**Project: Acoustic Signaling Based Touchscreen Design and Implementation**

**Sponsor:**

* Faculty Sponsor: Aimin Tang, Xudong Wang, UM-SJTU Joint Institute
* Faculty Mentor: Aimin Tang, Xudong Wang, UM-SJTU Joint Institute

**Background:**

With the omnipresence of demand for touchscreen input, interests in transforming electronic displays into touchscreens have grown. However, the cost of a touchscreen is much more expensive than an ordinary display. Thus, in many low-resolution requirement applications, e.g., the display for guideline which just needs to distinguish clicks at different place or some slide behaviors, it is desired to provide a low-cost solution. Moreover, for some legacy displays, it is also desired to provide some low cost solutions to update it to have a touchscreen-like function.

To this end, a few technologies like Infrared Touch and Surface Acoustic Wave Touch have been introduced. However, these solutions still suffer quite expensive cost of extra hardware. Moreover, these hardware usually occupies a large space that is not flexible to deploy.

In this project, we are aim to leverage acoustic signals that are generate by the commonly used microphones and speakers to achieve the above goal. Since the speaker is very small and cheap, the acoustic signaling based touchscreen design can provide a low-cost and easy-deployment solution with small extra hardware.

**Purpose:**

This project aims to transforming electronic displays into touchscreens by leveraging acoustic signals. More specifically, by analyzing the acoustic signals reflected by finger on the display with some algorithms in digital signal processing, the behaviors of click, slide, etc. can be recognized.

**Expected Deliverables**:

* Hardware device that consist of low cost microphones and speakers.
* Implement the corresponding algorithms to perform localization and tracking based on reflection of acoustic signals.
* Transform recognized user behavior into touchscreen input.

**Team:** Students with the following skills are encouraged to apply:

* Basic understanding of digital signal processing.
* Familiar with embedded system like FPGA.
* Master C/C++/Matlab programming.

**Benefit to Students**

* Get In-depth knowledge on digital communication, digital signal processing, embedded system development, etc.
* Get more knowledge towards JI Faculty’s research interests.

**Team:** Suggested team members: 5 students (ME or ECE)