

**RAPE DETECTION AND PREVENTION SYSTEM USING IOT AND MACHINE LEARNING**

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An information system project proposal submitted to the faculty of information technology in partial fulfilment of the requirements of the award of a degree in Information and Computer science.

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# Declaration

# Table of Contents

[Declaration 2](#_Toc42722985)

[Table of Contents 3](#_Toc42722986)

[List of Figures 4](#_Toc42722987)

[Abstract 5](#_Toc42722988)

[Chapter 1: Introduction 6](#_Toc42722989)

[1.1 Background 6](#_Toc42722990)

[1.2 Problem Statement 7](#_Toc42722991)

[1.3 Aim 8](#_Toc42722992)

[1.3.1 Specific Objectives 8](#_Toc42722993)

[1.3.2 Research questions 8](#_Toc42722994)

[1.3 Justification 8](#_Toc42722995)

[1.5 Scope and Limitation 9](#_Toc42722996)

[Chapter 2: Literature Review 10](#_Toc42722997)

[2.1 Introduction 10](#_Toc42722998)

[2.2 Challenges Facing 10](#_Toc42722999)

[2.3 Existing platforms rape prevention 10](#_Toc42723000)

[2.3. 1 Athena 10](#_Toc42723001)

[2.3.2 Watch Over Me 11](#_Toc42723002)

[2.3.3 Stilleto 12](#_Toc42723003)

[2.3.4 React Mobile app 12](#_Toc42723004)

[13](#_Toc42723005)

[2.3.5 Prevention Education 13](#_Toc42723006)

[2.4 Gaps in the existing systems 14](#_Toc42723007)

[References 15](#_Toc42723008)

# List of Figures

[Figure 2. 1: Athena x](file:///C:\Users\essnj\OneDrive\Desktop\project\Four-Year-Project\Chapter%201.docx#_Toc42635479)

[Figure 2. 2: Watch Over Me xi](file:///C:\Users\essnj\OneDrive\Desktop\project\Four-Year-Project\Chapter%201.docx#_Toc42635480)

[Figure 2. 3: Stilleto xii](file:///C:\Users\essnj\OneDrive\Desktop\project\Four-Year-Project\Chapter%201.docx#_Toc42635481)

[Figure 2. 4: React Mobile xiii](file:///C:\Users\essnj\OneDrive\Desktop\project\Four-Year-Project\Chapter%201.docx#_Toc42635482)

[Figure 2. 5 xiii](file:///C:\Users\essnj\OneDrive\Desktop\project\Four-Year-Project\Chapter%201.docx#_Toc42635483)

# Abstract

Gender based violence has become a prevalent disorder in the society. There exist many forms of gender based violence for instance; violence at home, abuse of the victims and sexual violence. Sexual violence is a recurring critical issue that continues to trouble the society. However, there are actions that have been taken to suppress the situation but most of the incline to be unsuccessful.

The victim often fall prey when they are alone or highly intoxicated because the vulnerability level is high. Thereafter, when the victim tries to reach out to people or report the incident to the police, the response time tends to be long and hence the victim becomes hopeless for justice which results to suicide, early pregnancies and family conflicts.

The proposed system is intended to reduce the number of victims. By incorporating both IOT and Machine Learning, there will be sensors to check the pulse rate and detect alcohol and module GSM and GPS modules that will facilitate communication. A body movement model will be used to detect any signs of physical struggle and later a report will be generated with regards to the data collected. The report will be sent to the clinic for evidence.

# Chapter 1: Introduction

## Background

Gender based violence (GBV) is violence against women based on women’s inferior status in society which is considered to be a human rights violation. According to United Nations General Assembly in 1993, it takes forms such as Physical, sexual and psychological violence within the family, Trafficking in women, Female genital mutilation and sexual abuse (Centre, 2014). It can be enacted by members of an army, terrorist organization or just a civilian.

The data availed at the Centre’s Website indicates that since 2001 to date, the Centre has supported over 21,341 survivors of GBV, of whom 56% were women, 36% girls, 3% men and 5% boys. In Kenya, 45% of women aged between 15 and 49 years have experienced either physical or sexual violence; One in five Kenyan women (21%) has experienced sexual violence. Most violence is perpetrated in familial relationships where the perpetrator is known to the victim, strangers account for only 6% of GBV in Kenya and most violence towards women is committed by an intimate partner, (Centre, 2014)

There are sites for GVB;

Community/Society- This is a group sharing common social, cultural, religious or ethnic belonging, it perpetuates existing family structure and power inequalities in the society. It justifies the behaviour of male abusers aimed at establishing control over women and supports harmful practices in the workplace.

