DESIGN AND DEVELOPMENT OF WEARABLE SMART SHOES FOR SAFETY PURPOSE

Project Reference No.: *45S_BE_0137*

College ***:*** *K.L.E's K.L.E. College of Engineering and Technology, Chikkodi*
Branch ***:*** *Department of Computer Science and Engineering*
Guide(s) ***:*** *Dr. Ramesh Kagalkar*
Student(S) ***:*** *Mr. Priyanshu Naik*
Mr. Rafeek Biradar
Ms. Anuruchi Shinde
Ms. Shruti Potadar

Keywords: Location detection, Emergency Alert Message, Number of Step count, Emergency Alert Message, Number of Step count, Temperature, Calories burned

Introduction:

The Status of women in India has undergone great changes over the past few centuries. In spite of this fact, women in modern India continue to challenge society and are often exposed to violent crimes and abuse. According to the poll conducted by Thomson Reuters, India is “The fourth most dangerous country for women” and the of the worst countries for women in Group of 20(G-20) countries. Girl harassment has always been a cause of major concern. The steep increase in incidents occurring now and then have put a big question on the freedom of girls. There is no fail-proof solution to help girls immediately during such situations and most of the time help arrives after the incident has occurred. With the increasing incidents with girls, it has become necessary to provide girls with a facility that can help them with the first line of self-defense as well as help arrest the culprits easily. These three questions have become a fixture on the national agenda, as has the issue of safety, or more precisely, freedom from violence. But women and girls have always thought about safety. How could they not, when the threat of violence is pervasive and shadows them from conception through their lifetimes? Concerns about safety limit women’s mobility and activities and teach them to strategize everything from timings to travel to how to walk to the office or college toilet.

The Indian women’s movement has always raised the issue of violence against women (or more broadly, gender-based violence that is directed at anyone by virtue of their gender) and the violence that follows from structural inequalities like caste, poverty, or identity. There is no city or country in the world where women and girls live free of the fear of violence. No leader can claim: that this is not happening in my backyard. Now we know that girls’ safety is of prior importance in today’s world. There is no such system that can provide safety to girls and therefore the girl cannot move freely. There are different These three questions have become a fixture on the national agenda, as has the issue of safety, or more precisely, freedom from violence. But women and girls have always thought about safety. How could they not, when the threat of violence is pervasive and shadows them

from conception through their lifetimes? Concerns about safety limit women's mobility and activities and teach them to strategize everything from timings to travel to how to walk to the office or college toilet. The Indian women's movement has always raised the issue of violence against women (or more broadly, gender-based violence that is directed at anyone by virtue of their gender) and the violence that follows from structural inequalities like caste, poverty, or identity. There is no city or country in the world where women and girls live free of the fear of violence. No leader can claim: that this is not happening in my backyard. Now we know that girls' safety is of prior importance in today's world. There is no such system that can provide safety to girls and therefore the girl cannot move freely. There are different products for the girls' safety such as shoes, sprays, etc. But these cannot provide safety in adverse conditions. Health tracking is another major issue and there is a number of devices available. This project deals with the development of smart shoes which can be used for safety as well as fitness tracking using IoT.

Problem statement

From the above literature survey, we can conclude that the need for women's safety is a crucial issue in India today. By studying the different solutions developed by different research scholars we can conclude that though a number of solutions have been proposed to handle the major issue of women's safety all the solutions fall short as they require the person to activate the system of danger manually either by clicking or shaking the phone. This is not a practical solution as girls in danger may or may not have time to take out the cell phones from their bags and activate the system. Additionally, all the solutions just focus on sending the GPS location which will take time for help to arrive at a realistic approach is of no use. Fitness tracking and tracking the calories burnt are also difficult to track from the distance we have walked. This project deals with the development of smart shoes using IoT to counter the problems existing above.

