A Smart Health Recommender System for Stroke Risk Monitoring and Prevention

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INTRODUCTION

Stroke , wherein the blood flow to the brain is blocked is one of the major causes of death and disability. it is a major strain on healthcare systems and is also very difficult to manage especially for elderly people and those residing in remote areas.
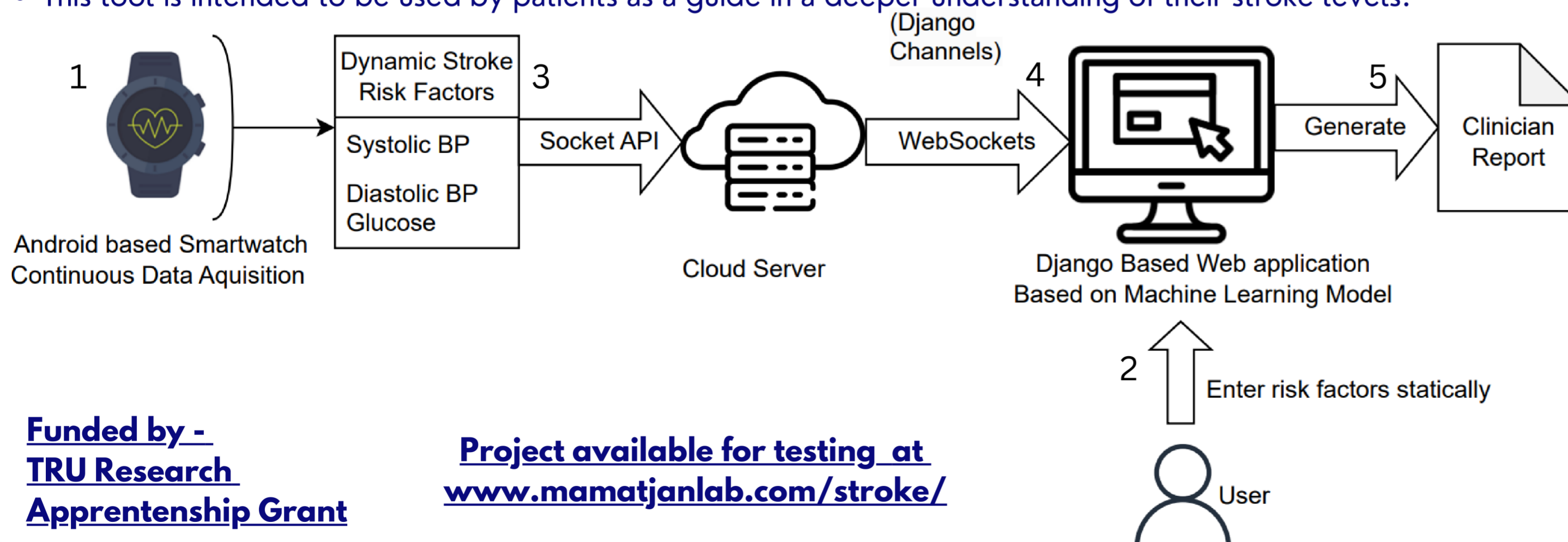
OBJECTIVE

We need a system that can employ AI to predict stroke in patients first hand and also we must extend the capabilities of this system to monitor patient vitals using a smartwatch.

METHODOLOGY

In this project, we were required to evaluate various technologies of web development and employ Django (a web framework that uses MVT architecture), in order to build a usable interface that can be used for clinicians to interact with the models and get results. Furthermore, we also built an automated system for stroke monitoring where the patient's data is continuously evaluated and updated to the system, this will be done using an app development framework on smartwatch operating systems such as android studio , and the use of API technologies to transmit data in-between. lastly, in order to have a robust and scalable operation we needed to have sustainable deployment on a cloud server that can host the system for which we use Heroku.

RESULTS

- Through this project, we created a system that can help patients with Stroke. This system allows patients to register and log into the system and enter their stroke risk factors (2). They are then presented with stroke risk prediction and detailed stroke insights by SHAP analysis (4). The system also generates a patient-specific clinical report detailing the same (5).
- We have also extended the functionalities of this system to include the use of a Smartwatch device that can help the patient to monitor their Systolic and Diastolic Blood pressure which (1) are identified as the dynamic risk factors (factors that change over a period of time) and to transmit this data to the server using API services (3).
- This tool is intended to be used by patients as a guide in a deeper understanding of their stroke levels.

1 Android based Smartwatch Continuous Data Aquisition

Dynamic Stroke Risk Factors 3
Systolic BP
Diastolic BP
Glucose

Socket API

Cloud Server

(Django Channels)
WebSockets

4 Django Based Web application Based on Machine Learning Model

5 Generate   Clinician Report

2 Enter risk factors statically

User

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Project available for testing at
www.mamatjanlab.com/stroke/

CONCLUSION

This system can not only predict stroke risk in patients but also provide detailed explanations about the risk factors that cause stroke in that patient, it then generates a clinical report with this information to essentially guide the patient. The system also can monitor the patient's risk factors using a smartwatch and transmit that data to the web application thus allowing patients to monitor their latest risk factors.

REFERENCES

Dekhil, E. et al. "A Novel Recommender System for Stroke Risk Stratification", Proceedings of the 19th IEEE Conference on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB), CIBCB (2022).