

# Coding Rhythms: Physiological Insights Into Software Development

## Running an Empirical Software Engineering Study

Whilst programming, one can either be **in the flow** and everything works smoothly or struggle to concentrate and spend a large amount of time solving error messages. One reason for not being in the flow can be **cognitive overload and stress**. The aim of this master project is to make the flow measurable by examining cognitive load and stress during **software developers' everyday tasks**. Making the flow measurable and finding techniques that promote this state would increase a programmer's **well-being and productivity**.

The programming flow can be measured by recording a person's physiological activity with **body sensors** during a programming task. Reactions of **the eyes, the brain, the skin and the heart** give insights into experienced cognitive load and stress. Making **physiological activity visible in source code** makes it possible to determine problematic sections in the code.

This master project builds up on the previous master project which involved the extension and use of an existing IntelliJ Integrated Development Environment (IDE) plugin, CognitIDE. The primary function of this plugin is to record physiological data and link it to specific code words. The students are expected to further work on extending the capabilities of this plugin. The major part of the project will be to conduct an ethics-board-approved empirical software engineering study with SAP software developers using this tool and analyzing the physiological data.

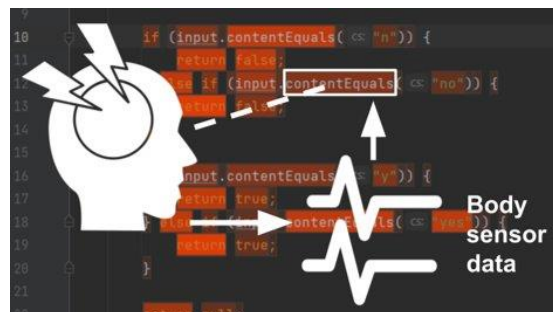


Figure 1: CognitIDE maps physiological values to code positions using eye tracking data

## Your Tasks

### 1. Enhance the CognitIDE Plugin:

- Make minor changes to the plugin to optimize the performance

### 2. Run a Study:

- Evaluate the pre-study of the last master project and make adaptations if necessary
- Conduct a study to test the plugin in scenarios mimicking everyday situations faced by SAP software developers.
- Record physiological data using body sensors and preprocess the data.
- Resulting in: A dataset of physiological data collected during programming tasks.

### 3. Analyze the data:

- Analyze the study data to understand strengths and shortcomings of the implemented plugin. Learn about stress levels, cognitive load, and overall well-being of developers during programming.
- Tasks involve data cleaning, identifying relevant measures and the use of Machine Learning algorithms for data analysis
- Resulting in: Analysis and insights into the use of CognitIDE for empirical software engineering studies and the impact of programming tasks on the physiological and psychological state of developers.

This project offers a unique opportunity to contribute to the **intersection of software development and physiological research**, with a specific focus on improving the work experience of professional software developers.

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