Demonstration of GestuRING, a Web Tool for Ring Gesture Input

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ABSTRACT
We present use cases for GestuRING, our web-based tool providing access to 579 gesture-to-function mappings, companion YouTube videos, and numerical gesture recordings for input with smart rings. We illustrate how practitioners can employ GestuRING for the design of gesture sets for ring-based UIs by discussing two examples: (1) enhancing a smart ring application for users with motor impairments with new functions and corresponding gesture commands, and (2) identifying a gesture set for cross-device watch-ring input.

CCS CONCEPTS
• Human-centered computing → Gestural input: Ubiquitous and mobile devices.

KEYWORDS
Smart rings, gesture input, GestuRING, web tool, applications.

1 INTRODUCTION
Smart rings are versatile wearable devices that implement a diversity of gesture-based interactions, including touch [2], mid-air [7], grasping [12], bimanual [5], and body-referenced input [6]. Designing gesture sets for smart ring UIs may involve experts [1, 3] or participatory approaches where end users are elicited for their preferences for intuitive ring gestures to effect system functions [4]. Our tool, GestuRING [11], available at http://www.eed.usv.ro/~vatavu/projects/GestuRING, provides resources to inform the design of ring gestures by featuring 579 gesture-to-function mappings and a companion YouTube video library. In this paper, we illustrate how practitioners can employ GestuRING for various goals. To this end, we adopt the UX approach of employing user personas and user scenarios1 to showcase practical uses of GestuRING.

1https://www.interaction-design.org/literature/topics/user-scenarios. In our user scenarios, users are the practitioners employing GestuRING.

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12 USER SCENARIO #1: SMART RING APP FOR PEOPLE WITH MOTOR IMPAIRMENTS
Most smart ring products feature NFC functionality that enables mobile users to authenticate, access premises, and make payments fast and effortlessly.2 Such features are convenient for people with motor impairments, since they enable simple interactions compared to other types of public display UIs with heterogeneous levels of accessibility [10]. Moreover, the global market for Bluetooth and NFC smart rings is projected to reach US$12.6 million by 2027, according to a September 2020 Global Industry Analysis report.3

In this context, we consider the following scenario. A company that develops and sells NFC rings designed for users with motor impairments wishes to incorporate extended functionality into their products; see Figure 1, left for the persona—Richard, the lead UX designer of the product—and the corresponding user scenario. Richard employs GestuRING to identify ring gestures to enable the extended functionality desired for the company’s products from close up NFC interactions to remote control of home appliances (Figure 1, right). He uses the keyword “appliance” in GestuRING and identifies three gestures: move the ring close to an appliance [13] and point upwards/downwards the wearing finger to specify the next and previous appliance from a list [8]. Richard continues his search with the keyword “TV” and finds seventeen results representing touch, free-hand, and mid-air interactions. Based on this information, Richard sets a meeting with the engineering team to discuss possible sensing solutions to implement those gestures.

3 USER SCENARIO #2: CROSS-DEVICE WATCH-RING USER INTERFACE
As smartwatches become mainstream,4 users rely on their functionality for health and fitness tracking, digital wallets, and replacement for smartphones. At the same time, the number of connected wearables overall is expected to reach 1 billion devices in 2022.5 In this context, cross-wearable input becomes an interesting option.

Imagine the scenario where a company that specializes in smart-watch software wants to expand their existing line of products with a combined watch-ring application; see Figure 2, left for an illustration of the persona—Sophia, the lead software engineer of the new application—and the corresponding user scenario. Sophia employs GestuRING to discover smart ring gestures that are also

2For example, the NFC Ring (https://nfcring.com) can be used to make payments, access control, unlock & control mobile devices, and transfer information among other features, and the Xeno S-Ring (https://www.xenomapro) enables gesture-based control of a music player, Bluetooth calls, data storage, NFC payments, and others.


5https://www.statista.com/statistics/487291
suitable for a watch or that work in conjunction with a watch. She uses the keyword “watch” in GestuRING and identifies a number of sixteen gestures featuring touch, free hand, and mid-air interactions, such as pointing with the index finger to control a cursor on the watch [9] or moving the finger clockwise to scroll content [7]. In a matter of minutes, Sophia manages to overview a diversity of information, watch videos of gestures, and select papers to read in detail. That afternoon, Sophia presents her team a preliminary set of gestures for their first prototype of a cross-device watch-ring UI.

4 CONCLUSION

We described two use case scenarios of our GestuRING tool for ring gesture input, which complement its technical description from [11]. Our tool is freely available on the web to assist researchers and practitioners to easily locate and access information from academic publications to inform designs of ring gesture user interfaces.

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REFERENCES


Figure 1: User scenario #1: extending the functionality of a NFC smart ring with new gestures to enable remote control of home appliances. On the right, a wheelchair user touches the display of a smart washing machine with their NFC ring.

Figure 2: User scenario #2: extending the functionality of a smartwatch application with ring gestures for menu navigation. On the right, a user wearing a smartwatch and a smart ring, respectively, for cross-device watch-ring input.