Design Doc Template

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# Introduction

## Summary

Most of the senior citizens deaths are due to negligence of their health and also due to falling down.If we could prevent old people from falling down then we can stop 95% of their deaths. By calculating the gait speed of old person using a wearable device( a SMART BAND) and sensors on different parts of the body enables a safety protection before the elderly fall down.In this way can prevent them from falling down according to a research. There is an immediate need of this technology in today’s life.

Also elderly people ,bedridden people feel difficulty in communicating with their family for the basic needs such as asking for food, water etc., My solution is about developing a gesture based messaging system along with a remainder system that helps to convey message to the caregiver immediately and he would be able to assist the senior citizens within seconds.

## Background

## PROBLEM STATEMENT

Most of the senior citizens feel difficult to communicate with their family for the basic needs and frequently forget their daily medical schedule. Most of the senior citizens deaths are due to falling down.

**1.Fall Prevention**

According to a research, it was found that a gait speed decline of 5 cm/s was associated with a 86.3% probability of falling within the next 3 weeks. So by calculating the speed and number of steps taken by an old person thereby we can prevent him from falling down in near future. Further we would store the walking speed in an SD card and compare the data of 2 weeks. If the difference in the avg. walking speed is greater than 0.5 cm/s then we would report them to take care.

This is just a part of our research through which we can predict.

Also there are some general cases of falling down like slipping in the bathroom, losing balance ,falling down the stairs etc. We also are trying to prevent the elderly in falling down in these cases also .

**2.Gesture based Messaging System**

As soon as the senior citizens or bedridden people make some particular fixed gesture an SMS is sent to the family members.The accelerometer takes the specific gesture readings and message is sent through a GSM module to the family members phones.All this would be integrated into a SMART BAND.

**Other competitors**

Our only competitor is Apple Band.Apple bands give us information only about **Fall detection**.We have the feature of **fall prevention** which gives us an upper hand and this way we are different from it.The unique feature of our band is gesture based messaging system which doesn’t exist in any device.

By designing and developing this prototype we can prevent elderly people from falling down and hence save many lives. Also we can make the lives of bedridden people healthier and simpler.

## Definitions, Acronyms, and Abbreviations

SBSC – Smart Band for Senior Citizens

GSM Module – Global System for Mobile communication

ADXL – A 3 - axis accelerometer

Design Overview

## Requirements

Project requirements, this can include requirements from customers, partners, or overseeing teams. The requirements for the project, this may include subsections for various types or sources of requirements

### Documentation

If the project requires any wiki pages, code comments, presentations, etc. that information should be included here

## Minimum Viable Product

The gesture enabled system should work perfectly.Also fall prediction and prevention should be done to such an extent that all the investors, customers along with myself should be satisfied that this would work for sure.

## Stretch goals

Optimising the cost of the product. Further development of the project in fall prevention category.

## Future work

In the future I would further like to work on fall prevention thereby making it more simplified and preventing the fall in a more efficient way.Further I would work on the project to help the people of different ages along with Senior Citizens making it a universal product.

# Architectural Diagrams

UML diagrams describing the project. You can look for any open source diagramming tool for the same.

# System Diagrams

This section, sometimes referred to as a ‘System Context Diagram’, would typically consist of a UML diagram which illustrates the boundary and interaction with external systems. For a CLI this may show which backend systems provide the data, for services it may indicate dependencies such as databases, Kafka, or downstream services.

# Application Programming Interface

For services, libraries, and command line interfaces that present an interface which can be wrapped

## Recommendations

Using a versioned endpoint simplifies the process of making future backwards incompatible API changes;

/api/v0

# User Interface

For frontends, a mockup canbe attached to illustrate the user interface. Command line interfaces may include a list of subcommands and their options.

# Data Models and Storage

For projects requiring messages queue such as Kafka, MySQL, etc.

Kafka

* How many partitions are needed for this topic?
* How many days of retention will be needed?
* What will the partitioning key become?
* How much data will be written to the topic during peak hours?
* What type of Kafka cluster will be needed? (E.g. aggregate, queuing, tracking, metrics, logging)

MySQL

* What does the table schema look like and how are they all tied together (provide a UML)?
* What sort of updates will be made to the tables?
* How will users make queries to the tables? (e.g. Complex joins, pre-filtering, single record gets)
* What the strategy for indexing?

# Service Operability

## Key Performance Indicators

Key performance indicators (KPI), describe how a service should be monitored and how its performance can be gauged. This would typically include an overview of the types of metrics an application will need to emit, call time, error rate, etc.

## Service Level Objectives

Service level objectives (SLOs), set targets for various KPI through alerts via email or SMS, these targets may provide early indicators of approaching a capacity limit, changes in load patterns through various phases of an application, changes in duration of offline processing, etc.

# Project Overview

## Communication and Tracking

Any relevant distribution lists, slack channels, taiga projects, etc

## Risks

**1**.Gestures not working at the right time.

**2.**Power Source

**3**. In some cases not able to prevent the fall at the right time as the reaction time will be around 0.05 to 0.08 sec.

## Milestones

**10th June**

Completion of working on Fall prevention and making it possible.

**18th June**

Testing the prototype along with developing and making all the required changes.

## Project Phases

**Phase-1:**

Working on fall prediction and prevention.

**Phase 2:**

Testing the prototype.

**Phase 3:**

Using embedded systems making its compact , cost-effective and robust product.

## Cost

Level of effort, number of resources, number of hours or weeks, unlike milestones which tracks project time cost should only include engaged time.

1) For the all tasks which are deliverables/visible on user-end side needs to be documented as stories.

2) Need to guess/estimate the time required in number of hours for the completing that stories which can be captured in taiga.

3) Assign that task to the right person and document the actual time taken for completing that task.

# Frequently Asked Question

**Is Fall Prevention really possible?**

Yes, fall prevention is possible taking the right care and perfect use of technology. Many researches have been done on fall prevention and prediction. With the help of these researches I would want to design a product that could help the elderly from falling and getting injured.

# References

**Fallsloop**

<https://www.fallsloop.com/services/webinars/archived-webinars>

**Predicting and preventing fall using technology**

<https://youtu.be/PVeEJrejOW4>

**Sensoria Smart Socks**

**How IOT can help prevent falls**

<https://www.expresscomputer.in/news/how-iot-can-help-in-preventing-falls-for-senior-citizens/18926/>

# Addendum

