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COMP3000 Computing Project

Project Title:

ACS Mini System - Automation of Construction Data Monitoring with Secure and Safety System

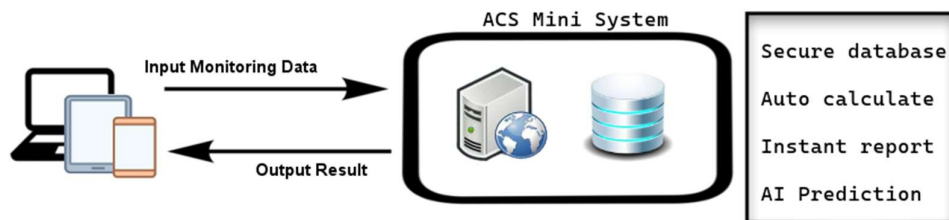
A – Automation, Artificial intelligence, Architecture

C – Cyber Security, Construction

S – Secure, Safety & Education

Scenarios:

In the modernization of construction work, automation and robotics are increasingly utilized. However, many SME companies, particularly in Hong Kong construction industry with aging workers and outsource pattern, still rely on manual monitoring due to limited resources. The workers use field book to mark down construction data, go back to office, input data to computer and calculate the result with excel, print out report and submit to client. This manual approach increases the risk of errors and accidents. To address this issue, the project aims to develop a mini and secure automation monitoring system with incorporating small-scale AI technologies for data prediction. Workers can input data anytime, anywhere after taking the measurement. Users will receive data immediately and the system can generate instant result. The focus is on providing a secure solution that is affordable and suitable for SME, improving safety standards and enhance operational efficiency in the construction industry.

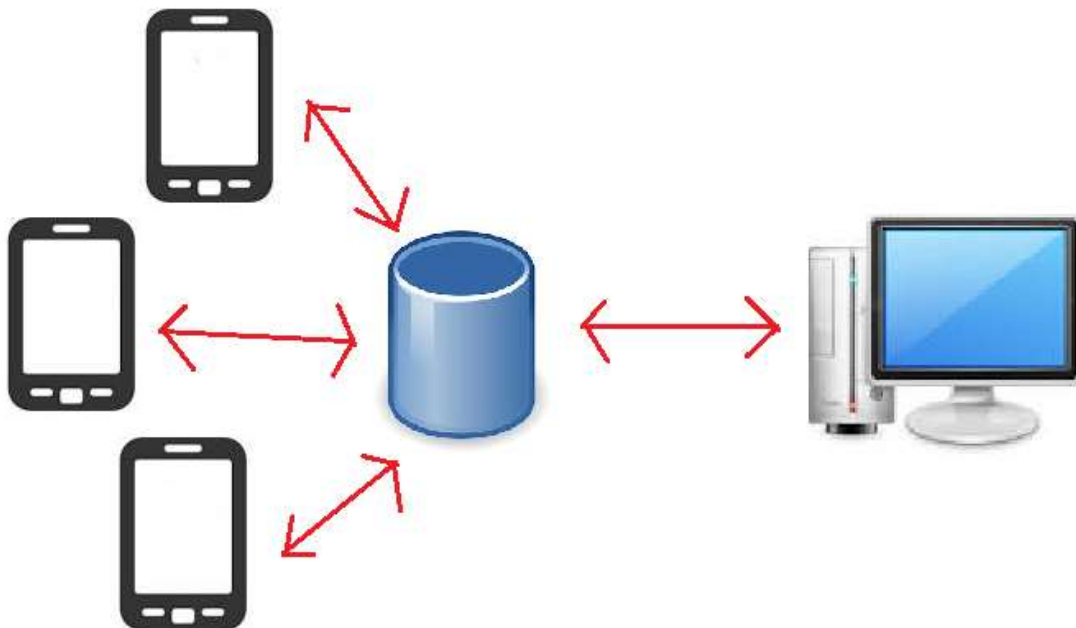


Project Vision:

The vision of the project is to revolutionize the construction industry in Hong Kong by developing a mini and secure automation monitoring system with small-scale AI technologies. With a specific focus on the challenges faced by SME construction companies, those are still rely on manual monitoring due to limited resources, aging workers, and an outsourcing, short period pattern. The objective of the project is to apply the complete software development lifecycle (SDLC) to develop a secure and safety database system for automating construction data monitoring which can enhance with a small-scale implementation of AI. The project aims to provide an affordable and scalable solution that focus on cyber security and safety at construction sites for SMEs. This seeks to enable these companies to embrace automation, improve safety standards, and enhance operational efficiency.

