innovative approach for women and children's security based location tracking system," in 2016 International Conference on Circuit, Power and Computing Technologies (ICCPCT), March 2016, pp. 1–5.

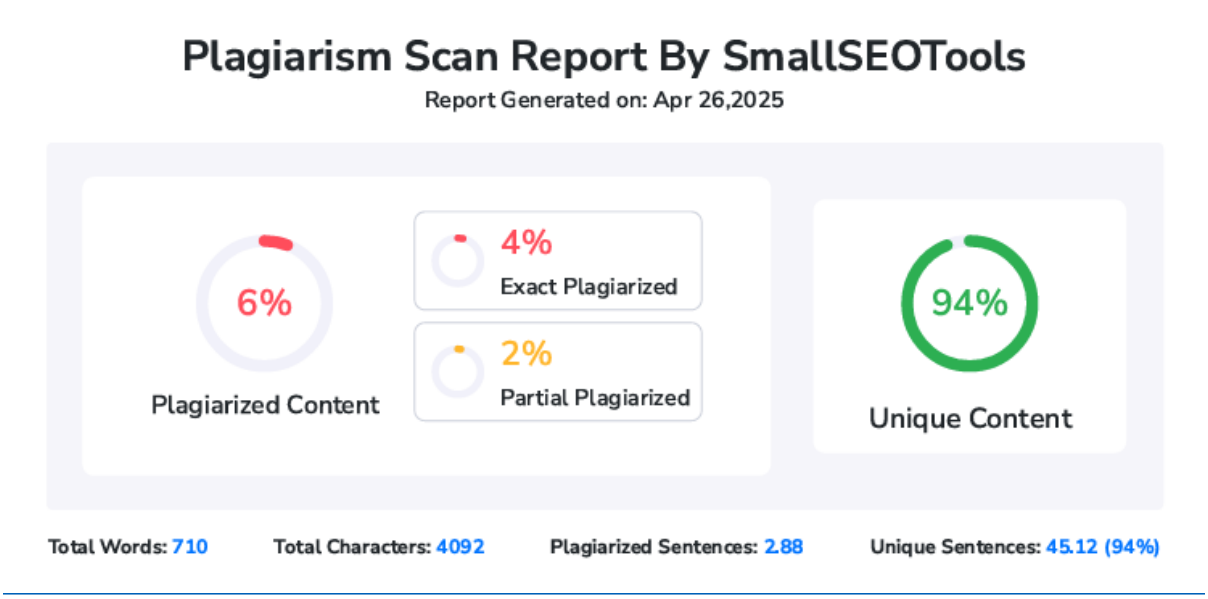
Annexure A
Plagiarism Report For this Report

