HIFAZAT ~ Saving Lives

Capstone Project Proposal

Submitted by:

(101917014) Ritik Rajdev

(101917023) Akshat Dogra

(101917125) Harshita Gupta

(101917179) Kavya Jaswani

BE Third Year- COPC

CPG No. 69

Under the Mentorship of

Dr. Ashima Anand

Assistant Professor

Computer Science and Engineering Department

Thapar Institute of Engineering and Technology, Patiala

March 2022

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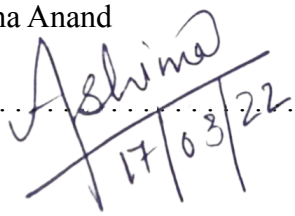
Mentor Consent Form

I hereby agree to be the mentor of the following Capstone Project Team

Project Title: Hifazat		
Roll No	**Name**	**Signatures**
101917014	Ritik Rajdev	
101917023	Akshat Dogra	
101917125	Harshita Gupta	
101917179	Kavya Jaswani	

NAME of Mentor: Dr. Ashima Anand

SIGNATURE of Mentor: . . . . .  . . . . . .

Project Overview

In the proposed software, our main objective is to decrease the rescue time after an incident by detecting the pattern from the victim's scream using machine learning models.

It has been observed that during these incidents a scream or a sharp noise is generally heard from the victim. If in case they're kidnapped by any means their location coordinates change drastically. So even if a scream is not heard you can generally deduce it from their location that can be in danger. In case of an accident their stagnant location along with any sound can give a rough idea if there's been an accident or not.We can use these instances as cues to determine if someone by any chance is in danger or not and then notify the appropriated contacts what's been observed so they can at least check if is there really is any need for help or rescue.

This software will aim to save lives by notifying the contacts designated by the user which can dramatically increase the chances of taking actions on time leading to timely rescue of accident victims, identification of rape cases and domestic violence and many more depending on the circumstances.

The stated project will be divided in Two major modules:

1. Model Training: It will be responsible for scream detection and will categorize screams if they are of distress or can be of distress or are not of any danger.
2. User Interface: It will act as a medium for sending messages and video clips along with location sharing. The user interface will be easy to navigate and will be aimed to be optimized in such a way that it would not require any latest silicon and can be used in dated phones as well.

Need Analysis

Traffic collisions in India are a major source of deaths, injuries and property damage every year. The National Crime Records Bureau (NCRB) 2016 report states there were 496,762 roads, railways and railway crossing-related traffic collisions in 2015. Of these, road collisions accounted for 464,674 collisions which caused 148,707 traffic-related deaths in India.

Rape is the fourth most common crime against women in India[2]. According to the 2019 annual report of the National Crime Records Bureau (NCRB), 32033 rape cases were registered across the country. Of these, 30,165 rapes were committed by perpetrators known to the victim.

Domestic violence in India includes any form of violence suffered by a person from a biological relative , but typically is the violence suffered by a woman by male members of her family or relatives. According to a National Family and Health Survey in 2005, total lifetime prevalence of domestic violence was 33.5% and 8.5% for sexual violence among women aged 15–49.

We Need a solution to reduce these types of crimes/Accidents to make our environment safer.

Literature Survey

Rape In India

Rape is the fourth most common crime against women in India[1]. According to the 2019 annual report of the National Crime Records Bureau (NCRB), 32033 rape cases were registered across the country, or an average of 88 cases daily . The share of victims who were minors or below 18 - the legal age of consent in India stood at 15.4%.Among these, victims who do report the assaults are alleged to suffer mistreatment and humiliation from the police.In 2018, official data showed that 1 rape was reported every 15 minutes in India. Of the 34,000 cases reported, just over 85 per cent led to charges, and 27 per cent ultimately led to convictions. This was then increased to 16 cases per minute in 2019.

Estimation Of Unreported Rapes

Most rapes go unreported because the rape victims fear retaliation and humiliation, both in India and throughout the world.Indian parliamentarians have stated that the rape problem in India is being underestimated because many cases are not reported, even though more victims are increasingly coming out and reporting rape and sexual assaults.The National Crime Records Bureau report of 2006 mentions that about 71% rape crimes go unreported.

Notable Incidents

1. **Ajmer rape case**

   In 1992, the Ajmer rape case was one of India's biggest cases of coerced sexual exploitation, with more than a hundred underage schoolgirls estimated to have been sexually molested and raped.

2. **2012 Delhi Gang rape case**

   The gang rape of a 23-year-old student on a public bus, on 16 December 2012, sparked large protests across the capital Delhi.She was with a male friend who was severely beaten with an iron rod during the incident.This same rod was used to penetrate her so severely that the victim's intestines had to be surgically removed, before her death thirteen days after the attack.

3. **2013 Mumbai gang rape**

   In August 2013, a 22-year-old photojournalist, who was interning with an English-language magazine in Mumbai, was gang-raped by five persons, including a juvenile, when she had gone to the deserted Shakti Mills compound, near Mahalaxmi in South Mumbai, with a male colleague on an assignment. This caused protests throughout the country since Mumbai with its very active nightlife was previously considered a safe haven for women. The city sessions court found the accused guilty and sentenced death penalty to the three repeat offenders in the Shakti Mills gang rape case, making them the first in the country to get the death sentence stipulated under the newly enacted Section 376E of the Indian Penal Code.

