

HelloHapticWorld: A Haptic Educational Robot Kit for Children

Proposal

User interactions with the recent smartphones and tablets are visually rich but poor in the sense of touch and thus is not fully immersive. We propose the **HelloHapticWorld**: a haptics educational kit which uses the variable friction of the TPad to virtually simulate the haptic sensation of tele-operated robot onto the fingertips of the user. The kit contains a mobile robot controlled by TPad and a modifiable field consisting of obstacles and road slopes of different sizes and shapes. This kit contributes in educating kids about haptic experiences by creating and exploring a DIY haptic world.

Salient Features of HelloHapticWorld

- The forward and sideways swipe gestures in the TPad screen with variable friction feedback are used for robot control in forward and angular trajectories respectively.
- Distance mapping of the obstacles and subsequent variable friction based haptic feedback.
- Haptic reconstruction of road slope in TPad screen using variable friction display.

Fig.1: Wireframe sketch of the control screen

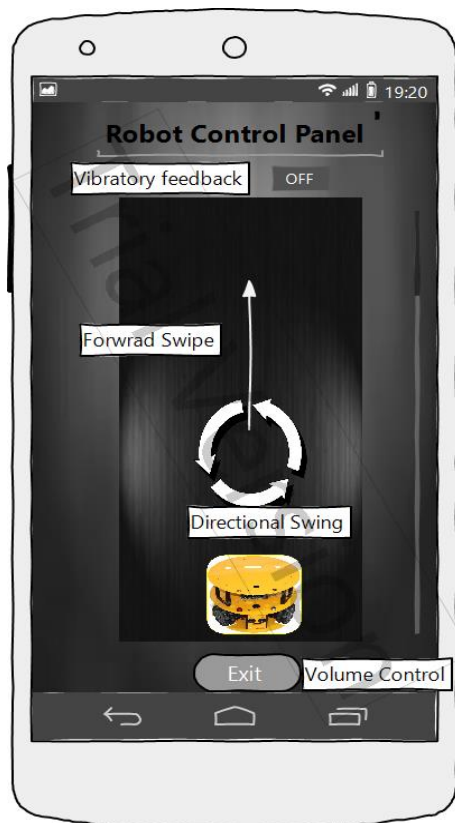
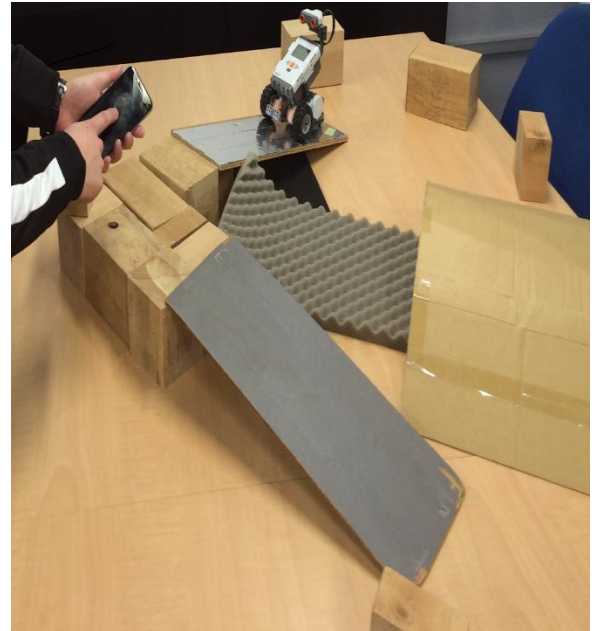