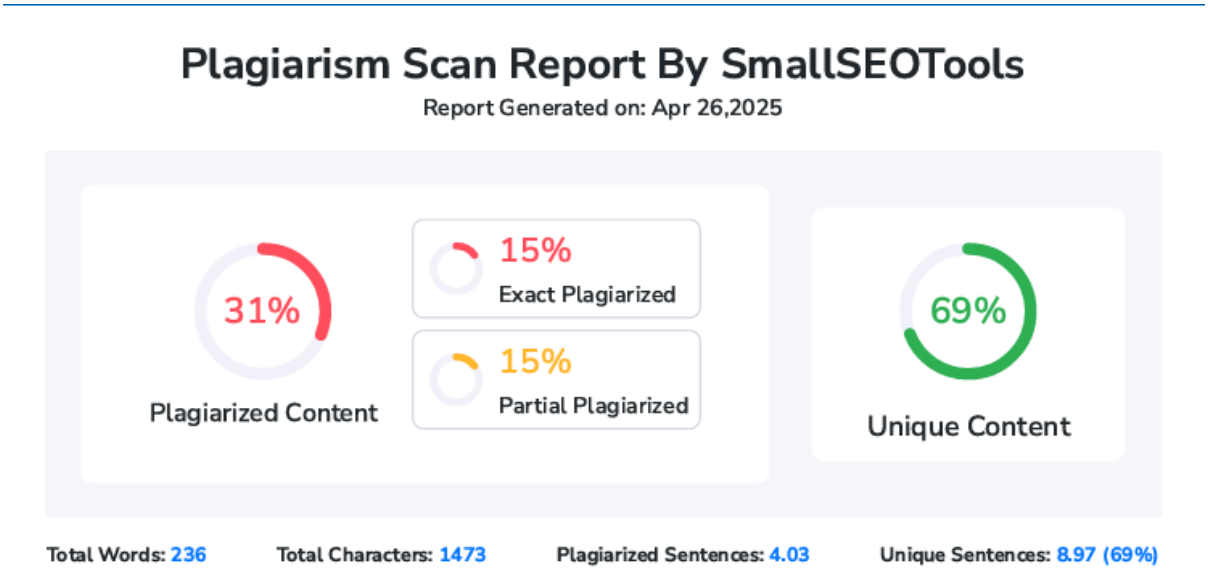

Plagiarism Scan Report By SmallSEOTools
Report Generated on: Apr 26,2025
27%
Plagiarized Content
6%
Exact Plagiarized
21%
Partial Plagiarized
73%
Unique Content
Total Words: 470
Total Characters: 3042
Plagiarized Sentences: 8.91
Unique Sentences: 24.09 (73%)

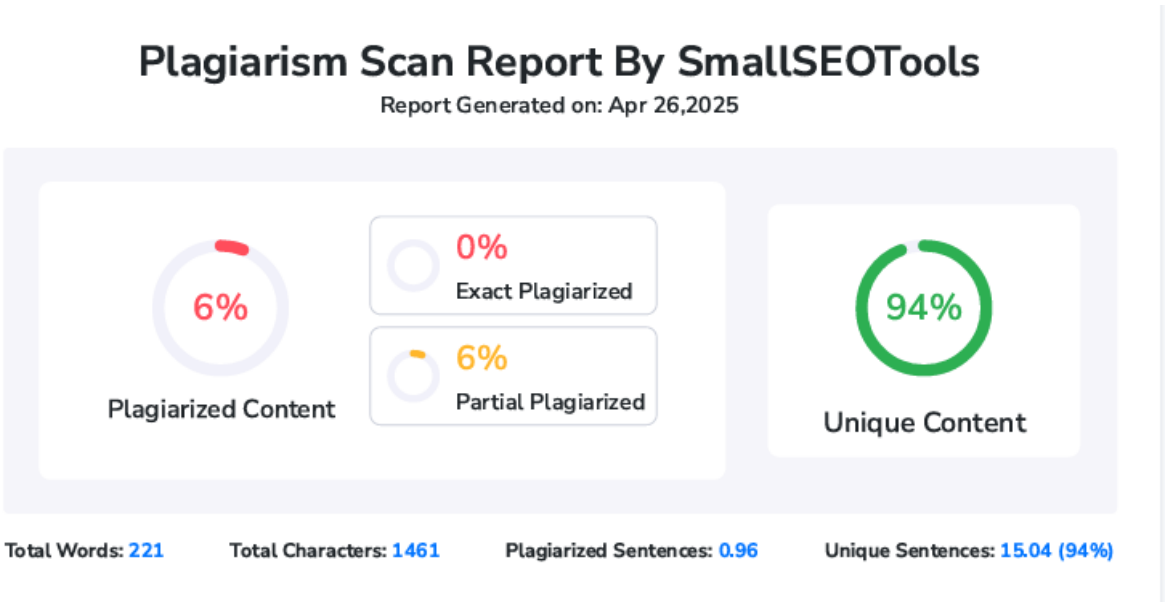

Plagiarism Scan Report By SmallSEOTools
Report Generated on: Apr 26,2025
9%
Plagiarized Content
0%
Exact Plagiarized
9%
Partial Plagiarized
91%
Unique Content
Total Words: 990
Total Characters: 7041
Plagiarized Sentences: 7.92
Unique Sentences: 80.08 (91%)


Plagiarism Scan Report By SmallSEOTools
Report Generated on: Apr 26,2025
40%
Plagiarized Content
19%
Exact Plagiarized
21%
Partial Plagiarized
60%
Unique Content
Total Words: 734
Total Characters: 4979
Plagiarized Sentences: 21.2
Unique Sentences: 31.8 (60%)


Plagiarism Scan Report By SmallSEOTools
Report Generated on: Apr 26,2025
27%
Plagiarized Content
14%
Exact Plagiarized
14%
Partial Plagiarized
73%
Unique Content
Total Words: 551
Total Characters: 3437
Plagiarized Sentences: 9.99
Unique Sentences: 27.01 (73%)