4. **Ranaghat case**

   On 14 March 2015, a 71-year-old nun was gang-raped in Ranaghat, West Bengal by intruders at the Convent of Jesus and Mary.Six men were arrested and charged with the crime by 1 April 2015.

5. **Kathua rape case**

   On 17 January 2018, Asifa, an 8-year old minor girl, was raped and murdered in Rasana village near Kathua in Jammu and Kashmir. The incident made national news when charges were filed against eight men in April 2018.

Traffic Collisions

Traffic collisions in India[2] are a major source of deaths, injuries and property damage every year. The National Crime Records Bureau (NCRB) 2016 report states there were 496,762 roads, railways and railway crossing-related traffic collisions in 2015.Of these, road collisions accounted for 464,674 collisions which caused 148,707 traffic-related deaths in India.According to the 2013 global survey of traffic collisions by the UN World Health Organization, India suffered a road fatality rate of 16.6 per 100,000 people in 2013.

Traffic collision-related deaths increased from 13 per hour in 2008 to 14 per hour in 2009. In 2015, 15 people per hour died due to road accidents according to NGO 'Indians for Road

Safety'.According to road traffic safety experts, the actual number of casualties may be higher than what is documented, as many traffic collisions go unreported. Moreover, victims who die some time after the collision, a span of time which may vary from a few hours to several days, are not counted as car crash victims.

Kidnappings In India

In 2020, there were over 84 thousand kidnapping and abduction cases reported in India[3][4]. The leading reason for this crime was to compel women to get married with over 24 thousand cases that year.

Although the threat of kidnapping exists throughout the country, two states and one territory in northern India -- Bihar, Uttar Pradesh and Delhi -- accounted for 50 percent of all abductions from 2004 through 2006. Bihar was the site of one-quarter of all kidnappings reported during that period. Following Bihar was Delhi, the national capital, with 16 percent of all abductions, and Uttar Pradesh, with 9 percent.

Domestic Violence In India

According to a National Family and Health Survey in 2005[5], total lifetime prevalence of domestic violence was 33.5% and 8.5% for sexual violence among women aged 15–49.A 2014 study in The Lancet reports that although the reported sexual violence rate in India is among the lowest in the world, the large population of India means that the violence affects 27.5 million women over their lifetimes.However, an opinion survey among experts carried out by the Thomson Reuters Foundation ranked India as the most dangerous country in the world for women.

Objectives

Our main objective is to decrease the rescue time by detecting various patterns and making logs of anomalies and responding to it immediately by notifying the contacts appropriated by the user. To achieve this we have divided certain tasks into sub-objectives as mentioned below:

- Train the model to detect screams or sharp noises and increase its efficiency to categorize them adequately.
- Make the user interface friendly enough so that anyone can use it with ease.
- Location tracking feature in case no screams are detected to at least provide a relevant trail to follow.
- Sending voice clips of that particular recorded scream to the designated contacts in such a way that the size of the file is minimum and no losses occur due to compression.

Methodology

- Scream Detection: To train our model for scream detection and accident detection we will take various scream and sharp noise samples that are produced during accidents like the sound of heavy breaks or crashes respectively and process them using SVM.
- User Interface: To make our user interface cross platform , lightweight and easy to use we will use flutter and various lightweight design patterns like material design[6] etc.
- Location Tracking: For location tracking we will use flutter packages which use gps[7][8][9].
- Message And Voice Clips Sharing: To send SOS and voice clips we will ask which application the user prefers and we will use an efficient encoding format that is universally supported like AAC, MP3 to minimize size in such a way that loss in data is minimum.

General working of our application can be seen in the flow chart in Fig. 1.

