SMARTPHONE MAGNETOMETER BASED CONTACT TRACING

PROJECT REPORT

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WHY WE USED MAGNETOMETER INSTEAD OF GPS –

-This is where our product differentiates as a better mousetrap

- The Magnetometer in a phone detects the magnetic orientation of the phone in relation to the X, Y and Z axes in relation to the real world north direction.

 - It is more battery-friendly as it uses less power compared to a gps/Bluetooth

 - It protects the privacy of the users as it does not store the location of the person unlike gps

 - It is more accurate than using gps

REQUIREMENT ANALYSIS –

The requirements for this project are,

↑ Any android powered device with an API level greater than 24. This covers nearly 73.7% of all android users.

↑ These devices must have an in built magnetometer present in them.

↑ Magnetometers are supported in android devices with an API level greater than 4.

↑ The app should be able to detect if two users were in contact with each other using magnetic field data.

↑ We must also ensure there is less power consumption and provides security and speed in delivering results.

Dependencies required-

↑ Android API for mobile app development.

↑ For the server we will be using Django webapps to handle requests.

↑ For the database to store field data we will be using postgresql.

DEFINED PROBLEM-

The problem is to create an app which can detect if two mobile phones were near each other at any particular instant, by measuring magnetic field strength near the devices using a magnetometer. If two mobile phones were near each then we can infer that its users in contact with each other.

Functional Diagram-
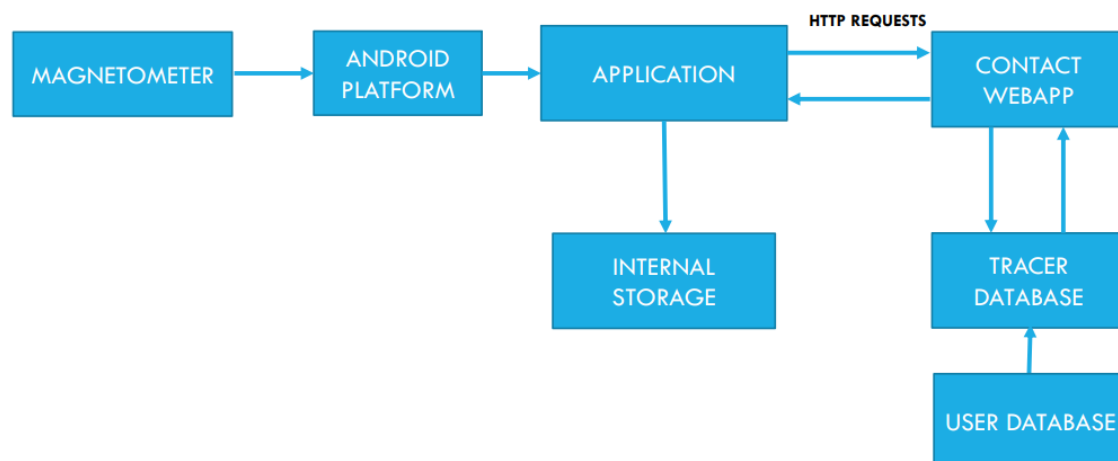
BACKEND- 3 WEBAPPS USED-

❑COMPUTE CONTACT CORRELATION-

-Checks the date/time

-Latitude & Longitude to determine position and check if within range of infected user

❑TRACER-Create sql models that contain magnetic trace of each infected user in multiple positions of each user for the past two weeks

❑USER -Creates user account for the infected users, hence assign user id. This will contain the database of infected.

FRONTEND- APP-

- Keeps recording the magnetic trace of each user for two weeks

- The magnetic trace will automatically get deleted at the end of two weeks

- Checks the location of the user every 30 minutes. This location(latitudes & longitudes) is determined by the cell towers.

