Title: Discrete Finger Pose Estimation for On-body Touch Interaction Through a Wearable Depth Sensor

Mobile computers (such as smartwatch, mixed reality head mounted display etc.) provide ubiquitous access to information in our everyday life. These devices have changed the way we were used to work and interact in a standard desktop environment. However, there are a lot of challenges when we try to interact with these devices. For example, smartphone and smartwatch suffer from small display size, Microsoft Hololens / HTC VIVE headset lacks tactile feedback and so on.

In the past, researchers proposed on-body interaction to address some of these challenges. In OmniTouch [1], Harrison, C. et al. used a wearable depth-sensing camera and a projection system to enable interactive multitouch applications on everyday surfaces (see Fig.1). Similarly, Sridhar, S et al. [2] developed WatchSense which increases the expressiveness of input by interweaving mid-air and multitouch for several interactive applications (see Fig.2).

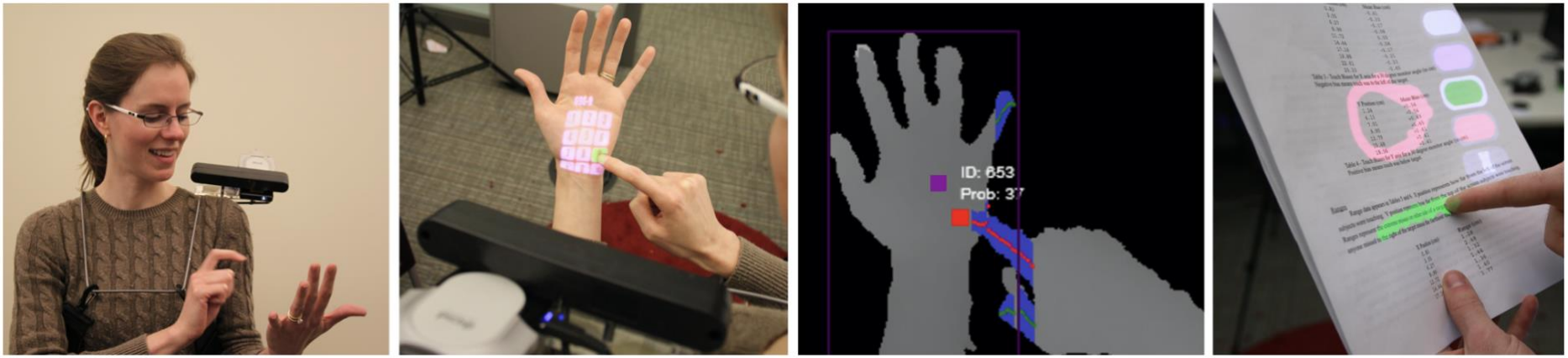

Figure 1. OmniTouch is a wearable depth-sensing and projection system that allows everyday surfaces - including a wearer's own body - to be appropriated for graphical multitouch interaction [1].

Figure 2. (a) WatchSense enables on- and above-skin input on the back of the hand (BOH) through a wrist-worn depth sensor. (b) Our prototype mimics a smartwatch setup by attaching a small depth camera to the forearm. (c) It tracks the 3D position of fingertips, their identities, and touch on the BOH in real-time on consumer mobile devices. This enables a combination of mid-air and multitouch input for interactive applications on the move [2].

Figure 3. Discrete finger poses for on-body interaction – (a) normal finger tap (b) tap with 90^0 finger rotation (c) tap with 180^0 finger rotation.

In this project proposal, we want to increase the richness of touch input on the forearm by estimating the finger pose discretely as shown in the Fig.3. We will use Kinect depth camera as a hardware and using computer vision technique we will try to detect three different finger poses.

References:

[1] Harrison, C., Benko, H., & Wilson, A. D. (2011, October). OmniTouch: wearable multitouch interaction everywhere. In Proceedings of the 24th annual ACM symposium on User interface software and technology (pp. 441-450). ACM.

[2] Sridhar, S., Markussen, A., Oulasvirta, A., Theobalt, C., & Boring, S. (2017, May). WatchSense: On-and above-skin input sensing through a wearable depth sensor. In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (pp. 3891-3902). ACM.