American International University-Bangladesh (AIUB)

Department of Computer Science
Faculty of Science & Technology (FST)

SafeHer – A Women's Safety Application

A Software Engineering Project Submitted
By

Semester: Summer_21_22		Section:	Group Number:	
SN	Student Name	Student ID	Contribution (CO3+CO4)	Individual Marks
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The project will be Evaluated for the following Course Outcomes

CO3: *Select* appropriate software engineering models, project management roles and their associated skills for the complex software engineering project and evaluate the sustainability of developed software, taking into consideration the societal and environmental aspects	Total Marks	
Appropriate Process Model Selection and Argumentation with Evidence	[5 Marks]	
Evidence of Argumentation regarding process model selection	[5Marks]	
Analysis the impact of societal, health, safety, legal and cultural issues	[5Marks]	
Submission, Defense, Completeness, Spelling, grammar and Organization of the Project report	[5Marks]	
CO4: *Develop* project management plan to manage software engineering projects following the principles of engineering management and economic decision process	Total Marks	
Develop the project plan, its components of the proposed software products	[5Marks]	
Identify all the activities/tasks related to project management and categorize them within the WBS structure. Perform detailed effort estimation correspond with the WBS and schedule the activities with resources	[5Marks]	
Identify all the potential risks in your project and prioritize them to overcome these risk factors.	[5Marks]	

Description of Student's Contribution in the Project work

Student Name:
Student ID:
Contribution in Percentage (%):
Contribution in the Project:

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Signature of the Student

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Student ID:
Contribution in Percentage (%):
<u>Contribution in the Project:</u>
- Contribution Description 1
- Contribution Description 2

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Signature of the Student

1. PROJECT PROPOSAL

1.1 Background to the Problem

- o Write the background description that helps putting your project into the right context of a problem domain and gives everyone involved a common view of the project.
- o What is the root cause of this problem? Why this problem is so important to consider?.

1.2 Solution to the Problem

- o Describe what is your project/thesis objective? What solutions are you going to provide to solve the above-mentioned problems?
- o What are the solutions you are going to propose to deal with the problem? why is this solution is particularly appropriate to solve the problem? Is the solution feasible to the meet the business objective?
- o Describe the basic functionalities of your proposed solution that makes the best use of state-

of-art technology and produced a significant result that is likely to have a major impact on societal, health, safety, legal and cultural issues. Provide a deep insight that demonstrate and preset a creative solution to the real-life problem.

- o Describe the target group of users of your solution? And how they will be benefited by your proposed solution to the problem?
- o Describe the contribution of your project to the development of scientific results that is identified and well documented.
- o Provide a literature review on what are the other studies that have discussed the same topic of yours in the literature and explain how your study has utilized and extended the problems of existing studies.
- o Provide a description of all the existing studies presented in the problem area. What are the existing software solutions (for project) are available to solve the aforementioned problems?
- o What are the existing software solutions are available to solve the aforementioned problem? And how your proposed solution is going to extend them in providing more benefits to the users?

2. SOFTWARE DEVELOPMENT LIFE CYCLE

2.1 Process Model

- o Provide an analysis regarding the nature and environment of the software that you are going to develop and select the best suitable method(s) to develop the software.
- o Present your arguments based on your analysis about why your selected method(s) is the best choice among all other methods to develop your proposed software.
- o Presents sufficient amount of evidence to support argument for your model selection in developing your proposed solution.

2.2 Project Role Identification and Responsibilities

- o Identify all the roles/stakeholder in the software/project management activities in software development.
- o Describes the responsibilities of the role in the software development.

Text Format:
- o Style: Times New Roman
- o Size: 12
- o Space: 1.0
- o Alignment: Justify
- o Length: Maximum 6 pages (including cover page)

Rubric for Project Assessment (CO3)

Criteria	Marks distribution (Max 3X5= 15)				Acquired Marks
	Inadequate (1-2)	**Satisfactory (3)**	**Good (4)**	**Excellent (5)**	
Selection of Software Engineering Models	Does not articulate a position or argument of choosing appropriate model. Does not present any evidence to support the arguments for the choice of the model	Articulates a position or argument for choosing models that is unfocused or ambiguous. Presents incomplete/vague evidence to support argument for model choice	Articulates a position or argument of choosing models that is limited in scope. Does not present enough evidence to support the argument for the choice of the model	Clearly articulates a position or argument for the choosing software engineering models. Presents sufficient amount of evidence to support argument for the model selection	
Role identification and Responsibility Allocation	The project has poor project management plans for identifying roles and assigning the responsibilities	Identify few roles in the project management where some of the roles are left alone with any project responsibilities	Identify most of the roles in the project management and assign their responsibilities	Well planned project with proper role identification and responsibility allocation in the project management activities	
Impact identification					
Formatting and Submission	Project report is not complete and Several errors in spelling and grammar. Present a Confusing	Some errors in spelling and grammar. Some problems	Few errors in spelling and grammar. Presents most of the details in	Project report is complete and No errors in spelling and grammar. Consistently	