Furthermore, it can establish a platform for sharing best practices, lessons learned, and success stories related to the adoption of automation and AI technologies in construction data monitoring. By creating a supportive ecosystem, the project seeks to facilitate the industry-wide transformation towards a more efficient, safe, and technologically advanced construction sector in Hong Kong.

In summary, the project is to develop a mini and secure automation monitoring system with small-scale AI technologies that will enable SME construction companies in Hong Kong to transition from manual monitoring to automated, intelligent data management. The vision encompasses improved safety standards, enhanced operational efficiency, and the promotion of a collaborative and innovative construction industry. Through this vision, the project aims to pave the way for a more sustainable and technologically advanced future in the construction sector.



Proposed Gantt chart:

Phases of the Secure Development Lifecycle:

1. Requirements Gathering and Analysis:

- Identify the key parameters and metrics to monitor, such as structural integrity, environmental conditions, worker safety, and equipment operation.
- Analyze the security requirements of SMEs, considering factors such as limited IT resources, budget constraints, and the need for user-friendly solutions.
- Conduct the specific security requirements for data monitoring in SME construction companies, considering factors such as data privacy, integrity, authentication, and access controls.
- Define security policies and guidelines that align with industry best practices to safeguard data and ensure compliance with relevant regulations.

2. Design and Architecture:

- Develop a scalable and cost-effective architecture for the automated monitoring system and minimal on-site hardware requirements.
- Incorporate security measures, such as encryption, authentication, access controls, and secure communication protocols, to protect data and ensure system integrity.
- Implement small scale of AI algorithms or machine learning models that can process and analyze the collected data efficiently.

3. Implementation and Coding:

- Apply secure coding practices and utilize pre-built security libraries to prevent common vulnerabilities and ensure the system's integrity.
- Develop lightweight AI algorithms or models that can run efficiently on limited computational resources while providing accurate safety risk assessments.

4. Testing and Quality Assurance:

- Conduct rigorous testing, including functional testing, performance testing, and security testing, to verify the reliability and effectiveness of the automated monitoring system.
- Collaborate with SME construction companies to perform real-world testing and gather feedback to improve the system's usability, performance, and security.

5. Deployment and Operations:

- Develop user-friendly interfaces and provide clear documentation to facilitate easy deployment and adoption of the automated monitoring system by SME construction companies.
- Establish secure deployment practices, such as secure configuration guidelines and best practices, to ensure the system is resistant to potential security threats.
- Provide ongoing technical support and maintenance, including regular updates, bug fixes, and security patches.

Work Package	Duration
Project Initiation	1 week
Requirements Gathering and Analysis	2 weeks
System Design	3 weeks
Development	8 weeks
Testing and Quality Assurance	5 weeks
Deployment and Implementation	1 week
User Training	1 week
Documentation	1 week
Project Review and Closure	1 week

Risk Plan:

Here are some potential risks that could arise during the development of the secure and safety system for automating construction data monitoring in SME construction companies, along with proposed mitigation strategies:

1. Technical Complexity: The project involves integrating AI technologies and ensuring cyber security. The technical complexity may lead to delays or unexpected issues.

Mitigation: Conduct a thorough feasibility study and technology assessment before starting the project to identify potential technical challenges. Allocate sufficient time for research and development, review and update the project plan based on emerging technical requirements.

2. Resource Constraints: SMEs often face limitations in terms of budget, skilled workforce, and infrastructure hardware, which can impact project execution.

Mitigation: Conduct a comprehensive resource planning exercise with SMEs. Identify and allocate necessary resources effectively. Explore cost-effective solutions that align with the budget constraints of SMEs.

3. Data Security and Privacy: The system will handle sensitive construction data, which poses potential risks of data breaches and privacy violations.

Mitigation: Implement robust security measures, such as encryption, access controls, and regular security audits. Comply with local privacy laws and implement appropriate risk strategies to ensure data security and privacy.

4. Changes in Regulatory or Legal Requirements: Changes in regulations or legal requirements related to construction data management and cyber security may impact the project.

Mitigation: Stay updated on relevant regulations and industry standards. Allocate time and resources for regular compliance reviews and adapt the system accordingly to ensure adherence to the latest regulatory requirements.

Reference:

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