

MSc Thesis proposal

Classifying brain activity using low-cost biosensors and automated time tracking

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by having the user install a program on their device which tracks the active application and sends the data to their servers for storage and analysis. The user can then view their data in a dashboard on the service providers website. These services are marketed towards teams and professionals, who generally want to keep track of individual and team productivity.

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II	Problem description, research goals and questions	1	Functional brain imaging methods such as fMRI and fNIRS, have been used to study the relationship between cognitive or physical activity, and brain activity [2][4]. However, the more accurate methods such as fMRI are costly and inflexible. However the recent availability of low-cost biosensors enables studying
III	Methodology	1	
IV	Scientific contributions	1	Imaging techniques hold the promise of relating cognition to physical activities and brain structures. As an example it has been shown that it is possible to classify what task a participant is undertaking using fMRI[2], which has been replicated using EEG and low-cost sensors[3].
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I. BACKGROUND

People spend more time than ever using computing devices[**TODO**]. As services, entertainment, and work, moves online this trend is expected to continue. While several studies have been tracking how people spend their screen time, and how that varies with demographics, is not publicly available [**TODO**].

Furthermore, how different computer activities affects the user behaviorally and neurologically is of interest for many areas of research, including:

- the impact of screen time for adolescents [**TODO**]
- attention span among media multitasking adults [**TODO**]
- depression

There are companies (RescueTime, etc.) who offer automated time tracking as a service. These services generally function

II. PROBLEM DESCRIPTION, RESEARCH GOALS AND QUESTIONS

The problem we seek to investigate is whether EEG and other low-cost biosensors can be used to accurately classify device activity in a broader context than previous studies.

- What about measuring flow?
- What about measuring attention/distractibility?

III. METHODOLOGY

IV. SCIENTIFIC CONTRIBUTIONS

- The open source automated time-tracker ActivityWatch.
- Relationships between device activity and brain activity, as measured by EEG.

V. RESOURCES

- ActivityWatch, an open source automated time tracker (already developed by the author, but never before used in a scientific publication)
- OpenBCI Cyton biosensing board (8 channel) and Ultracortex headset
- HEGduino

VI. REFERENCES

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