organization of concepts, supporting arguments, and real-life example. Sentences rambling, and details are repeated.	of organizing the answer in a logical order of defining, elaborating, and providing real-life examples.	a logical flow of organization in definition, details, and example.	presents a logical and effective organization of definition, details, and real-life example of the topic.	
			Acquired marks:	
			CO Pass / Fail:	

Rubric for Project Assessment (CO4)

Marking Criteria	Marks Distribution (Maximum 3X5=15)				Acquired Marks
	Inadequate (1-2)	**Satisfactory (3)**	**Good (4)**	**Excellent (5)**	
Project Planning	No background information regarding the project is given; project goals and benefits are missing.	Insufficient background information is given; project goals and benefits are poorly stated	Sufficient background information is given; the purpose and goals of the project are explained.	Thorough and relevant background information is given; project goals are clear and easy to identify.	
Effort Estimation and Scheduling	Student vaguely discuss the impact of societal, health, safety, legal and cultural issues in their project	Student provided with partial relevance to the impact of societal, health, safety, legal and cultural issues in their project	Student fairly provided the analysis to the impact of societal, health, safety, legal and cultural issues in their project	Student comprehensively provided the analysis to the impact of societal, health, safety, legal and cultural issues in their project	
Risk Management	Ambiguous representative example.	Partially identify / indicate towards real-life example.	Real-life example is fairly connected towards the definition.	Comprehensively defend with real life example.	
				Acquired Marks:	
				CO Pass / Fail:	

SafeHer – A Women's Safety Application

1.1 Background to the Problem

In recent years, women's safety has become an increasingly critical concern worldwide, especially in developing nations like Bangladesh. Reports of harassment, assault, and abduction are distressingly frequent, particularly in urban areas. Many women feel unsafe when traveling alone or in unfamiliar places due to the lack of immediate access to help and safety resources. One of the core issues is the absence of an accessible, real-time safety support system that can empower women to act quickly in emergencies. Traditional emergency hotlines are often slow, confusing, or inaccessible during real-time danger. Moreover, a lack of awareness and proper reporting channels contributes to underreporting of incidents, thereby weakening the response system.

The root cause of this problem lies in insufficient infrastructure, underreporting, poor accessibility of safety services, and a lack of trust in existing systems. This issue is important not just for individual well-being, but also for societal development, gender equality, and national safety.

2. Solution to the Problem

2.1 Objective

The main objective of this project is to design and develop a mobile-based safety application named **"SafeHer"**, dedicated to enhancing women's safety. The app will provide essential tools such as emergency alerts, real-time location tracking, anonymous incident reporting, access to nearby safe zones (like police stations and hospitals), and awareness resources.

2.2 Proposed Solution and Feasibility
The proposed solution will include:

- **Emergency Help Button:** A one-tap emergency alert system that activates a **voice alert** (loud warning sound) and instantly shares the user's live location with pre-selected emergency contacts and authorities.
- **Live Location Tracking:** Allows for **real-time location monitoring**, with an **optional sharing feature**, enabling users to share their location only when they feel unsafe. Admins will also **track user locations** during active emergency alerts to ensure quick response and better coordination.
- **Incident Reporting System:** Enables users to **report safety incidents**, either **anonymously** or with their identity, encouraging safe and barrier-free communication.
- **Safe Zone Directory:** Displays a list of **verified nearby safe zones** such as police stations, hospitals, and emergency shelters, complete with names, contact details, and distance from the user.

- **User Feedback Mechanism:** Users can **rate and provide feedback** on different areas or zones based on their personal safety experience, helping the community stay informed and cautious.

This solution is highly feasible as it uses readily available mobile technologies (GPS) and is designed to be lightweight, user-friendly, and culturally suitable for users in Bangladesh.