Fig.2: Conceptual robot field



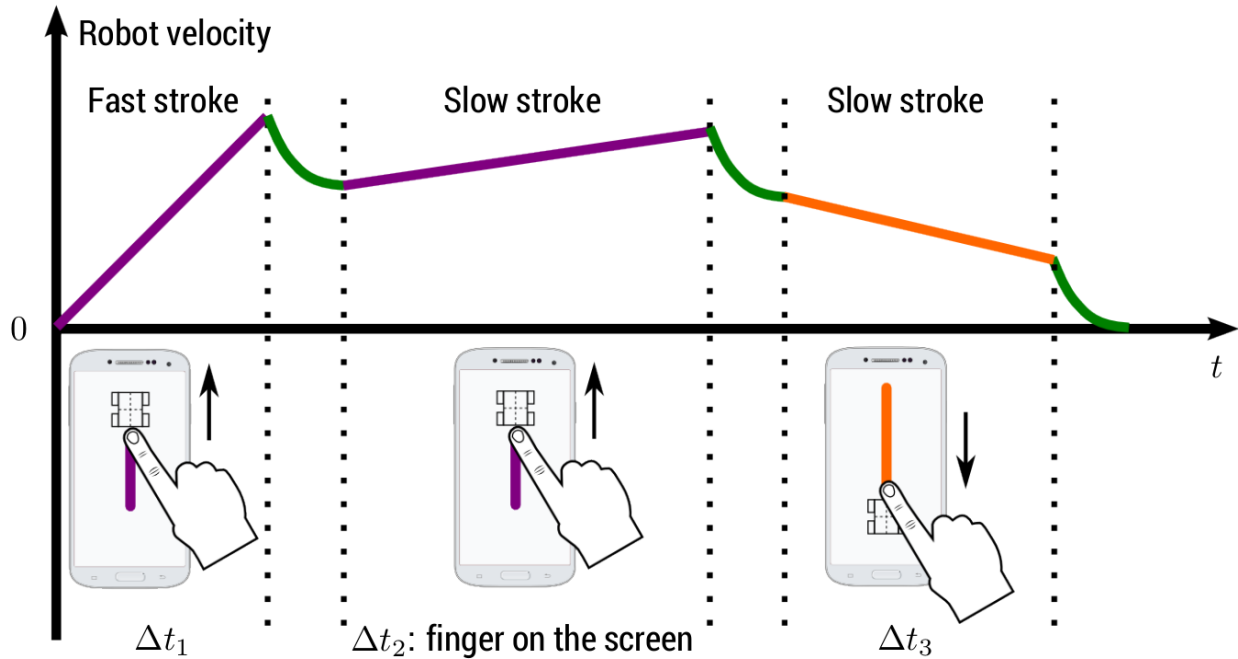


Fig.3: Gesture to robot motion profile during swipe motion

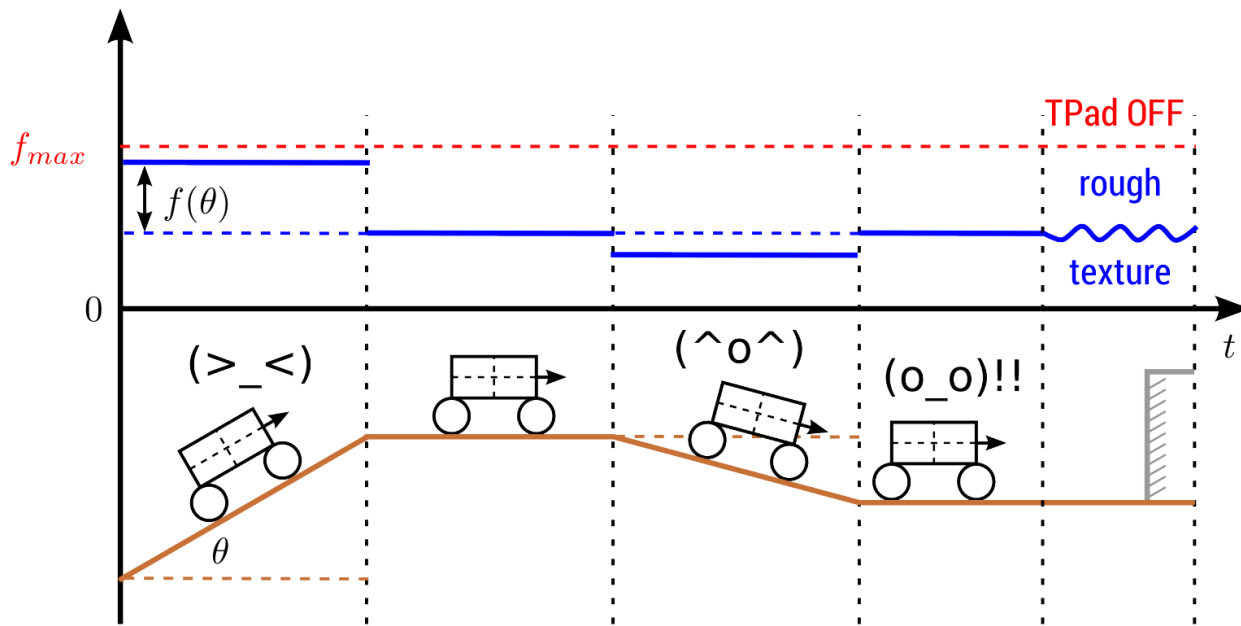


Fig.4: Conceptual robot motion profile and corresponding tactile feedback

Members of the HelloHapticWorld Team

Dennis Babu- a doctoral student of Human Robot informatics lab (Konyo Lab),Haptics Group, Tohoku University. I have working command over C++,basic

java and Embedded C and can contribute to HelloHapticWorld kit in Android application development and embedded programming.

Demonstrations and research papers.

1. Demonstration of Smart card operated energy meter for household applications during the tenure in

CMERI-CSIR, India [2013-2014].
<https://www.youtube.com/watch?v=q-DORAZJzHA>
2.I Banerjee, D Babu, S. Bhattacharjee, J Roychowdhury. Vegetable Grading Using Tactile Sensing and Machine Learning. Advanced Computing, Networking and Informatics- Volume 1. Smart Innovation, Systems and Technologies Volume 27, 2014, pp 77-85.

Daniel Gongora - I am currently undertaking my first haptics research project using vibrotactile stimuli and most of my previous projects dealt primarily with signal processing. As for the present proposal, I will collaborate specially on the mapping of the robot sensors data to friction values the user can discriminate but I am also looking forward to explore the expressiveness power of textures as means of conveying robot's emotions.

Shunya Sakata- A master student of Human Robot informatics lab (Konyo Lab), Haptics Group, Tohoku University. My research is to develop tactile display using vibrotactile stimuli for conveying realistic

hitting sensation. I study how to produce vibration since it is required to design appropriate stimuli for achieving this objective. I have skills for designing objects and 3D printing. So I can contribute to the team in terms of producing vibration for friction, designing of obstacles and 3D printing.

Seonghwan Kim- A master student of Human Robot informatics lab (Konyo Lab), Haptics Group, Tohoku University. My research theme is to assist performances of gesture interface by use of tactile feedbacks. I have produced haptic application with good operability using various vibrotactile stimuli to the wrist and have submitted to AsiaHaptics2014.(Seonghwan Kim, Masashi Konyo and Satoshi Tadokoro, "Haptic Assistance of Spatial Pointing with Simple Vibrotactile Feedback for Gesture Interfaces", AsiaHaptics2014).With my experiences of making haptic applications ,I hope to contribute in the application development and implementation.

Advisors

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