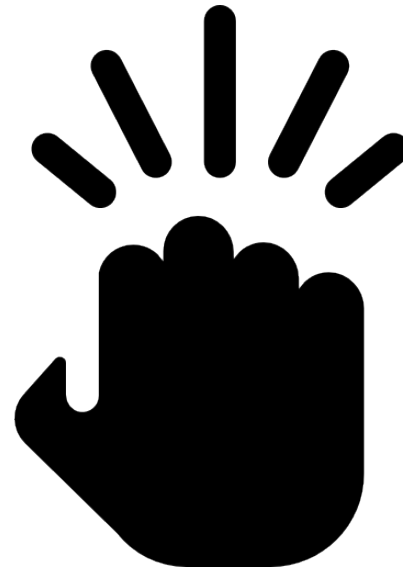

SurfacePad

Gesture Recognition on Ubiquitous Surfaces
with a Single Mobile Device

20212927 Jeongwoo Kim

■ Goal

- SurfacePad
 - Gesture Recognition on Ubiquitous Surfaces with a Single Mobile Device



■ Motivation

- There are situations where it is difficult to **touch** the screen
- To operate a smartphone **without** touching the screen, a new App is required

Examples of situation



■ Related Works

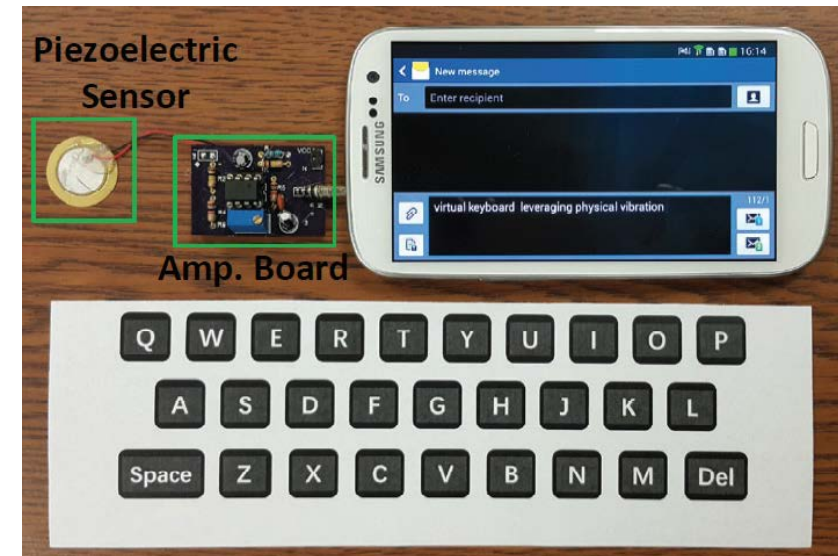
■ ViType

- Body vibration
- Piezoelectric vibration sensor



■ VibKeyboard

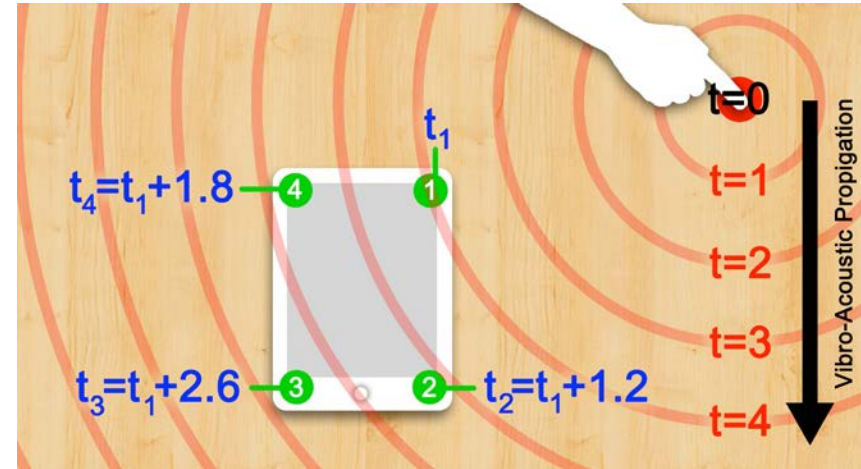
- Easily connected to mobile device
- Piezoelectric vibration sensor & Amp



■ Related Works

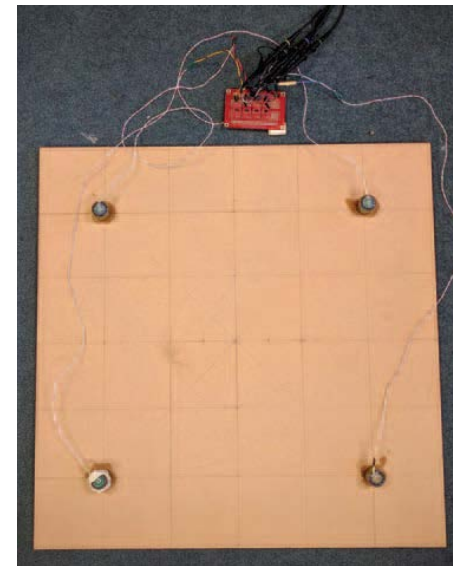
■ Toffee

- 4 vibro-acoustic sensor
- Time Difference of Arrival(TDoA)



