



Development of a PyQt Based Plugin to Quantify System Performance for Explore Desktop

Project Management and Software Development
for Medical Applications

General Info

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Project Abstract

Mentalab Explore(MLX) is a wireless mobile biosignal acquisition system with up to 8 ExG (EEG, EMG, EOG) channels and 9 axis movement data (accelerometer, magnetometer and gyroscope). The hardware can be used with various software frameworks i.e. Python, Matlab etc. to develop applications targeting different application solutions. In this project we aim to carry-out a feasibility study. We will develop an interface to provide real time feedback to the subjects via a Virtual Reality (VR) application.

Background and Motivation

Explore Desktop¹ is the flagship application to visualize, analyze and record bluetooth data streams from MLX. Upon successful connection, the MLX device keeps sending binary streams to the Python client, which is then parsed in human readable format.. The backend used Python and C++ for communication and bluetooth packet parsing. We use PyQt to achieve a cross platform ecosystem. However, there is an increasing demand for a developer version of the desktop software to process, display and improve software integrity². The idea is to continuously monitor the performance of the operating system and Python ecosystem and calculate real-time debug information³. The goal is to allow more insight and transparency to users and developers alike.

Student's Tasks Description

The project would be realized in several steps. The first step would be to talk to

stakeholders(researchers/developers) and verify requirements.

Next, the student would design and develop an independent interface in PyQt to calculate and display the following information:

- Calculate data rate based on incoming bluetooth stream
- Bluetooth connection strength(RSSI)
- Save last N chunks of raw binary streams on demand
- Display number to packets dropped based on theoretical sampling rate of the device

A bonus step would be to integrate the code with current desktop software and CI/CD deployment.

Technical Prerequisites

These skills are recommended for this project.

- Knowledge on parallel programming and threading in Python
- Good understanding of design patterns
- Basic understanding of UI design
- Knowledge of signal processing is a plus

References

[1]<https://wiki.mentalab.com/explore-desktop-guide/>

[2]Chousiadass, D., Menychtas, A., Tsanakas, P., Maglogiannis, I. (2018). Advancing Quantified-Self Applications Utilizing Visual Data Analytics and the Internet of Things. In: Iliadis, L., Maglogiannis, I., Plagianakos, V. (eds) Artificial Intelligence Applications and Innovations. AIAI 2018. IFIP Advances in Information and Communication Technology, vol 520. Springer, Cham.
https://doi.org/10.1007/978-3-319-92016-0_24

[3]<https://doc.qt.io/qtforpython-5/PySide2/QtCore/QThread.html>