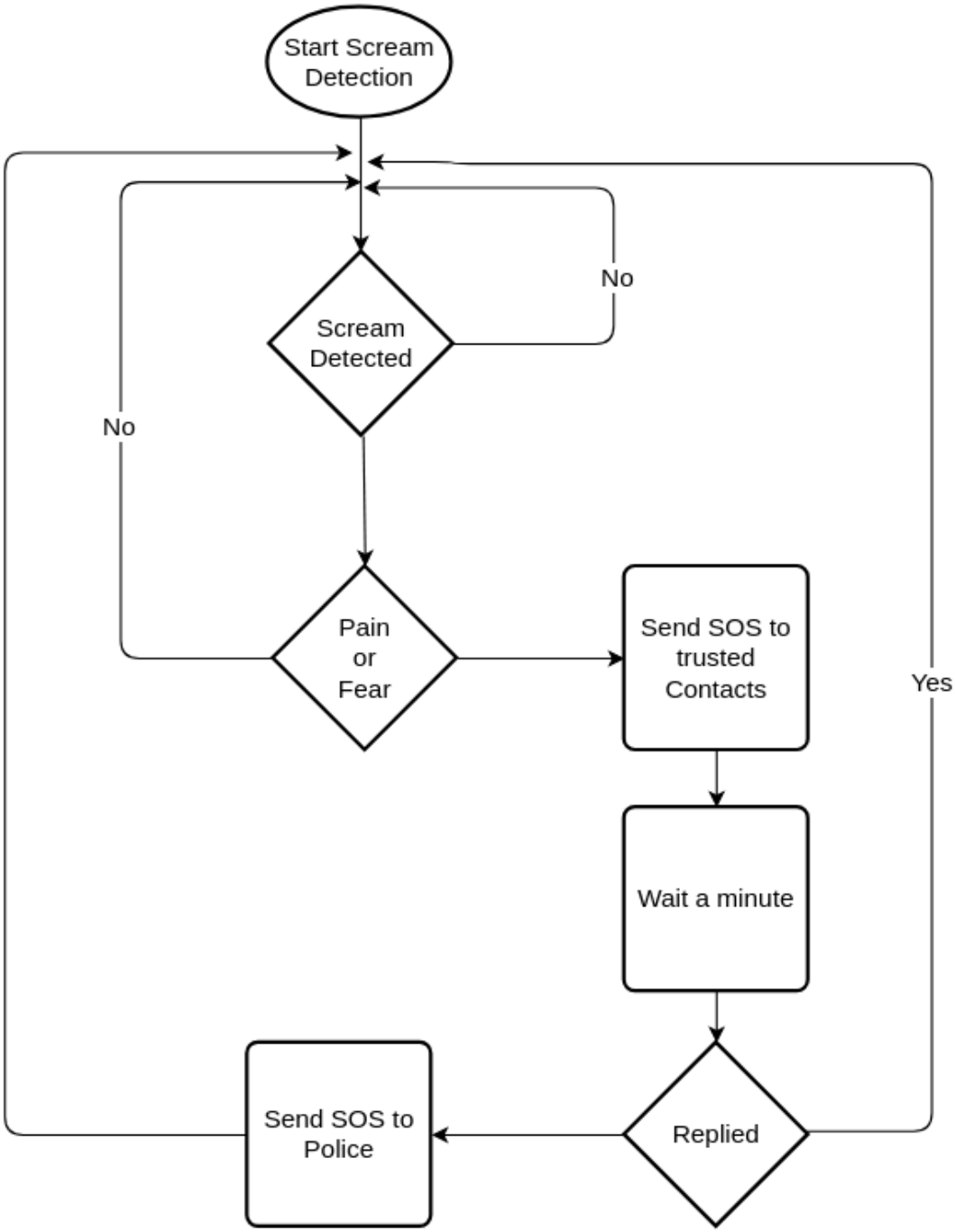

Start Scream Detection
Scream Detected
No
No
Pain or Fear
Send SOS to trusted Contacts
Yes
Wait a minute
Replied
Send SOS to Police

Fig. 1

Work Plan

S.No.	Activity	Month	February				March				April				May				August				September				October				November				December			
		Week No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	Identification and Planning of Project	Plan																																				
		Actual																																				
2	Studying ML, CNN, Deep Learning & Scream Detection	Plan																																				
		Actual																																				
3	Data Collection & Preprocessing	Plan																																				
		Actual																																				
4	Create ML models, Frontend	Plan																																				
		Actual																																				
5	Make Data Annotations	Plan																																				
		Actual																																				
6	Increasing Model Efficiency	Plan																																				
		Actual																																				
7	Testing	Plan																																				
		Actual																																				
8	Final Report	Plan																																				
		Actual																																				

Fig. 2

Red: Work that still needs to be done.

Green: Work that is done.

Project Outcomes

- An application with a user-friendly interface.
- A model that can categorize screams on various factors and then classifies if one can be in danger or not and logs that particular scream or audio.
- Notified contacts will receive a SOS message that will be sent automatically from the user side with the audio file attached in the minimum size possible with no audio loss.
- Location sharing to monitor any unusual movements in case no screams are detected.
- Cross platform user interface optimization.

Individual Roles

Akshat Dogra: Idea Finalization, Overall Integration of Model and Frontend.

Harshita Gupta: Idea Finalization, Complete Frontend Designing.

Kavya Jaswani: Idea Finalization, Model Analysis and Designing.

Ritik Rajdev: Idea Finalization, Model Testing, Accuracy and Enhancements.

Course Subjects

- Machine Learning
- Application Development using Flutter and Dart
- Deep Learning
- Software Engineering

References

[1] https://en.wikipedia.org/wiki/Rape_in_India

[2] https://en.wikipedia.org/wiki/Traffic_collisions_in_India

[3] https://wikileaks.org/gifiles/attach/21/21049_INDIA%20kidnapping%20final.doc

[4]https://www.statista.com/statistics/632867/reported-abduction-and-kidnapping-cases-by-type-india/#:~:text=In%202020%2C%20there%20were%20over,24%20thousand%20cases%20that%20year

[5] https://en.wikipedia.org/wiki/Domestic_violence_in_India

[6] https://material.io/design

[7] https://pub.dev/packages/google_maps_flutter

[8] https://pub.dev/packages/latlong

[9] https://pub.dev/packages/geolocator