Family- This is the arena where physical abuses (spousal battering, sexual assault, sexual abuse) and/or psychological abuses occur. Domestic violence can also take such forms as confinement, forced marriage of woman arranged by her family without her consent, threats, insults and neglect. Given that violence within the family and household takes place in the home, it is often seen as a ‘private’ issue and information about it is lacking. ( Minnesota Advocates for Human Rights, 2003).

In 2007 Kenya experienced post-election violence which brought a lot of disorder amongst its citizens. there were extremist groups or malicious individuals that would go from house to house, to torture the inhabitants; destroy their belongings and even to an extreme of sexual violence women. This was to impose punishment due to the ethnical classes and some would take advantage of the fact that measures were not being and also people lived in and hence the women couldn’t defend themselves.

Alcohol and drug abuse such as cocaine influence an individual’s tendency towards violence. The respondents of the 1991 National Criminal Victimization Survey perceived more than one fourth of violent criminal assailants to be under the influence of alcohol, less than 10% of these assailants were reported by victims to be under the influence of illicit drugs. Of these, more than half were reported to be under the influence of both alcohol and drugs (Parker & Auerhahn, 1998).

The numbers of unemployed youth are increasing to a point they would opt to commit crime in order to gain money for sustainability purposes. In the midst of all this, they commit sexual violence depending on the victim in this case being the women.

There have been cases of women being abducted and held hostage or sold to different countries lieu of payment. A different instance though rare in Kenya, the recruitment of women and promise them marriage and wealth, in such the women lured and fall prey to these false proposition. The ones behind this are highly capable of orchestrating sexual violence and sometimes end up killing the victims. (Bigio & Vogelstein, 2017)

## Problem Statement

There are many rape cases that reported to the police but only few of them get a hearing. When victims report these cases, they are mostly in a traumatised state, this makes then unfit to give accurate statements leading to  not recording a report of rape as a crime but noting it as an incident hence investigations not being carried out, raising the possibility that perpetrators could go on to reoffend (Barr, 2019)

The rape few cases that make it to trial they are dealt in a manner contrary to the seriousness it requires. The of the survivors struggle to maintain their composure when confronted with their memories of the violence (Review, 2014). They are expected to show less emotions and give elaborate answers and descriptions when confronted with questions or objectivity to because these cases are normalised to sex. This discourages the victims from reporting the case in addition to it, stigmatisation from the society and sometimes the evidence isn’t considered enough.

There are certain traits that make one a rape-target, the female gender at a high risk of being sexually assaulted and there are few who look for women on their cell phone, searching through their purse or doing other activities while walking because they are off guard and can be easily overpowered. There factors that favour the perpetrators, the use of a weapon to threaten the victim and the attack is most likely bound to happen very early in the morning or late in the night since there would be few people to witness.

Psychological Aggression is an aftermath of sexual violence and it takes exhibits itself in different ways such as, self-esteem, likely leading to depression or anxiety and threatening actions are intended to frighten/intimidate, thus leading to anxiety, compliance, and passivity; (Jordan, Campbell, & Follingstad, 2010)

Emotional reactions like guilt, shame, Fear, distrust and Sadness. Physical reactions like changes in eating or sleeping patterns, concerns about physical safety, Physical injury, concerns about pregnancy or contracting an STI or HIV

There are financial costs that incur to the community. These costs include medical services, criminal justice expenses, crisis and mental health services fees, and the lost contributions of individuals affected by sexual violence (© National Sexual Violence Resource Cente, 2010)

## 1.3 Aim

To develop an application that detects and prevents women from being sexually assaulted.

### 1.3.1 Specific Objectives

1. To investigate the challenges faced by victims before during sexual violence.
2. To review the existing solutions that prevent sexual violence from occurring and also help the victims to cope up with the outcomes.
3. To design, develop and test an application that prevents women from being sexual assaulted.

### 1.3.2 Research questions

1. What are the challenges faced by victims during sexual violence?
2. What are the existing solutions?
3. How to design, develop and test an application that prevents women from being assaulted?