Plagiarism Scan Report By SmallSEOTools
Report Generated on: Apr 26,2025
6%
Plagiarized Content
4%
Exact Plagiarized
2%
Partial Plagiarized
94%
Unique Content
Total Words: 710
Total Characters: 4092
Plagiarized Sentences: 2.88
Unique Sentences: 45.12 (94%)


Plagiarism Scan Report By SmallSEOTools
Report Generated on: Apr 26,2025
31%
Plagiarized Content
15%
Exact Plagiarized
15%
Partial Plagiarized
69%
Unique Content
Total Words: 236
Total Characters: 1473
Plagiarized Sentences: 4.03
Unique Sentences: 8.97 (69%)


Plagiarism Scan Report By SmallSEOTools
Report Generated on: Apr 26,2025
6%
Plagiarized Content
0%
Exact Plagiarized
6%
Partial Plagiarized
94%
Unique Content
Total Words: 221
Total Characters: 1461
Plagiarized Sentences: 0.96
Unique Sentences: 15.04 (94%)

Annexure B
Paper Publication and Certificate Details

Paper Published

1. Paper published at International Conference on Engineering, Science and management 2025

CERTIFICATE

OF PARTICIPATION

This is to Certify that

Mr. Divyesh Chaudhari

Student, Department of Computer Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India.

For attending and giving an oral presentation on the paper entitled

RFID based child tracking system for crowded public spaces

at the **"International Conference on Engineering, Science and Management (ICESM) 2025"** - Organized by Department of Computer Engineering & Electrical Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India & Event Organizer: RSP Conference Hub, Coimbatore, Tamil Nadu, India on **11th & 12th March 2025.**

Dr. Rahul Agrawal
HoD, Department of Electrical Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India

Prof. S. G. Shukla
HoD, Department of Computer Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India

Dr. N.G. Nikam
Principal, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India

CERTIFICATE

OF PARTICIPATION

This is to Certify that

Mr. Omkar Borade

Student, Department of Computer Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India.

For attending and giving an oral presentation on the paper entitled

RFID based child tracking system for crowded public spaces

at the **"International Conference on Engineering, Science and Management (ICESM) 2025"** - Organized by Department of Computer Engineering & Electrical Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India & Event Organizer: RSP Conference Hub, Coimbatore, Tamil Nadu, India on **11th & 12th March 2025.**

Dr. Rahul Agrawal
HoD, Department of Electrical Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India

Prof. S. G. Shukla
HoD, Department of Computer Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India

Dr. N.G. Nikam
Principal, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India

CERTIFICATE

OF PARTICIPATION

This is to Certify that

Mr. Siddhesh Ghode

Student, Department of Computer Engineering , Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India.

For attending and giving an oral presentation on the paper entitled

RFID based child tracking system for crowded public spaces

at the **"International Conference on Engineering, Science and Management (ICESM) 2025"** - Organized by Department of Computer Engineering & Electrical Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India & Event Organizer: RSP Conference Hub, Coimbatore, Tamil Nadu, India on **11th & 12th March 2025.**

Dr. Rahul Agrawal
HoD, Department of Electrical Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India

Prof. S. G. Shukla
HoD, Department of Computer Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India

Dr. N.G. Nikam
Principal, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India

CERTIFICATE

OF PARTICIPATION

This is to Certify that

Mr. Mayur Jagtap

Student, Department of Computer Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India.

For attending and giving an oral presentation on the paper entitled

RFID based child tracking system for crowded public spaces

at the **"International Conference on Engineering, Science and Management (ICESM) 2025"** - Organized by Department of Computer Engineering & Electrical Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India & Event Organizer: RSP Conference Hub, Coimbatore, Tamil Nadu, India on **11th & 12th March 2025.**

Dr. Rahul Agrawal	**Prof. S. G. Shukla**	**Dr. N.G. Nikam**
HoD, Department of Electrical Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India	HoD, Department of Computer Engineering, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India	Principal, Guru Gobind Singh College of Engineering & Research Centre, Nashik, Maharashtra, India

Paper Published

2. Paper published at International Journal of Innovative Research in Engineering Multidisciplinary Physical Sciences.

INTERNATIONAL JOURNAL

of Innovative Research in Engineering & Multidisciplinary Physical Sciences

IJIRMPS • E-ISSN 2349-7300 • ijirmps.org • editor@ijirmps.org • Impact Factor: 9.907

Widely Indexed Open Access Peer Reviewed (Refereed) Online Scholarly / Academic Journal

CERTIFICATE OF PUBLICATION

IJIRMPS

Paper # 232388

The editorial board of **IJIRMPS** is hereby awarding the certificate to

Mr. Divyesh Chaudhari

in recognition of publication of the paper titled

RFID Based Child Tracking System for Crowded Public Spaces

published in Volume 13, Issue 2 (March-April 2025).

