SOFTWARE ENGINEERING PROJECT

ByStander

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Abstract

Put your abstract paragraph here.

Acknowledgement

Put your acknowledgement paragraph here.

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Chapter 1

Introduction

1.1 Background

Emergencies strike without warning, and panic often follows. When faced with danger, many people freeze or make poor decisions due to stress, potentially worsening outcomes for themselves and others. This natural stress response can prevent effective action precisely when clear thinking is most crucial.

In Thailand alone, emergency services receive over 4,300 calls daily (1.6 million annually), with traffic accidents (25.6%), unknown issues (20.4%), and medical emergencies like abdominal pain (10.6%) leading the statistics. These situations are particularly dangerous for vulnerable populations like children, the elderly, and those with existing medical conditions, who may require specialized attention during crises.

The consequences of delayed or ineffective emergency responses can be devastating: preventable injuries, loss of life, and lasting psychological trauma. Caregivers and bystanders, despite good intentions, may hesitate or act incorrectly due to emotional distress, leading to preventable harm. This gap between knowledge and action directly impacts survival rates and recovery outcomes.

Our smartphone application addresses this critical need by providing real-time emergency guidance through the technology already in users' pockets. By offering step-by-step instructions during crisis situations, clear direction to reduce panic, and specialized protocols for various emergencies, we can transform emergency response capabilities at the individual level. This research focuses on leveraging widely available mobile technology to improve emergency outcomes when every second counts.

1.2 Problem Statement

In emergency situations, the psychological phenomenon of stress-induced cognitive impairment presents a significant public health challenge. Despite the widespread availability of emergency protocols and safety guidelines, individuals frequently experience severe decision-making paralysis when confronted with high-stress scenarios. This cognitive disconnect—between theoretical knowledge and practical application under pressure—remains inadequately addressed in current emergency response systems.

Observed evidence indicates that approximately 80% of individuals experience significant mental processing disruptions during high-stress emergencies, manifesting as confusion, memory lapses, and decision-making hesitation. Furthermore, over 60% of people either freeze completely or make critical errors during emergencies, substantially reducing survival rates and positive outcomes. This phenomenon affects both untrained bystanders and individuals with prior emergency training, suggesting that traditional knowledge-based preparation may be insufficient.

This cognitive impairment is particularly problematic for caregivers of vulnerable populations, including those managing chronic conditions, elderly individuals, and children with special medical needs. The psychological pressure experienced by these caregivers can be even more pronounced, as the consequences of delayed or incorrect actions may be more severe for their dependents.

The gap between emergency knowledge and emergency performance represents a critical area for intervention. While considerable resources have been invested in emergency protocols, comparatively little attention has focused on overcoming the psychological barriers to implementing these protocols during actual emergencies. Our application aims to address this gap by examining the efficacy of real-time digital guidance systems in mitigating stress-induced cognitive impairment and improving emergency response outcomes across diverse scenarios and populations.

1.3 Solution Overview

Bystander is an AI-driven emergency assistance application designed to enhance response efficiency during critical situations. By leveraging real-time location data, the application identifies the most appropriate emergency contact, ensuring faster and more effective assistance. Instead of solely relying on a general emergency hotline, Bystander determines whether contacting local police, a nearby hospital, or specialized emergency services is the best course of action.

The core functionality of the application follows a structured process:

1. Incident Detection – When an emergency occurs, the app assists users in identifying the most suitable authority to contact.

2. Optimized Emergency Call Routing – The application recommends the fastest and most relevant emergency contact based on real-time location data.

3. Guided Response Actions – While awaiting professional assistance, users receive clear, step-by-step guidance to help manage the situation effectively.

1.3.1 Features

1. Real-Time Emergency Service Locator: Utilizes GPS tracking to determine whether calling the general emergency hotline or directly contacting a nearby hospital or police station is the best option.

2. AI-Generated Emergency Scripts: Automatically compiles a structured emergency report, including key details such as location and the nature of the incident, enabling clear and effective communication with responders.

3. Step-by-Step Emergency Guidance: Provides easy-to-follow instructions on handling various emergencies, such

as administering first aid or assessing an individual's condition before help arrives.

4. Community-Powered Guidance: Allows verified experts (e.g., medical professionals, emergency responders) to contribute video or text-based instructional content for different emergency scenarios. Content is categorized by emergency type (e.g., fire, traffic accident, medical emergencies) for ease of access.

1.4 Target User

ByStander is designed for individuals who are at a higher risk of facing emergencies and require immediate assistance in critical situations. The key target users include residents of Thailand who are prone to emergencies, such as those who live with elderly individuals or sick patients who may require urgent medical attention. Or general individuals who have a higher chance of encountering emergencies, including those who frequently drive at night or work in high-risk environments.

- Age Group: 15-60 years old, ensuring accessibility for teenagers, adults, and middle-aged individuals who may need emergency support.

- Skill Level: Users with basic knowledge of technology, ensuring that the application is simple and intuitive for individuals with minimal technical experience.