## Justification

The proposed system is not only meant to but detect sexual violence using the Machine Learning model analysis that uses body movements to detect physical struggle, the victim able to use the data acquired and generated inform of a report, can be used as proof. The helps in case the victim decides to report the case to the police.

The IOT purview of the system includes communication with enlisted contacts, the fact that more people are aware when the victim feels unsafe, increases the chance her getting help from people and the contingency that the police will be on time will be high.

Real time data analysis with renders the proposed system essential because data being generated automatically, this way persons with malicious motives don’t get to interfere with the data and less time is wasted given that the report can be sent immediately to the right personnel.

## 1.5 Scope and Limitation

Given that GVB is a broad subject, the proposed system aims to tackle on Sexual violence.

Nairobi will be the point of focus given that it is a densely populated urban area and there tends to be a high rape cases There has of a record of 24.5 per cent of rape cases according to the Daily Nation. (Daily Nation, 2019). With a population of 4,734,881 (World Population Review, n.d.), The women understudy will be 15 years and above since as stated before, 45% of women aged between 15 and 49 years have experienced either physical or sexual violence and it would be easier for them to operate the system with ease.

There is a high rate of unemployment and also drug and substance abuse by the youth this also increases the crime rate in the city.

Limitations: The victims are hard to approach given that they may be experiencing stigmatisation, Post S Traumatic disorder, social isolation or depression so they may shy away from being because they feel ashamed or are fearful of what may be said about them. The researchers as well will have difficulties in obtaining sensitive information hence they need to be trained for such occurrences.

# Chapter 2: Literature Review

## Introduction

This chapter discusses the challenges encountered by the rape targets before being sexually assaulted. Existing platforms are as well highlighted and evaluated. Finally, gaps in the existing systems are also addressed.

## Challenges Facing

## Existing platforms rape prevention

### 2.3. 1 Athena

Athena is a black silicone pendant the size of a half-dollar and can be pinned to a purse, clothing, or even worn as a necklace. With a recessed button at the center of the device to prevent accidental alerts, users can hold it for three seconds to trigger a loud alarm that will immediately notify friends and family of their current location, or alternatively, press it three times in quick succession to send a silent alert if you’re suspicious of being targeted. ( 10 Best Tech Devices to Prevent Rape, 2017)

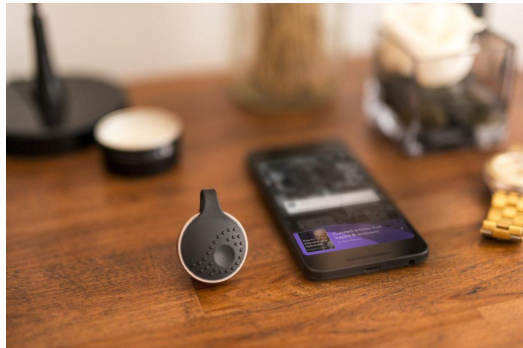


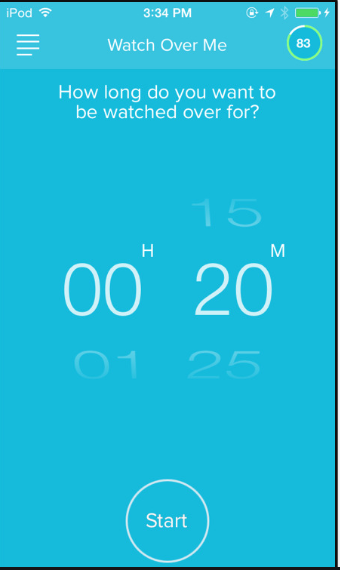
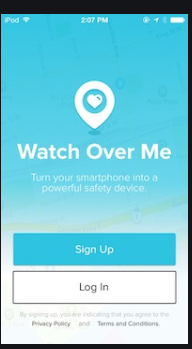
Figure 2. 1: Athena

### 2.3.2 Watch Over Me

This is a free app available for Android and iOS, allowing the user to set a timer when traveling alone. When you’re in a situation where you don’t have time to make a call for help, just shake your phone and even if it’s locked the app turns on your phone’s alarm, video camera and sends an alert to your pre-set emergency contacts. The company that created it dubbed itself the “Waze of personal safety” stating, “instead of giving you traffic updates, it warns you when you’re about to enter a high-[crime](https://www.psychologytoday.com/us/basics/law-and-crime) zone.”

