Individual Plan - Degree Project

Reducing Sedentary Behavior for Software Engineers: Identified Performance Issues and Benefits Using a Visual Programming Language Inside Virtual Reality

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PROJECT INFORMATION

Preliminary title
Reducing Sedentary Behavior for Software Engineers: Identified Performance Issues and Benefits Using a Visual Programming Language Inside Virtual Reality

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Keywords
Visual Programming Language, Virtual Reality, Performance, Health.

BACKGROUND AND OBJECTIVE

Profession that is primarily conducted sedentary have increased due to a growth of office related occupation [4]. One such profession is software engineering. A concern with this direction is that sedentary behavior has been found to have a negative effect on health, such as overweight [3], depression [7], and a higher risk of cardiovascular events [6]. It is therefore of interested to reduce sedentary behavior while keeping or increasing the productivity of these professions.

There exist previous studies exploring ways to prevent sedentary behavior during work, such as making the employers more aware of their activity with help of notification from a mobile application [2], introducing standing desks [5], and walking while having meetings [1]. One of these studies found that to make the change be of effects, the intervention needs to not hurt the productivity and be customized for the work context [1]. Similarly, this degree project aims to explore the potential to reduce the sedentary behavior for software engineers. But instead of adding intervention to the work environment, this study explores the potential of conducting software engineering in virtual reality that requires movement, reducing the sedentary behavior form the work itself.

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In terms of reducing sedentary behavior, virtual reality (VR) that uses six degrees of freedom have its benefits that it typical requires move movement compared sittning in front of a computer. A typical VR-application might need the user to walk, look around, and move their arms to grab or push interfacetbales. Of course, the design of a VR-application heavily effects the amount of these movements. Compare this to a mouse and keyboard setup, where the user only needs to do small movements with their fingers and wrist in order to interact with a GUI. TODO: Give references of positive health effects.

One potential issue with conducting software engineering inside VR is the performance. Software engineering as an occupation often require programming, which is typically done with help of a keyboard. A number of studies have found that typing with VR controllers is slower compared to using a qwerty keyboard [TODO: Cite a number of studies]. Therefore, to generate code by typing inside VR might prevent sedentary behavior, but will also reduce the productivity.

One approach that do not require a keyboard by generate code with a visual programming language. That is, you need to move elements around in the program in order to create a desired outcome. There are mainly two ways to implement VPL. One is a block-based approach which is like putting lego together, which is forcing a specific layout of the code blocks [7]. The other is a flow-based approach which is more like putting cables together, and is instead more free regarding placement of the code [7]. VPLs have previously been implemented in VR. For example, FlowMatic [6] is a flow-based environment for creating VR applications, while Cubely [8] makes use of blocks for teaching programming. HackVR [9] combines the flow-based approach with the object oriented paradigm, which they argue has a natural translation to VR applications. However, none of these studies have focused on the health aspect of VPL in VR.

Talk about the potential and goal of this research

The background knowledge required to carry out the project.

RESEARCH QUESTION AND METHOD

Question
State the question that will be examined. Formulate is as an explicit and evaluable question. State your hypothesis.

Objectives
Objectives: Break down the research questions to measurable objectives.

Tasks
Describe the tasks that are necessary to reach the objectives. For each task, describe the challenges it involves.

Method
Describe the method/s that will be followed. Explain why they are appropriate for the project or for the specific tasks.

Ethics and Sustainability
Does the project address questions of ethics or sustainability? Does the project raise ethical or sustainability questions? If yes, how could these be handled?

Limitations
Define the limitations on what is to be done (so that it is clear what is not included in the degree project).

Risks
Explain what can go wrong and delay or make the project impossible to conclude. Explain how you will deal with these problems.

EVALUATION AND NEWS VALUE
Evaluation: How is it determined if the objectives of the degree project have been fulfilled and if the research question has been adequately answered? What kind of qualitative or quantitative measures can be defined and evaluated?

Expected scientific results: How is the work scientifically relevant?

The work's innovation/news value. Why does someone want to read the finished work? And who are these people?

PRE-STUDY
Description of the literature studies. What areas will the literature study focus on? How shall the necessary knowledge on background and state-of-the-art be obtained? What preliminarily important references have been identified?

CONDITIONS AND SCHEDULE
List of the resources are needed to solve the problem. This can be technical equipment, software, or data, but also experiment and interview subjects.

Describe the way the external supervisor will be involved in the project.

Provide a project timeline, specifying the main tasks and the time allocated for them, milestones (time of achievement of intermediate goals)

REFERENCES

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