- Industry or Domain Knowledge: None required, as the application is designed for general use without requiring prior expertise in emergency response or healthcare.

1.5 Benefit

The app helps people in emergencies by providing faster response times, making it easy to contact the right service quickly. It also ensures clear communication by using AI to create easy-to-understand reports, so users can explain their situation even when they are panicked. The app gives immediate guidance with step-by-step instructions, helping users know what to do while waiting for help. It's also user-friendly and easy to use, even during stressful situations. The Community Powered Guidance feature offers localized advice from trusted experts, giving users the most relevant and up-to-date information to help them respond effectively in any emergency.

1.6 Terminology

1. Emergency (situation): An unforeseen combination of circumstances or the resulting state that calls for immediate action.
2. Cognitive Impairment : Problems with a person's ability to think, learn, remember, use judgement, and make decisions. Signs of cognitive impairment include memory loss and trouble concentrating, completing tasks, understanding, remembering, following instructions, and solving problems. Other common signs may include changes in mood or behavior, loss of motivation, and being unaware of surroundings. Cognitive impairment may be mild or severe. There are many causes of cognitive impairment, including cancer and some cancer treatments.
3. Geotagging: Adding location information to something, like a picture or a post, so people know where it was taken or where something is happening.
4. Emergency Hotline: A special phone number you can call for immediate help during an emergency, like calling 911 for urgent situations.

Chapter 2

Literature Review and Related Work

In this chapter, describe other solutions/research that address the same topic as your project. If you are working on a software project, create a list of alternative solutions and analyze them in the competitor analysis section. If you are working on a research project, describe your related work research in the literature review section.

2.1 Competitor Analysis

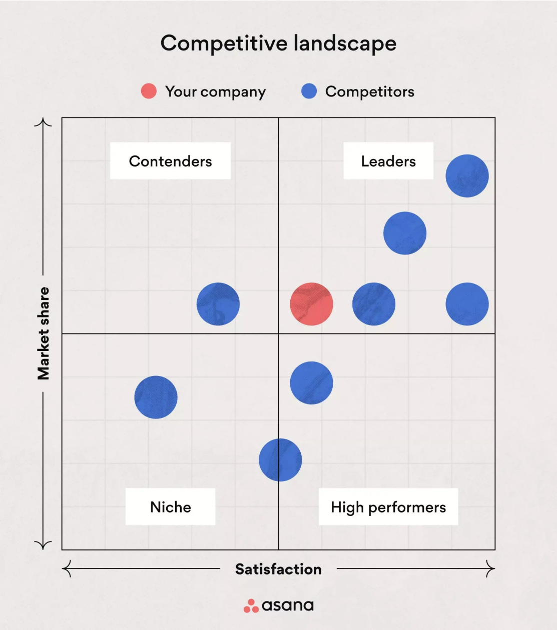

Figure 2.1: Competitive Landscape by Asana

Refer to an article "How to create a competitive analysis (with examples)" by Asana. You can use the Competitor Landscape (left image) or Competitor Analysis Framework (right image) for your project.

2.2 Literature Review

Add a literature review section if it fits with your project.

Chapter 3

Requirement Analysis

3.1 Stakeholder Analysis

<TIP: List your stakeholders for your project here/>

Stakeholders are individuals, groups, or entities that have an interest, concern, or stake in a particular project, decision, organization, or system. These are individuals or groups who can affect or be affected by the outcomes of your project.

3.2 User Stories

<TIP: Write user stories for each of your stakeholders here./>

User stories are a technique used in agile software development to capture and describe functional requirements from an end user's perspective. They are a way of expressing software features or functionality in a simple, non-technical language that can be easily understood by both developers and stakeholders.

3.3 Use Case Diagram

<TIP: Write a use case diagram for your project here. Refer to an article "What is a use case diagram?" by Lucidchart for help./>

3.4 Use Case Model

A use case is a detailed description of how a system interacts with an external entity (such as a user or another system) to accomplish a specific goal. Use cases provide a high-level view of the functionality of a system and help in capturing and documenting its requirements from the perspective of end users.

<TIP: Write use cases for your project here. Make sure to use the appropriate type of use case for each scenario (brief, casual, and fully-dressed use case)./>

3.5 User Interface Design

<TIP: Put the initial design of your application here. You can showcase a detailed design of a specific page or a sitemap of your application. See an example below./>