Objectives:

The project deals with the concept of smart shoes for safety and monitoring. The main objective of the project is to develop a smart shoe that can assist in emergency-related conditions. The objectives of the project are:

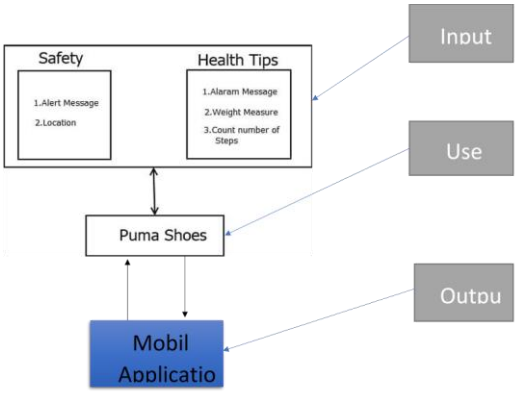
- To develop smart shoes with IoT hardware, which can activate the emergency condition by tapping the sensors inside the shoes in a particular pattern
- To develop a smart knife extruding system from shoes that gets activated when the shoes are tapped in a particular pattern for the first line of defense for immediate backup.
- To develop an emergency trigger system that will fetch the GPS coordinates and send them to the nearest police station and family members using SMS and IOT notification
- To implement an SOS alert and buzzer system that can draw the attention of nearby people using the alert system
- To develop a body parameter monitoring system that monitors the body temperature of the person wearing the shoes and sends an alert notification if the parameters are not normal

- To implement a step counting system that can keep a track of no of steps making it a pedometer
- To develop an android application that can be used to track the location of the person wearing the shoes in emergency conditions as well as keep a track of emergency conditions as well as body temperature
- To keep a track of the persons, walk and give reports regarding daily calories burnt.

Methodology

To complete the entire project successfully the following methodology is adopted. The entire project will be carried out step-wise. The entire project is divided into the following modules which will be achieved step by step.

- To study the currently existing system and understand the pros and cons
- The Smart Shoes Module:
  - To develop a smart shoe with a tap pattern recognition system
  - Programming the ESP32 BLE SOC to recognize the patterns and analyze the dangerous situation.
  - Interfacing GPS and GSM Modem to the smart shoes to send the location details when the person wearing the shoe is in danger
  - To develop a Siren alert system by interfacing high pitch buzzer.
  - Interfacing accelerometer and development of step counting system.
- The Android Application Module:
  - Develop an android application with the ability to establish communication with the shoes IoT Protocols
  - To receive the danger message and the activate the emergency system o Implementation of GPS location tracking system with a live map
  - To establish a communication channel with cloud backend using web services
- Web Services Module:
  - Write Web services that form a medium of data transfer from smart shoes to the Cloud backend.
- To establish a communication channel with cloud backend using web services.
  - Cloud Backend module
  - The cloud server implementation which receives the GPS data of the girl in danger and updates it on the app
  - Conclusion and Documentation.



Shoes module

Result and discussion

A result is the final consequence of a sequence of actions or events expressed qualitatively or quantitatively. Possible results include advantage, disadvantage, gain, injury, loss, value and victory. There may be a range of possible outcomes associated with an event depending on the point of view, historical distance or relevance.

Smart shoes –Safety Shoes which they can always carry with them. Activated by tapping in a particular pressure pattern. Track of the persons current location. Measure the steps. Self-defense mechanism. Assist in danger and emergency situations. Health Care Tips.

Scope of future work:

The global athletic footwear market will exceed 110 billion dollars by 2025. Footwear innovators are turning shoes into carry-on health monitors with additional comfort features. Additionally, the sustainability trend has spread into the shoe industry, enabling new designs to be bought with a better conscience. Smart shoes are a smart footwear technology. It adopts smartphone applications to support tasks that cannot be done with standard footwear. The uses show vibrating of the smartphone to tell users when and where to turn to reach their destination via Google Maps or self-lacing. With the help of a few small devices, these shoes can measure how active you are by monitoring how many steps you've taken, your pace, how many calories you've burned, and more. These shoes can even show you your location with the use of geo-location systems, such as GPS. The shoes have pressure sensors in the soles that sense when to put the foot inside and trigger an algorithm that allows an automatic lacing. With integrated LEDs, the shoes can alert a user of a low battery or a tight fit. Moreover, these shoes do not need charging every day, and the charge can last up to two weeks so easy to use.

Conclusion:

From the proposed project we can conclude that the concept of smart shoes can help in the safety of the girls by providing them the safety tool in the form of shoes which they can always carry with them. The proposed system can be activated by tapping in a particular pressure pattern when in danger and uses IOT and GSM To keep a track of the persons current location over GPS coordinates. Further we can also conclude the designed smart shoes measure the steps and also provides a self-defense mechanism from within the shoes by automatically protruding the knife from the shoes when in danger thus providing a complete safety solution in the form of smart shoes to assist in danger and emergency situations. We can also conclude that the proposed project will keep a track of the fitness of the person wearing the shoes using daily walking count and determining the calories burnt as well as showing daily and weekly reports to the user.