IJIRMPS E-ISSN: 2349-7300

Co-Author(s): Dr. Sweety Jachak, Mr. Siddhesh Ghode, Mr. Omkar Borade, Mr. Mayur Jagtap

INTERNATIONAL JOURNAL

of Innovative Research in Engineering & Multidisciplinary Physical Sciences

IJIRMPS • E-ISSN 2349-7300 • ijirmps.org • editor@ijirmps.org • Impact Factor: 9.907
Widely Indexed Open Access Peer Reviewed (Refereed) Online Scholarly / Academic Journal

CERTIFICATE OF PUBLICATION

IJIRMPS

Paper # 232388

The editorial board of **IJIRMPS** is hereby awarding the certificate to

Mr. Omkar Borade

in recognition of publication of the paper titled

RFID Based Child Tracking System for Crowded Public Spaces

published in Volume 13, Issue 2 (March-April 2025).

IJIRMPS E-ISSN: 2349-7300

Co-Author(s): Dr. Sweety Jachak, Mr. Divyesh Chaudhari, Mr. Siddhesh Ghode, Mr. Mayur Jagtap

INTERNATIONAL JOURNAL

of Innovative Research in Engineering & Multidisciplinary Physical Sciences

IJIRMPS • E-ISSN 2349-7300 • ijirmps.org • editor@ijirmps.org • Impact Factor: 9.907
Widely Indexed Open Access Peer Reviewed (Refereed) Online Scholarly / Academic Journal

CERTIFICATE OF PUBLICATION

The editorial board of **IJIRMPS** is hereby awarding the certificate to

Mr. Siddhesh Ghode

in recognition of publication of the paper titled

RFID Based Child Tracking System for Crowded Public Spaces

published in Volume 13, Issue 2 (March-April 2025).

Paper # 232388

Co-Author(s): Dr. Sweety Jachak, Mr. Divyesh Chaudhari, Mr. Omkar Borade, Mr. Mayur Jagtap

INTERNATIONAL JOURNAL

of Innovative Research in Engineering & Multidisciplinary Physical Sciences

IJIRMPS • E-ISSN 2349-7300 • ijirmps.org • editor@ijirmps.org • Impact Factor: 9.907
Widely Indexed Open Access Peer Reviewed (Refereed) Online Scholarly / Academic Journal

CERTIFICATE OF PUBLICATION

IJIRMPS

Paper # 232388

The editorial board of **IJIRMPS** is hereby awarding the certificate to

Mr. Mayur Jagtap

in recognition of publication of the paper titled

RFID Based Child Tracking System for Crowded Public Spaces

published in Volume 13, Issue 2 (March-April 2025).

IJIRMPS E-ISSN: 2349-7300

Co-Author(s): Dr. Sweety Jachak, Mr. Divyesh Chaudhari, Mr. Siddhesh Ghode, Mr. Omkar Borade

Project Competitions

1. Participated in IEEE Bombay section SAC's Technovation a Project Competition organized by KBT College of Engineering, Nashik

IEEE BOMBAY SECTION
STUDENT ACTIVITIES COMMITTEE

IEEE BOMBAY SECTION

ESTD. 1914
KBTCOE

TECHNOVATION 2025

this is to certify that

Divyesh Chaudhari - Guru Gobind Singh College of Engineering and Research Centre

has successfully participated in the Divisional Round of Technovation 2025, held at MVPS's Karmaveer Adv. Baburao Ganpatrao Thakare College of Engineering, Nashik, on 12th April 2025. We appreciate the efforts and contributions in showcasing the team's innovative project and technical skills.

Prof. Harshal Dalvi
Chair - Young Profession A.G.
IEEE Bombay Section

Prof. Radhika P. Chandwadkar
IEEE Branch Counsellor,
KBT CoE, Nashik

Dr. Satish R. Devane
Principal
KBT CoE, Nashik

IEEE BOMBAY SECTION
STUDENT ACTIVITIES COMMITTEE

IEEE BOMBAY SECTION

ESTD. 1914
KBTCOE

TECHNOVATION 2025

this is to certify that

Omkar Borade - Guru Gobind Singh College of Engineering and Research Centre

has successfully participated in the Divisional Round of Technovation 2025, held at MVPS's Karmaveer Adv. Baburao Ganpatrao Thakare College of Engineering, Nashik, on 12th April 2025. We appreciate the efforts and contributions in showcasing the team's innovative project and technical skills.