ALGORITHM-
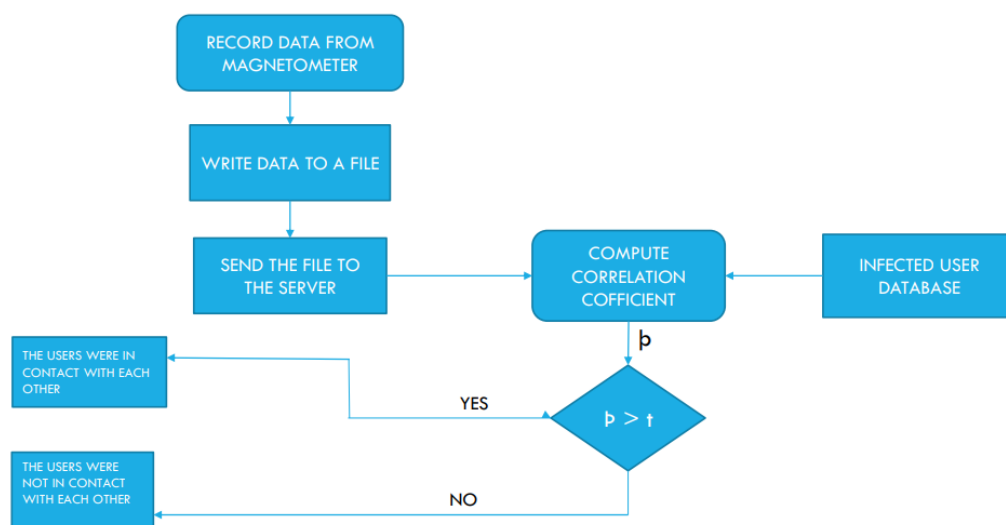
COST BENEFIT ANALYSIS-

There is no development cost for this app since all of it based on an open source platform. The only expenditure which might occur is while setting up the server and its usage. The amount spent on the server varies according to its usage. All other existing contact tracing apps in the market are free of cost.

POTENTIAL REVENUE MODEL-

↑ Convince govt it is a better product than arogyasetu because of the usage of completely different technology and the previously mentioned reasons which might lead to two outcomes

 - Acquisition by the govt

- Funding and exclusivity by govt

↑ Ad revenue

APP LAYOUT-

-Calculates the magnetic field strength with respect to earth's magnetic field and

- Time taken to get the result This is achieved by clicking on the record button, which activates all the above discussed webapps.
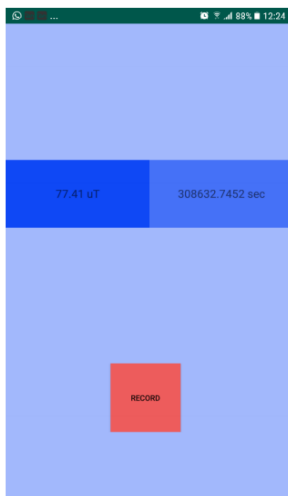
MAGNETIC FIELD STRENGTH AT A DISTANCE GREATER THAN 2 METRES-
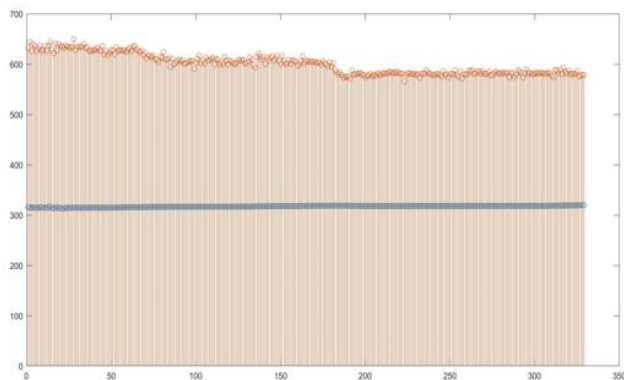
PLOT OF FIELD STRENGTH BETWEEN 2 MOBILE PHONES
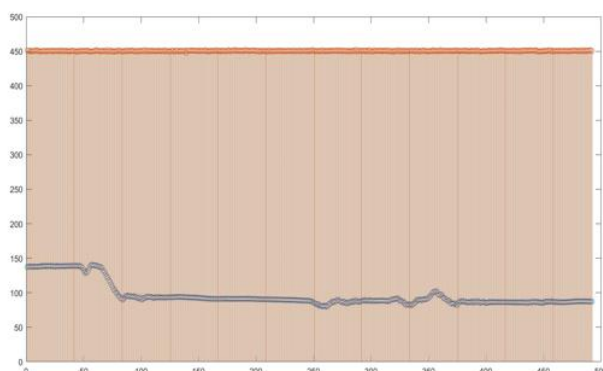
CORRELATION COEFFICIENT

$R =$

1.0000   -0.1280

-0.1280   1.0000

MAGNETIC FIELD STRENGTH AT A DISTANCE LESS THAN 2 METRES-

PLOT OF FIELD STRENGTH BETWEEN 2 MOBILE PHONES

CORRELATION COEFFICIENT

$R =$

$$\begin{matrix} 1.0000 & -0.8625 \\ -0.8625 & 1.0000 \end{matrix}$$

CODE-

❏APP

https://github.com/Epic02/App

❏SERVER

https://github.com/Epic02/Magneto/tree/master/Contacttracing/Contacttracing/apps

DEMO PRESENTATION-

❏ Server Working Video

https://drive.google.com/file/d/1lLz5qS1fhPng4Uw392-cDFFZ701BKLC/view?usp=sharing

❏App Working video

https://drive.google.com/file/d/1mnYrjgFX2LpicdDJAJDGT0-py2zXMvLF/view?usp=sharing

REFERENCES-

https://ieeexplore.ieee.org/document/8626091