

Project Proposal

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I. INTRODUCTION

Our project is about using IoT to track health indicators of a walker's user along with measuring the usage statistics of the walker itself.

We plan on fitting the following sensors into a walker:

- 1) An accelerometer that will allow tracking of how much the walker is being used.
- 2) A GPS that will allow the municipality to have an overview of the position of each user.
- 3) Pulse sensors on each handle, in order to track the user's heart rate overtime.

These sensors will be connected to an Arduino that transmits the data through LoRaWAN to a Raspberry PI that will be a gateway connected to the server.

II. USE CASE

The people using the walker will be streaming their sensor data to a central server belonging to the Municipality. This data is then used to analyse both the overall use of the walkers, something that interests the manufacturing companies, and the over-time change of the health indicators in order to track long-term progress of the user's well-being.

III. USAGE OF INTERNET OF THINGS

How: We will use sensors to gather data and send it to a remote server.

Why: IoT seems like a good way to gather data from a moving object like a walker. Since the infrastructure for LoRaWAN is considerably developed in Aarhus, we thought it would be a good protocol to use for streaming data from walkers to the central server.

We considered the possibility of getting sensors with built-in LoRaWAN capabilities, but doing so would increase cost of the project, restrict our choice of sensors, and the work to be done by us would be reduced, meaning a smaller "delta" in our project. Thus, we decided on an architecture where individual sensors are connected to an Arduino which has a LoRaWAN tranceiver.

IV. QUESTIONS WE SEEK TO ANSWER

Some of the questions we seek to answer are as follows:

- Can we help make better walkers by analysing how and where they are used?
- Is it possible to have a walker that measures some health parameters of its user?

- Can we track the health progress of a user by analysing the measured health parameters?

It should be noted that we will probably not get to the analysis point because our project intends to be the foundation for a larger scheme with the next steps including the analysis of collected data.

V. THE ENVISIONED ARCHITECTURE

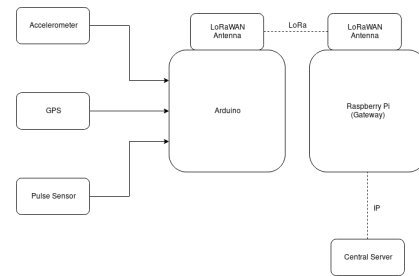


Fig. 1. Schematic representation of the Architecture

VI. WEEKLY MILESTONES

A rough sketch of our weekly plan is as follows:

- 1) Have the Raspberry Pi(Gateway) communicating with server.
- 2) Have Arduino communicating with Raspberry Pi using LoRaWAN.
- 3) Connect Accelerometer to Arduino and get its data on Server.
- 4) Repeat step 4 for GPS and pulse sensor.
- 5) Fit Components on the walker and preliminary tests
- 6) Test the system, collect and plot data.
- 7) Write the report

VII. STRECH GOALS

If we have additional time, we can work on the following goals:

- 1) Measure pressure applied on handles
- 2) Analysis of collected data
- 3) Measure durability/wear and tear
- 4) Measure blood pressure
- 5) Analyse gait
- 6) Include a gsm adapter in the arduino, that way we can have bigger upload speeds, allowing us to have real-time updates which in turn would allow for use-cases of emergency situations and we would also be able to send video.