

Development of an Emotionally-aware IDE

Background

Software development is one of the most knowledge-intensive activities performed by humans. Developers require focus and prolonged attention while avoiding stress which can, in the short term, make them slip bugs in the codebase and, in the long term, lead them to burnout. Developers use different tools supporting a variety of tasks and providing technical information, these varies from code editors, to debugger, and version control systems. These tools are nowadays integrated into full-fledged Integrated Development Environments (or IDEs), such as Eclipse or IntelliJ IDEA, or lightweight, plugin-based solutions such as VSCode and Atom. These IDEs, however, do not provide developers with information regarding their emotional states. Being aware of such information can be useful. For example, code written while the developer is in a distracted or raged state may need special attention before being integrated into the system or product. Similarly, a developer working in an apprehensive state for a long time may need to take a break, while a developer in a “flow” state should not be interrupted.

The field of affective computing uses devices that can recognize, interpret, and process human affects combining computer science, psychology, and cognitive sciences. Through affective computing, a machine (e.g., a computer, a robot) can interpret the emotional state of humans and adapt its behavior accordingly. To do so, several physiological signals, acquired from the human body, need to be analyzed. Among those, in this project, the students will work with:

- Blood Volume Pulse (BVP) which measures the flow of blood in the body and its variability.
- Galvanic Skin Response (GSR) which measures the electrical property of the skin, and their variation (e.g., due to sweat).
- Electroencephalography (EEG) which measures the electrical activity of the brain (i.e., voltage change due to current between neurons).
- Saccades which represent the eye movements between different fixation points (e.g., time spent looking at something, “distance” between to fixation points).

These signals combined can be correlated to specific emotions. To acquire, process, and analyze these signals, the students will be given access to devices, such as [Empatica E4 wristband](#) (BVP and GSR), [Epoc+ helmet](#) (for EEG), and [GazePoint](#) (for eyetracking), and their development toolkits.

Objectives

Modern IDEs are “technically” smart (they offer smart features for code completion, debugging, etc) but not “emotionally” smart. This project aims at developing a prototype of an IDE which can leverage developers’ emotions to improve their work. In this project, the students are expected to achieve the following:

- Elicit, analyse, and specify the requirements towards an emotionally-aware IDE together with the customer.
- Design a mock-up for a hypothetical user interface of an emotionally-aware IDE.
- Develop an approach to process data from the devices, analyze it, and use it within the IDE.
- Develop a prototype plugin for an existing IDE (e.g., VSCode).
- Evaluate the resulting approach in collaboration with the customer and, possibly, with participants recruited among university students.

Pre-requisites

- Theoretical and practical experience with software engineering and development practices.
- Interest in the applied side of software engineering as well as human aspects of software development.
- Willingness to learn and became familiar with a new field, such as Affective Computing.
- Knowledge of basic data analysis and visualization techniques.
- Command of English in an academic context.

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