You can choose to add updates in the form of texts, pictures, or video, and if you do not tap the “I’m Safe” button before the timer runs out, friends and family are immediately given your location and any information you've uploaded. Because the app is activated based on inactivity, you’ll be taken care of even if you’re separated from your phone.

Figure 2. 2: Watch Over Me



### 2.3.3 Stilleto

One functionality that sets Stiletto apart from other wearable jewelry or app, other than its stylish look, is the ability to place 911 calls on your behalf. Less than an inch on all sides, it can be worn as a pendant on necklaces or bracelets, and with a single press, dials an emergency contact, or the police. If you’re unable to speak for yourself, the automated voice assistant takes care of that for you. If the situation de-escalates, with a second press, you can confirm your safety.  (TECHFASTER, 2016)



Figure 2. 3: Stilleto

### 2.3.4 React Mobile app

React Mobile offers both a free safety app and a panic button device that can be attached to clothing, car keys, wallets, or carried in hand. Once activated, a React Mobile dispatcher immediately provides emergency contacts with your profile information and GPS location. Called “the world’s smallest personal panic button” React Mobile also offers group packages, perfect for organizations and community groups looking to stay protected together.

## 

Figure 2. 4: React Mobile

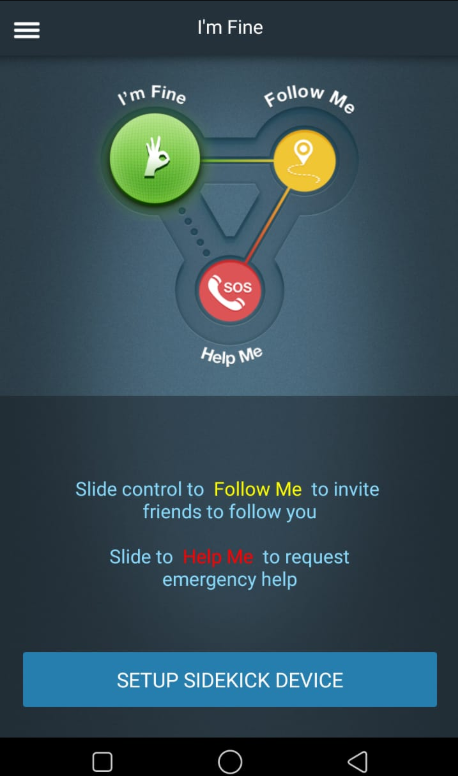
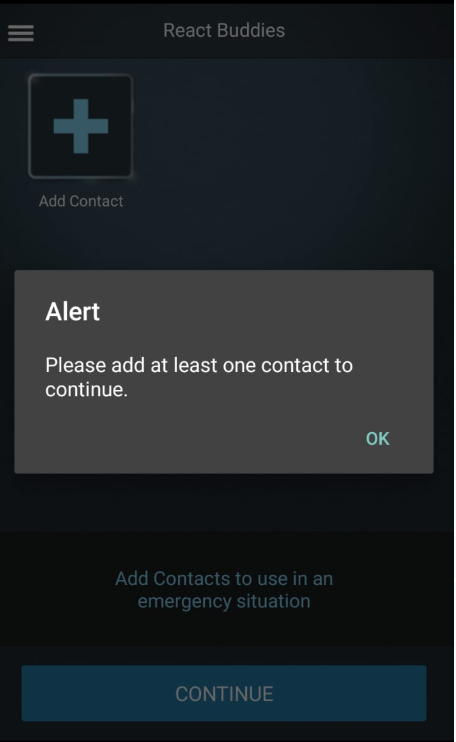


Figure 2. 5

### 2.3.5 Prevention Education

There are programs that have been that different adapted by different institutions to different types of audiences. Adolescents, educators stress the importance of eliciting student participation rather than presenting an entirely didactic program. Programs for older students may include: Setting clear personal boundaries. Confronting sex role stereotypes. Developing healthy attitudes toward emotional and sexual intimacy. Distinguishing between non-assertiveness, assertiveness, and aggressiveness.

The University of Michigan has a nationally known, full-fledged Sexual Assault Prevention and Awareness Center that offers a wealth of services to the campus community. Their campus rape crisis center provides peer education on rape prevention, organizes rape awareness weeks, and provides programs for men through the Men's Outreach Committee. (Joel Epstein & Langenbahn, 1994)

(Rape Prevention Education, 2019)

Figure 2.5: 1R.P.E

## Gaps in the existing systems

The applications may prevent by focusing on the

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