Prof. Harshal Dalvi
Chair - Young Profession A.G.
IEEE Bombay Section

Prof. Radhika P. Chandwadkar
IEEE Branch Counsellor,
KBT CoE, Nashik

Dr. Satish R. Devane
Principal
KBT CoE, Nashik

IEEE BOMBAY SECTION
STUDENT ACTIVITIES COMMITTEE

IEEE BOMBAY SECTION

माता विद्या प्रसारक समाज, नाशिक
बहुजन हिताय बहुजन सुखाय
ESTD. 1914
KBTCOE

TECHNOVATION 2025

this is to certify that

Siddhesh Ghode - Guru Gobind Singh College of Engineering and Research Centre

has successfully participated in the Divisional Round of Technovation 2025, held at MVPS's Karmaveer Adv. Baburao Ganpatrao Thakare College of Engineering, Nashik, on 12th April 2025. We appreciate the efforts and contributions in showcasing the team's innovative project and technical skills.

Prof. Harshal Dalvi
Chair - Young Profession A.G.
IEEE Bombay Section

Prof. Radhika P. Chandwadkar
IEEE Branch Counsellor,
KBT CoE, Nashik

Dr. Satish R. Devane
Principal
KBT CoE, Nashik

IEEE BOMBAY SECTION
STUDENT ACTIVITIES COMMITTEE

IEEE BOMBAY SECTION

ESTD. 1914
KBTCOE

TECHNOVATION 2025

this is to certify that

Mayur Jagtap - Guru Gobind Singh College of Engineering and Research Centre

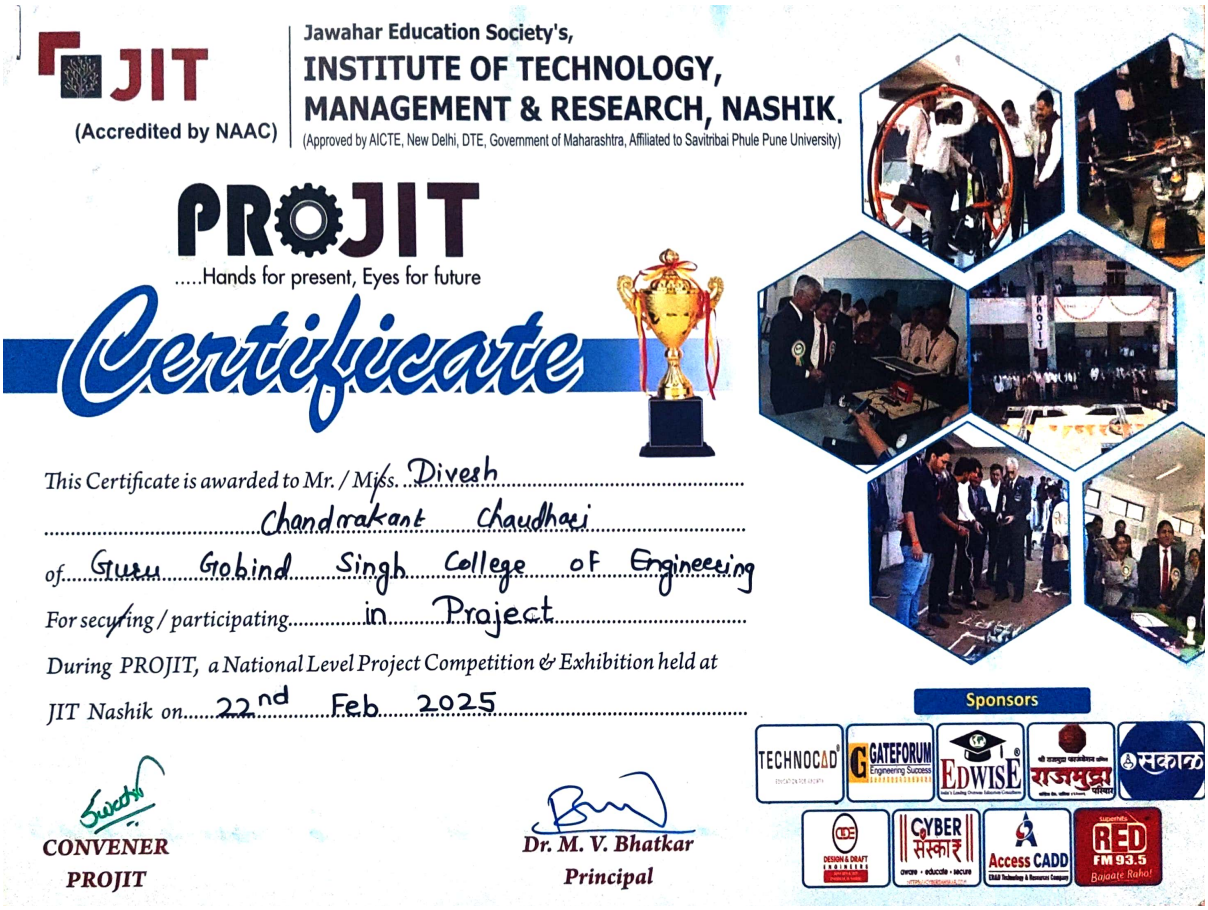
has successfully participated in the Divisional Round of Technovation 2025, held at MVPS's Karmaveer Adv. Baburao Ganpatrao Thakare College of Engineering, Nashik, on 12th April 2025. We appreciate the efforts and contributions in showcasing the team's innovative project and technical skills.