■ SurfaceVibe

- 4 vibration sensors
- Time Difference of Arrival
- Tap & Swipe Tracking



■ Related Works

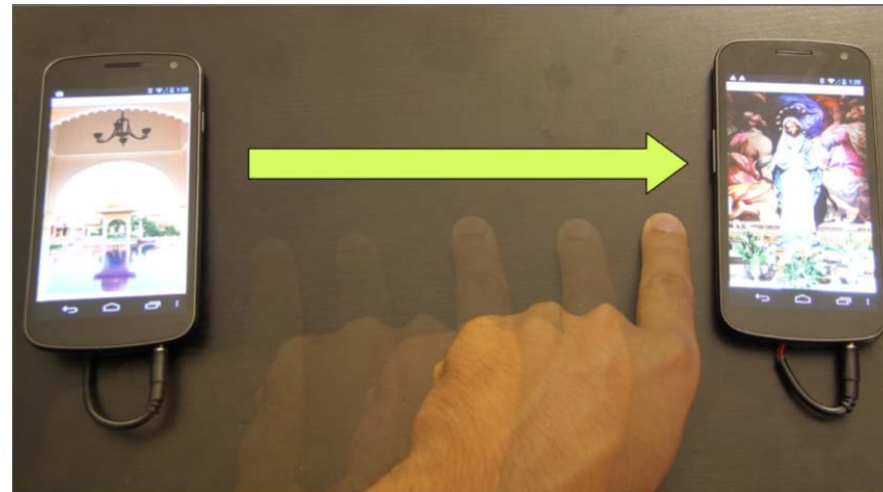
■ UbiTap

- Smartphone MIC
- Acoustic dispersion



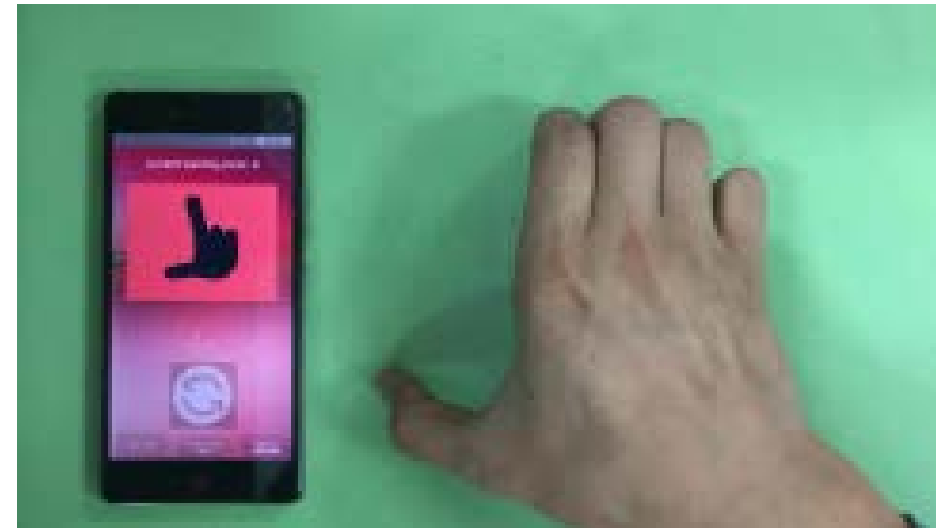
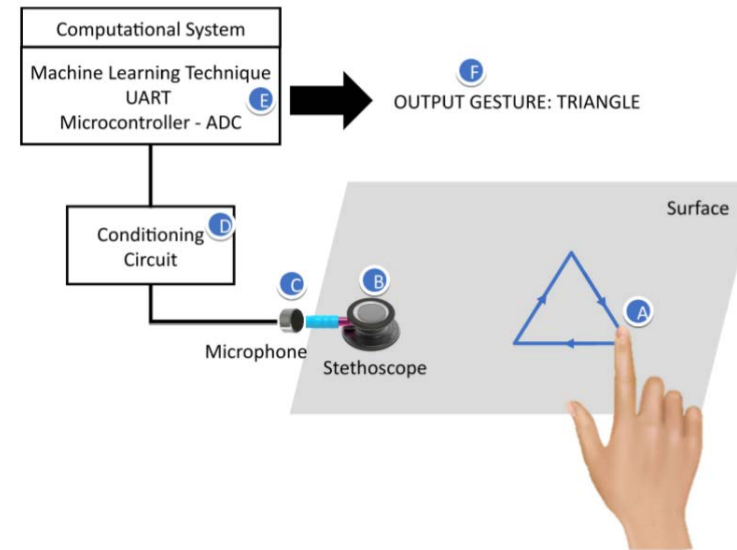
■ SurfaceLink

- Inertial & Acoustic sensing
- Gesture class, length, shape, mode



■ Related Works

- Acoustic Sensing based on a HMM
 - Hidden Markov Model
 - Single MIC
- HCI on the Table
 - SVM using Acoustic signal
 - STE, ZCR, MFCC, CFCC



■ Cross-domain Impact

- **Drawing Tablet:** A drawing tablet helps people for comfortable drawing, but it has a different texture from paper and it's LCD is high-cost. With this technology, application will be able to recognize how pictures are being drawn on paper and render it in device.
- **Manufacturing Industry:** Technology and material costs for touch screens will be reduced, which will reduce the cost for smartphone manufacturing.

■ Approach

■ Stereo MIC

- Through the time difference that the sound reaches each microphone(Time Difference of Arrival, TDoA), application will be able to identify the source of sound.

■ Accelerometer

- Since different types of vibration will occur depending on the type of gesture, the accelerometer can read the information to distinguish the type of gesture.

■ Sound Decibel

- Since it will be difficult to measure the distance from the location of the gesture with only the accelerometer, the sound decibel information will correct the distance information.

■ Bixby

- Bixby can run applications installed on smartphones with only voice recognition.

■ Machine Learning

- If I adapt to the use of machine learning, I can use it to analyze with higher accuracy.

■ Plan

	~4/4	~4/11	~4/18	~4/25	~5/2	~5/9	~5/16	~5/23	~5/30
Related works									
Sensor analysis									
Gesture recognition model									
App design									
S/W development									
User study									