3. Key Functionalities

3.1 User Side Functionalities

The application will offer the following features for end users:

- **Registration and Login:** Secure sign-up and login system for user authentication.
- **Home Page:** Central dashboard displaying key features, alerts, and safety tips.
- **Emergency Help Feature:** One-tap emergency button with voice alert and live location sharing for instant support.
- **Live Location Tracking:** Allows users to monitor their real-time location and share it with trusted contacts and admins during unsafe situations.
- **Report Incident Page:** Enables users to report incidents anonymously or with their identity, ensuring freedom and privacy.
- **Settings Page:** Allows customization of app behaviour, emergency contacts, notification preferences, and privacy controls.
- **Profile Page:** Displays and manages user information such as name, contact details, and profile picture.
- **User Feedback on Safety Zones:** Lets users' rate and comment on the safety of specific areas or locations.
- **Safe Zone Directory:** Lists nearby police stations, hospitals, and verified safe places with maps and contact information.

3.2 Admin Side Functionalities

Administrators will have access to the following tools and management features:

- **Admin Login:** Secure login access for authorized administrators only.
- **Admin Dashboard:** Central control panel displaying summaries of reports, active users, location alerts, and overall safety metrics.
- **Report Management:** Allows admins to view, filter, verify, and respond to incident reports submitted by users.
- **User Management:** Enables administrators to manage registered users, including account verification, deactivation.
- **Monitoring Tool for Real-Time Tracking:** A secure, admin-only tool to monitor users' real-time location during emergencies to ensure a faster response and proper coordination with safety services.

These features combine mobile app capabilities with responsible data handling and public service coordination.

Target Users

- **Primary Users:** Women (students, workers, travelers) in urban and semi-urban Bangladesh.
- **Secondary Users:** Law enforcement, NGOs, and local government units.
- They will benefit through improved access to help, safer commuting, psychological support, and the ability to report anonymously and instantly.

5. Technological Impact

SafeHer leverages **state-of-the-art technologies** to offer a robust and responsive safety platform. Key technologies used include:

- **Real-time GPS Tracking:** Ensures location awareness and tracking for emergencies.
- **Cloud Database Storage:** Provides scalable, reliable, and secure storage of user data, incident reports, and feedback.
- **User Authentication Systems:** Maintains data privacy, allowing personalized and secure access to user profiles and settings.

The application introduces a **community-centered approach**, encouraging user participation, shared responsibility, and proactive safety measures. It supports awareness through educational content and facilitates **prompt reporting** and **faster response times**, significantly improving existing safety systems.

6. Contribution to Scientific Knowledge and Society

SafeHer contributes to the advancement of **mobile safety technology**, with a specific focus on developing country environments where public safety infrastructure may be limited. The project addresses crucial **legal, social, cultural, and technological challenges** related to women's safety.

Moreover, SafeHer serves as a **scalable prototype**, capable of being adapted for other **vulnerable groups**, such as the **elderly**, **children**, and **people with disabilities**. Its innovative use of real-time data, anonymous reporting, and safe zone feedback mechanisms makes it a valuable reference for researchers and developers working on technology for social good.

7.Literature Review and Existing Studies

Existing applications such as **bSafe** and **Circle of 6** offer emergency alerts and live tracking. These apps focus on emergency alerts and location tracking. However, they lack:

- Local safe zone integration (e.g., hospitals, police)

- A Bangladesh-focused design
- Multi-role access for admins
- Anonymous reporting
- Admin-side monitoring panel

These limitations are addressed by **SafeHer**, making it a superior and more relevant solution for the target region.

Extension over Existing Solutions

SafeHer will improve upon these by:

- Real-time **feedback**
- Mapping **verified safe zones**
- Dedicated admin-side management and monitoring panel
- Anonymous incident reporting option
- Including Voice alerts for emergency

8. Uniqueness and Extension Over Existing Solutions

SafeHer extends existing ideas by integrating:

- Real-time feedback on safety from the user community
- A resource base managed by admin with reports
- Safe zone verification and ranking based on user feedback

SafeHer is more than just an emergency app; it is a comprehensive safety platform built for and by the community. It empowers users with awareness, connects them to resources, and gives them a voice in making their surroundings safer. It stands to make a significant contribution to public safety, women's rights, and technological innovation in social good.

2. SOFTWARE DEVELOPMENT LIFE CYCLE

2.1 Process Model

In developing SafeHer, a mobile-based safety application targeting women's security in real-time situations, the **Scrum** framework — a subset of Agile methodologies — is chosen as the most suitable software development process model.

