Tangible Web: Supporting Mobile and Cross-Device Interactions

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1 INTRODUCTION

Modern sensor-equipped mobile devices, personal computers, and other off-the-shelf sensing and computing platforms are sufficiently advanced to support cross-device and tangible interactions with digital media. However, building such interactive experiences is hindered by the complexity of setting up and managing the underlying communication and limited tools to explore the opportunities and challenges of these new modes of interaction. In this workshop, we present the Responsive Ecologies Toolkit (REtk), a cross-platform development environment that provides tools to ease the prototyping of cross-device and tangible applications. Participants will be introduced to key concepts in cross-device and tangible interactions in the first sessions. Participants will then learn the workflow and features supported by REtk. In the second session, participants will design and develop cross-device and tangible experiences of increasing complexity, using devices at hand, within the REtk environment. We expect participants to explore and understand different modalities of interaction within cross-device environments.

2 RESPONSIVE ECOLOGIES TOOLKIT

REtk provides a conceptual framework that allows the web developers to design responsive ecologies as hierarchical nested structures. Every object, screen, sensor in an interaction space is mapped within a hierarchical structure. This forms the basis for generating the web applications and managing the communication between different sensors and devices. This hierarchical tree encapsulates relationships between various entities and determines how they interact: (a) direct interaction and communication occurs between a child node and its parent node, (b) interaction between sibling nodes is mediated by their parent node, and (c) the tree structure is also used to determine the communication path between two (directly unrelated) nodes. In addition, the nested structure simplifies the modification of specific hardware and software

components of an application by targeting the changes to specific sub-nodes with minimal impact to the rest of the device ecology. Based on the hierarchical nested conceptual structure, REtk provides a visual authoring environment and runtime environment to assist the prototyping of responsive ecologies of devices.

3   WORKSHOP PROPOSAL

3.1   Duration

This will be a full day workshop with virtual attendance.

3.2   Details

In this workshop, we will focus on the design and development of cross-device tangible interactions using web technologies by researchers and designers with different levels of web development programming expertise. In this workshop, we will introduce the workflow and features of REtk to support (a) novices by providing a visual authoring environment with workflow-based programming, and (b) experienced developers, by providing in-line coding and debugging tools as well as toolkit extensibility features.

In the first part of the workshop, we will introduce key concepts in cross-device interactions and tangible interactions within responsive ecologies. We will then introduce REtk and the underlying framework concepts i.e. the hierarchical nested structure of a device ecology, high level conceptual design of interactions, and the tool workflow. In addition, we will go through the key features of the toolkit and how the runtime environment works.

In the second part of the workshop, the participants will get an opportunity to familiarize with the toolkit by going through simple programming exercises that can be run remotely via web hosted services. Once familiar with REtk, the participants will advance to building custom interaction experiences based on the devices at hand. We will wrap the workshop up with a discussion of the advantages and challenges of REtk.

4   ORGANIZERS

Aneesh P. Tarun is a Postdoctoral Fellow at the Synaesthetic Media Lab, Ryerson University. His research interests include developing toolkits for cross-device interactions and designing spatial and embodied interactions for novel technologies. As a part of his doctoral research, Aneesh designed and developed prototypes using multiple flexible displays that mimics handling of physical paper while supporting cross-device interactions.

Victor Alexandru received his Bachelor of Biomedical Engineering from Ryerson University. Victor is currently working on the designing and building prototyping tools for cross-device interactions. His interests include machine learning, bioinformatics, and MCUs. He hopes to make the world a better place by working towards making healthcare cheaper and more accessible.

Sarthak Marwaha recently graduated from the Master of Digital Media program at Ryerson University. Sarthak is currently working on designing tangible tools to support programming for New Media artists. He has previously worked in various creative and design fields like Interaction Design and Media Production. His research interests include human-computer interaction and user experience research as well as making design easy and accessible.

Ali Mazalek is director of the Synaesthetic Media Lab, a playground where physical materials, analog sensors, and digital media happily co-exist and come together in novel ways to support creativity and expression across both science and art disciplines. As a digital media and human-computer interaction researcher, she has spent nearly 20 years trying to get digital technologies to fit better into her physical world and life, rather than letting them drag her into the pixelated depths of her computer screens. At the same time, she has a deep interest in how computational media can support and enhance creative practices and processes, supporting new forms of expression and new ways of thinking and learning.