Prof. Harshal Dalvi
Chair - Young Profession A.G.
IEEE Bombay Section

Prof. Radhika P. Chandwadkar
IEEE Branch Counsellor,
KBT CoE, Nashik

Dr. Satish R. Devane
Principal
KBT CoE, Nashik

2. Participated in National Level Project Competition organized by JIT College of Engineering, Nashik



JIT
(Accredited by NAAC)

Jawahar Education Society's,
INSTITUTE OF TECHNOLOGY, MANAGEMENT & RESEARCH, NASHIK.
(Approved by AICTE, New Delhi, DTE, Government of Maharashtra, Affiliated to Savitribai Phule Pune University)

PROJIT
.....Hands for present, Eyes for future

Certificate

This Certificate is awarded to Mr. / Miss. Divesh Chandrakant Chaudhari
of Guru Gobind Singh College of Engineering
For securing / participating in Project
During PROJIT, a National Level Project Competition & Exhibition held at
JIT Nashik on 22nd Feb 2025

CONVENER
PROJIT

Dr. M. V. Bhatkar
Principal

Sponsors
TECHNOCAD, GATEFORUM Engineering Success, EDWISE, राजमुद्रा, सकाळ, DESIGN & DRAFT, CYBER संस्कार, Access CADD, RED FM 93.5 Bajaate Raho!

JIT
(Accredited by NAAC)

Jawahar Education Society's,
INSTITUTE OF TECHNOLOGY, MANAGEMENT & RESEARCH, NASHIK.
(Approved by AICTE, New Delhi, DTE, Government of Maharashtra, Affiliated to Savitribai Phule Pune University)

PROJIT
.....Hands for present, Eyes for future

Certificate

This Certificate is awarded to Mr. / Miss. Omkar Vilas Borade
of Guru Gobind Singh college of Engineering
For securing / participating in Project
During PROJIT, a National Level Project Competition & Exhibition held at JIT Nashik on 22nd Feb 2025

Sponsors

CONVENER
PROJIT

Dr. M. V. Bhatkar
Principal

JIT
(Accredited by NAAC)

Jawahar Education Society's,
INSTITUTE OF TECHNOLOGY, MANAGEMENT & RESEARCH, NASHIK.
(Approved by AICTE, New Delhi, DTE, Government of Maharashtra, Affiliated to Savitribai Phule Pune University)

