A Simulation Platform to Study Interaction Temporality

Duration : 6 mois
Team : Mjolnir (Inria Lille – Nord Europe & CRIStAL)
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The project consists in designing and implementing a testbed to simulate typical graphical user interfaces (desktop, mobile, etc.) with minimal latency, to allow researchers fine control over different visual and temporal aspects of an interface's behavior.

Description

The goal is to produce a test platform that can be used for prototyping and in controlled experiments, for various research projects about the temporality of human-computer interactions (HCI). For instance:

- evaluate the effects of various sources and amplitudes of input lag on performance and usability,
- simulate visual updates right before the user clicks, that can generate selection or activation errors (Fig. 1),
- run realistic controlled experiments on web browsers.
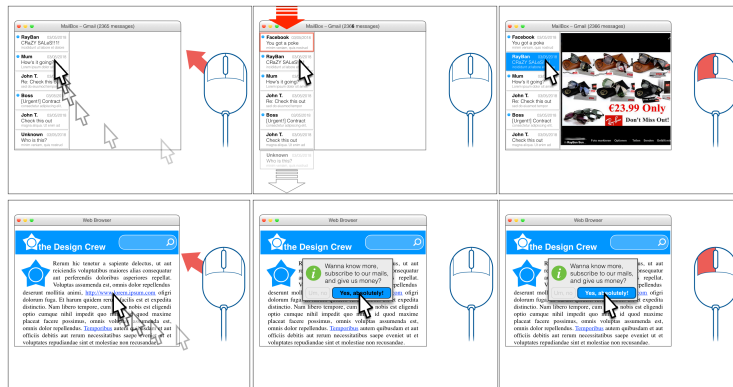
The platform has to be usable and realistic, and to allow researchers to script all aspects of its visual updates: additional delays, making windows / widgets / notifications appear and disappear, simulating global slowdowns, etc. It should also be able to log every interface and display events without increasing interactive delays, and to restore previous states of the simulated interface or system.

Ideally, the platform should be available on different devices and environments, with a central OpenGL module that can extend on e.g. desktop applications, mobile apps, or as a web application (WebGL) to run large-scale controlled experiments with numerous participants.

Research & Novelty

Such high flexibility and fine control over input and display events will require careful and in-depth design, as well as new models of input/output event management compared to today's interface design patterns.

The student will also have the opportunity to apply state-of-the-art HCI methods of real-time latency measurement[1]. If the project makes quick progress, the student will be involved in the research work for which this platform is needed, in e.g. the design of controlled experiments to evaluate the effects of different temporality issues in user interfaces, and/or in new interaction techniques to detect or mitigate those effects.

Candidat(e)

The candidate must demonstrate an interest in HCI, and OpenGL skills; knowledge in WebGL is a bonus. He/she should demonstrate technical and conceptual creativity.

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[1] http://mjolnir.lille.inria.fr/turbotouch/lagmeter/