Nature and Environment of the Software

SafeHer is intended to be a **real-time, responsive, user-centric mobile application**. Its target users (women, especially in Bangladesh) require:

- A lightweight, mobile-friendly interface
- Fast feature updates based on feedback

- Quick adaptation to evolving safety requirements or user needs
- Continuous testing and refinement
- Multiple interacting roles (users and admins)

Given the **dynamic nature of the safety domain**, new requirements are expected to emerge frequently during development. Additionally, SafeHer needs to be rolled out in phases (starting with MVP (minimum viable product) and iteratively enhanced based on community input and real-world usage.

Why Scrum is the Best Fit

The Scrum model is chosen over traditional models like **Waterfall**, **V-Model**, or even **Incremental** for the following reasons:

- **Iterative and Incremental Development**: Scrum supports frequent releases of working software, which is ideal for quickly deploying an MVP (Minimum Viable Product) version of SafeHer and progressively adding features like feedback mechanisms or voice alerts.
- **User-Centric Design**: Frequent user feedback (from testers or pilot groups) can be incorporated into successive sprints, aligning perfectly with SafeHer's goal of evolving based on community input.
- **Flexibility to Change**: Unlike the Waterfall model, which is rigid and linear, Scrum accommodates changing requirements—critical for an app meant to respond to new safety risks and user needs.
- **Short Sprint Cycles**: Allows rapid development and testing of core features like emergency alerting and live tracking.
- **Cross-functional Collaboration**: Encourages close collaboration between developers, testers, domain experts, and potential users — ensuring SafeHer meets both technical and social expectations.

Why Not Other Models?

 Waterfall Model

- Follows a rigid, linear process, making it difficult to adapt to changing requirements. Once a phase is completed, user feedback is hard to incorporate—unsuitable for the evolving nature of *SafeHer*.

 V-Model

- A structured, test-heavy approach ideal for hardware or regulatory systems. It lacks the flexibility and quick iteration needed for a dynamic mobile app like *SafeHer*.

Incremental Model

- Delivers the product in parts but lacks defined roles (e.g., Scrum Master, Product Owner) and structured feedback loops, making it less collaborative than Scrum.

 Iterative Model

- Focuses on repeated development cycles but lacks formal team practices like daily standups or sprint reviews, which are essential for team coordination and fast delivery.

Extreme Programming (XP)

- Emphasizes technical practices like pair programming. While agile, it's developer-centric and lacks formal management roles. It doesn't support broader collaboration with non-technical stakeholders, which is key for *SafeHer*.

Supporting Evidence from Literature

- According to **Sommerville (2016)**, Agile methods such as Scrum are particularly well-suited for applications with rapidly changing or uncertain requirements, which is true for safety-focused applications like SafeHer.
- A study by **Boehm and Turner (2004)** also emphasizes Agile's success in projects that demand user involvement and rapid adaptability, which aligns with SafeHer's iterative feedback and admin-managed content features.
- Research by **Petersen & Wohlin (2010)** indicates that Agile approaches improve software quality and delivery speed in mobile application development — both critical for SafeHer's usability and trustworthiness.
- In **Koch (2005)**, it is noted that Agile (Scrum in particular) shortens time-to-market while maintaining adaptability, a key factor for the rapid prototyping and release strategy of SafeHer.

2.2 Project Role Identification and Responsibilities

Functional Requirements

1. Registration and Login

- **1.1** The software shall allow users to register using name, phone, email, and password.
- **1.2** The system shall allow users to securely log in using valid credentials.
- **1.3** The system shall verify login credentials with stored database records.
- **1.4** If credentials are valid, the user is redirected to the home page.
- **1.5** If login fails three times, the account will be temporarily locked.
- **Priority Level**: High
- **Precondition**: User must be registered.

2. Emergency Help Feature

- **2.1** The system shall provide a one-tap emergency button.
- **2.2** Upon activation, it shall trigger a loud voice alert.
- **2.3** The app shall share live GPS location with predefined emergency contacts and admins.
- **Priority Level**: Very High
- **Precondition**: Emergency contacts must be configured.
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3. Live Location Tracking

- **3.1** Users can enable real-time tracking within the app.
- **3.2** Location data can be shared optionally with trusted contacts or admins.
- **Priority Level**: High
- **Precondition**: Location permission must be granted by the user.

4. Report Incident Page

- **4.1** Users can submit incident reports anonymously or with Identity.
- **4.2** Admins can view and manage all reports.
- **Priority Level**: High
- **Precondition**: User must be authenticated.