PROJIT
.....Hands for present, Eyes for future

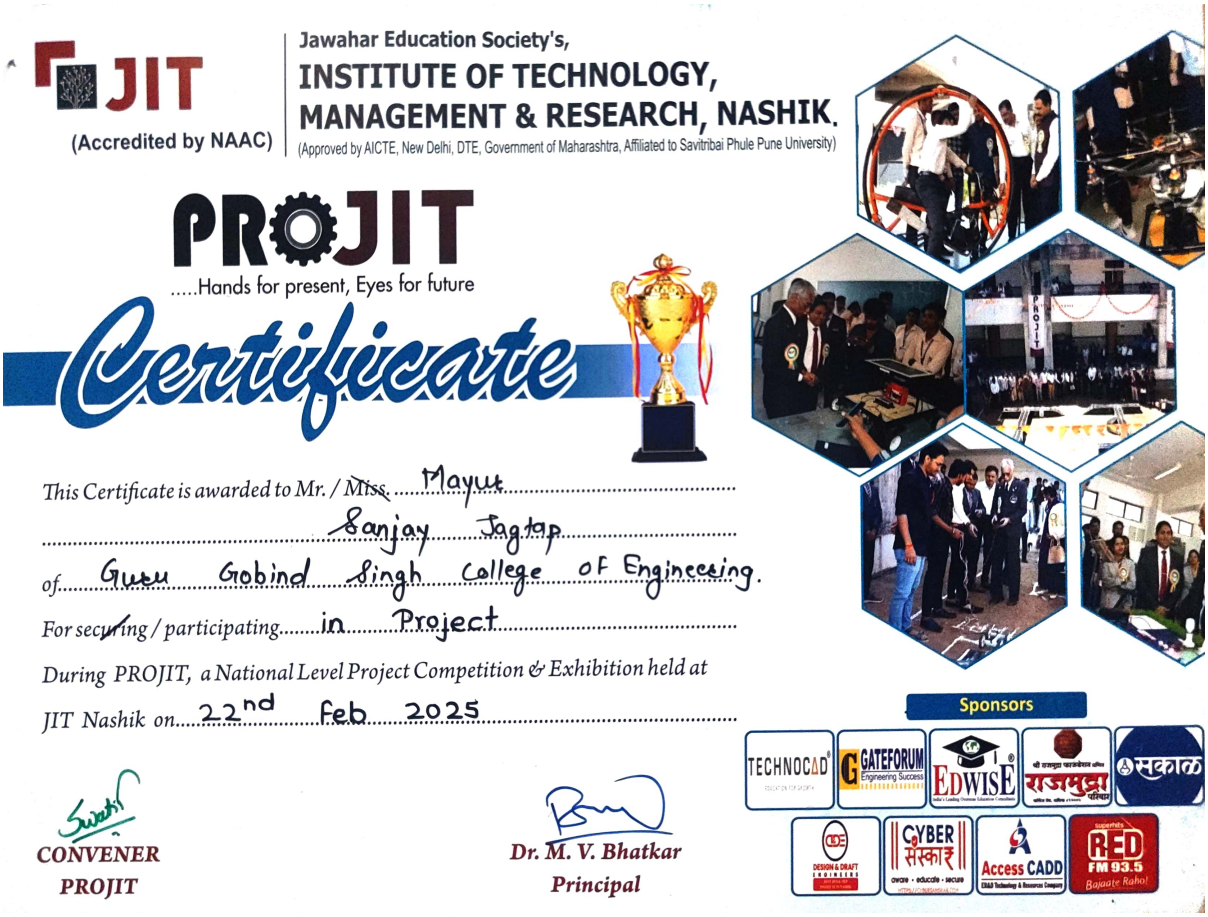
Certificate

This Certificate is awarded to Mr. / Miss. Siddhesh Digambar Ghode
of Guru Gobind Singh College of Engineering
For securing / participating in Project
During PROJIT, a National Level Project Competition & Exhibition held at JIT Nashik on 22nd Feb 2025

Sponsors

CONVENER
PROJIT

Dr. M. V. Bhatkar
Principal



JIT
(Accredited by NAAC)

Jawahar Education Society's,
INSTITUTE OF TECHNOLOGY, MANAGEMENT & RESEARCH, NASHIK.
(Approved by AICTE, New Delhi, DTE, Government of Maharashtra, Affiliated to Savitribai Phule Pune University)

PROJIT
.....Hands for present, Eyes for future

Certificate

This Certificate is awarded to Mr. / Miss. Mayur Sanjay Jagtap
of Guru Gobind Singh College of Engineering.
For securing / participating in Project
During PROJIT, a National Level Project Competition & Exhibition held at
JIT Nashik on 22nd Feb 2025

CONVENER
PROJIT

Dr. M. V. Bhatkar
Principal

Sponsors
TECHNOCAD, GATEFORUM Engineering Success, EDWISE, राजमुद्रा, सकाळ, DESIGN & DRAFT, CYBER संस्कार, Access CADD, RED FM 93.5 Bajaate Raho!