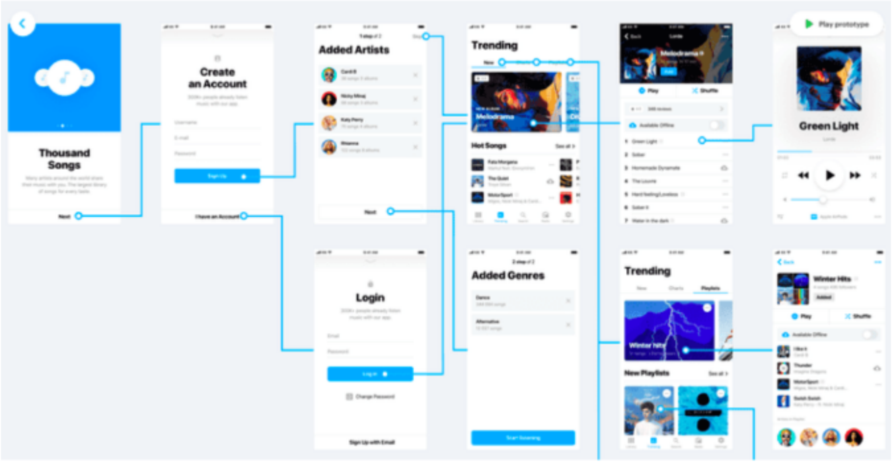

Figure 3.1: User Interface Design

Chapter 4

Software Architecture Design

<TIP: Describe how you design your application using Unified Modelling Language (UML). There should be at least two diagrams that describe the software architecture. You may add additional or remove unnecessary diagrams. However, there needs to be a coherency between them at the end./>

4.1 Domain Model

<TIP: Describe the business concept of your project. Showcase a domain model that captures the said concept./>

4.2 Design Class Diagram

<TIP: Showcase a design class diagram for your project and explain how it works here. You can group classes into packages or layers to communicate your design better./>

4.3 Sequence Diagram

<TIP: Sequence diagrams describe how the software runs at runtime. You do not have to create a sequence diagram for every scenario. However, there should be one for all the main ones./>

<ChatGPT: Creating a sequence diagram for every use case is not strictly necessary, but it can be a valuable tool in certain situations. Sequence diagrams are particularly useful for illustrating the interactions

between different components or objects in a system over time, showcasing the flow of messages or actions between them./>

4.4 Algorithm

<TIP: Optional, If you are working on a research project that proposes a new algorithm, you can describe your algorithm here. It can be in the form of pseudocode or any diagram that you deem appropriate./>

Chapter 5

Software Development

5.1 Software Development Methodology

<TIP: Describe your software development methodology in this section. />

5.2 Technology Stack

<TIP: Describe your technology stack here. See the following example from ThaiProgrammer.org />

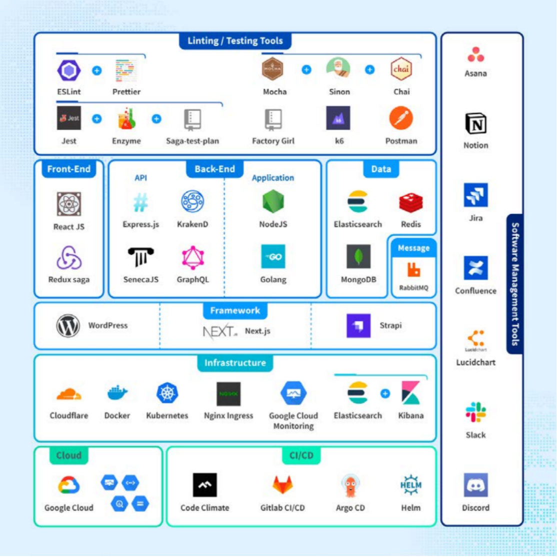

Figure 5.1: Example technology stack

5.3 Coding Standards

<TIP: Describe your coding standard for this project here. />

5.4 Progress Tracking Report

<TIP: Show that you have been working on this project overtime. It can be in the form of a burndown chart or a contribution graph from GitHub./>

Chapter 6

Deliverable

6.1 Software Solution

<TIP: Share a link to your Github repository. Showcase screenshots of the application and briefly describe each page here. />

6.2 Test Report

<TIP: Describe how you test your project. Place a test report here. If you use continuousintegration and deployment (CI/CD) tools, describe your CI/CD method here. />

Chapter 7

Conclusion and Discussion

<TIP: Discuss your work here. For example, you can discuss software patterns that you use in this project, software libraries, difficulties encountered during development, or any other topic. />

Reference

Bibliography

[1] Overleaf, “Learn latex in 30 minutes,” https://www.overleaf.com/learn/latex/Learn_LaTeX_in_30_minutes.

Appendix A

Appendix A: Example

<TIP: Put additional or supplementary information/data/figures in appendices. />

Appendix B

Appendix B: About LaTeX

LaTeX (stylized as LaTeX) is a software system for typesetting documents. LaTeX markup describes the content and layout of the document, as opposed to the formatted text found in WYSIWYG word processors like Google Docs, LibreOffice Writer, and Microsoft Word. The writer uses markup tagging conventions to define the general structure of a document, to stylize text throughout a document (such as bold and italics), and to add citations and cross-references.

LaTeX is widely used in academia for the communication and publication of scientific documents and technical note-taking in many fields, owing partially to its support for complex mathematical notation. It also has a prominent role in the preparation and publication of books and articles that contain complex multilingual materials, such as Arabic and Greek.

Overleaf has also provided a 30-minute guide on how you can get started on using LaTeX. [1]