5. Safe Zone Directory

- **5.1** The app shall list nearby safe zones (police, hospitals).
- **5.2** The app shall show contact info, map, and distance from user.
- **Priority Level**: Medium
- **Precondition**: GPS enabled.

6. Feedback Mechanism

- **6.1** Users can rate and review safety zones.
- **6.2** Admins can moderate feedback for reliability.
- **Priority Level**: Medium

7. Admin Dashboard

- **7.1** Admins can log in securely using their credentials.
- **7.2** The dashboard shows summaries of reports, alerts, and users.
- **7.3** Admins can manage users, deactivate accounts, and track real-time locations during emergencies.
- **Priority Level**: High
- **Precondition**: Admin role login.

Non-Functional Requirements

1. **Security**: The application must implement strong data encryption techniques to protect user data, particularly sensitive information such as passwords, location data, and incident reports. All communications between client and server must use secure protocols like HTTPS (Hyper Text Transfer Protocol Secure).

2. **Performance**: The app must respond to user interactions promptly. In the case of emergency help activation, the system should trigger the voice alert and share the live location within **2 seconds** to ensure timely assistance.
3. **Usability**: The interface should be intuitive, user-friendly, and culturally appropriate, especially for female users in urban and semi-urban regions of Bangladesh. The design must be mobile-optimized and accessible for users of varying technical skills.
4. **Scalability**: The system must be capable of handling an increasing number of users, emergency reports, and feedback entries without significant performance degradation.
5. **Availability**: The application must ensure high availability, ideally **99% uptime**, so users can access the system whenever needed, especially in critical situations.
6. **Privacy**: The system must offer users complete control over their data sharing preferences, especially regarding location tracking and anonymous reporting. Privacy policies should be transparent and strictly enforced.
7. **Responsiveness**: The application must ensure all user interactions (e.g., button clicks, navigation, form submissions) are handled within **1 second** under standard network conditions, providing a seamless experience.

Roles and Responsibilities

Scrum Master: The Scrum Master ensures the SafeHer development team follows Scrum principles, removes obstacles, and facilitates collaboration between developers, testers, users, and management. They guide the project to stay on track and continuously improve the app's safety features and usability.

Product Owner: The Product Owner manages the SafeHer Product Backlog by gathering requirements from stakeholders and prioritizing features such as emergency alerts and live tracking. They ensure the app's development aligns with user needs and community safety goals, acting as the main link between users and the development team.

Scrum Team: The Scrum Team is a self-organizing group responsible for delivering SafeHer's working increments each sprint. They estimate effort, manage the Sprint Backlog, refine user stories, and address issues to ensure timely delivery of core functions like location services and incident reporting.

Customer: The Customer collaborates closely with the Product Owner to define SafeHer's features and provides ongoing feedback based on real-world usage, ensuring the app effectively meets community safety expectations.

Management: Management sets strategic goals and project standards for SafeHer, supports the team with resources, and ensures that the development aligns with organizational objectives related to public safety and social impact.

Users (Women): The primary users of the application are women who will register, report incidents, trigger emergency alerts, and share feedback. Their interaction with the application helps shape its continuous improvement.

Admin Panel Users (Authorities, NGOs, Safety Officers): These users access the admin dashboard to manage incident reports, track user locations during emergencies, manage feedback, and verify safe zones. Their role is vital in responding to incidents and maintaining system trust and safety.

References

[1] I. Sommerville, *Software Engineering*, 10th ed. Boston, MA: Pearson, 2016.

[2] B. Boehm and R. Turner, *Balancing Agility and Discipline: A Guide for the Perplexed*. Boston, MA: Addison-Wesley, 2004.

[3] K. Petersen and C. Wohlin, "The effect of moving from a plan-driven to an incremental software development approach with agile practices," *Empirical Software Engineering*, vol. 15, no. 6, pp. 654–693, 2010.

[4] M. Reaves, "bSafe: A mobile app designed to deter assault," *National Network to End Domestic Violence*, 2019. [Online]. Available: https://www.techsafety.org/resources

[5] J. H. Gillis, "The Circle of 6 App: Using mobile technology to prevent sexual violence," *The White House Blog*, 2014. [Online]. Available: https://obamawhitehouse.archives.gov

[6] A. Islam and S. Akter, "Mobile application development in Bangladesh: An analysis of user expectations and developer strategies," *International Journal of ICT Research*, vol. 11, no. 2, pp. 47–54, 2022.