ARCord: Visually Augmented Interactive Cords for Mobile Interaction

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Introduction

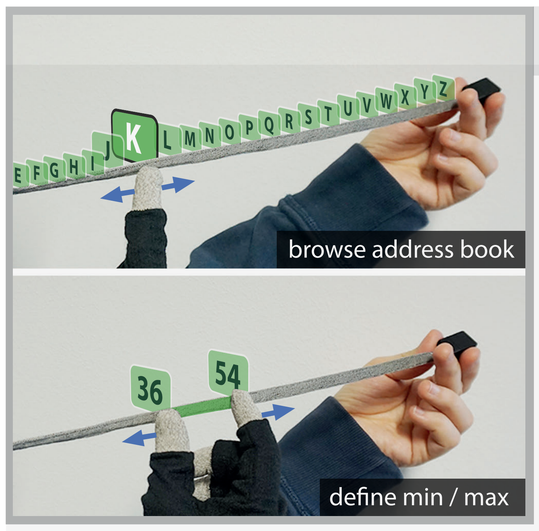
We want to extend the interaction and application repertoire of body-worn cords by contributing the concept of visually augmented interactive cords using state-of-the-art Augmented Reality (AR) glasses. This novel combination of simultaneous input and output on a cord has the potential to create rich AR user interfaces that seamlessly support direct interaction and reduce cognitive burden by providing visual and tactile feedback.

We present:

- **The concept of visually augmented interactive cords**
- **An interaction repertoire of cord-based interaction techniques**
- **A set of touch-enabled cord sensors**
- **An initial prototype with AR overlays**

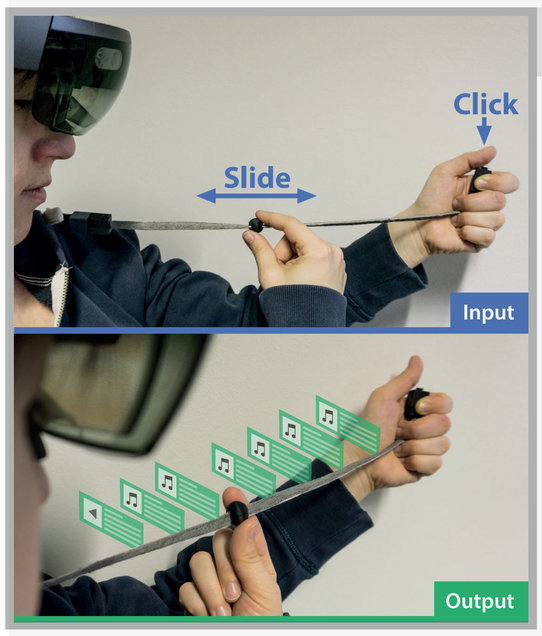
Interactive Visual Cord Controls

A set of cord-based interaction techniques allows for item and value selection, menu navigation, adjustment of continuous values and ranges, or raycasting selection of distant objects.



Single Value & Range Selection

- The linear degree of freedom nicely maps to adjusting values and ranges.
- The user directly selects items by touching the cord or moving the cord toggle.
- To finish input and confirm an action a tactile button at the cord's end can be pressed.



Menu Navigation

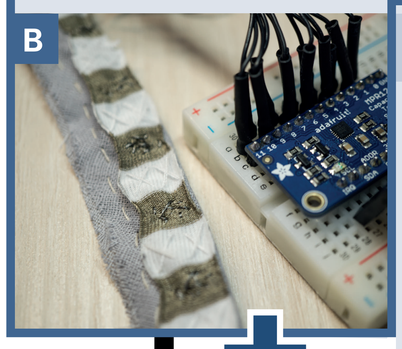
- Directly coupled input and output allow to build complex and dynamic menus.
- Due to the visual feedback, there is no need to learn predefined interaction schemes or mappings.
- The physical cord acts as a wearable dock with dynamically attached menu icons to access mobile apps and services.

Raycasting Selection & Clipboard

- Visually augmented ray casting method to select distant objects.
- Allows more peripheral pointing without the need of moving the head.
- Selected objects appear as small proxy elements at the cord.
- Enables multi-stage selection:
  1.) group selection
  2.) refinement on the cord

Current Prototypes

In order to evaluate our concepts, we fabricated three touch-enabled cord sensors to lay a solid basis for our novel visually augmented cord approach. In addition, we started to implement a basic AR menu on the HoloLens.



Cord Position Sensors

- Our first sensor uses a soft membrane potentiometer **(A)**. Our second sensor integrates capacitive fabric pads **(B)**.
- Our most promising cord sensor uses a moveable slider on a resistive cord **(C)**.

Cord Confirmation Button

- We realize a tactile button in a typical size of a cord lock at the end of the string enabling explicit actions.
- The button provides haptic qualities and can be used to trigger selections.

Augmented Reality Glasses

- We use the Microsoft HoloLens as state-of-the-art AR glasses.
- For future work, we plan to realize a cord tracking and to implement real-world applications (e.g., smart city guide).

Input
Output

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