

OBJECTIVE

Build 3D objects (knob, puck, and joystick) that interface with a touch screen and develop software (GUI) to detect object actuation as well as configuration



Fig 1: Ultrasound Interface

SYSTEM DESIGN

- Tangible Object-** 3D user input device with haptic feedback. Knob has multiple points on the touch screen to produce multi signals.
- Graphical User Interface - Designer interface** to monitor the signal processing and software decision making.
- Client Side:** Recognize the object with TUIO driver
- Server Side:** Interprets TUIO to display object orientation.



Fig 2: Touch screen and knob

USER SIDE- KNOB DESIGN

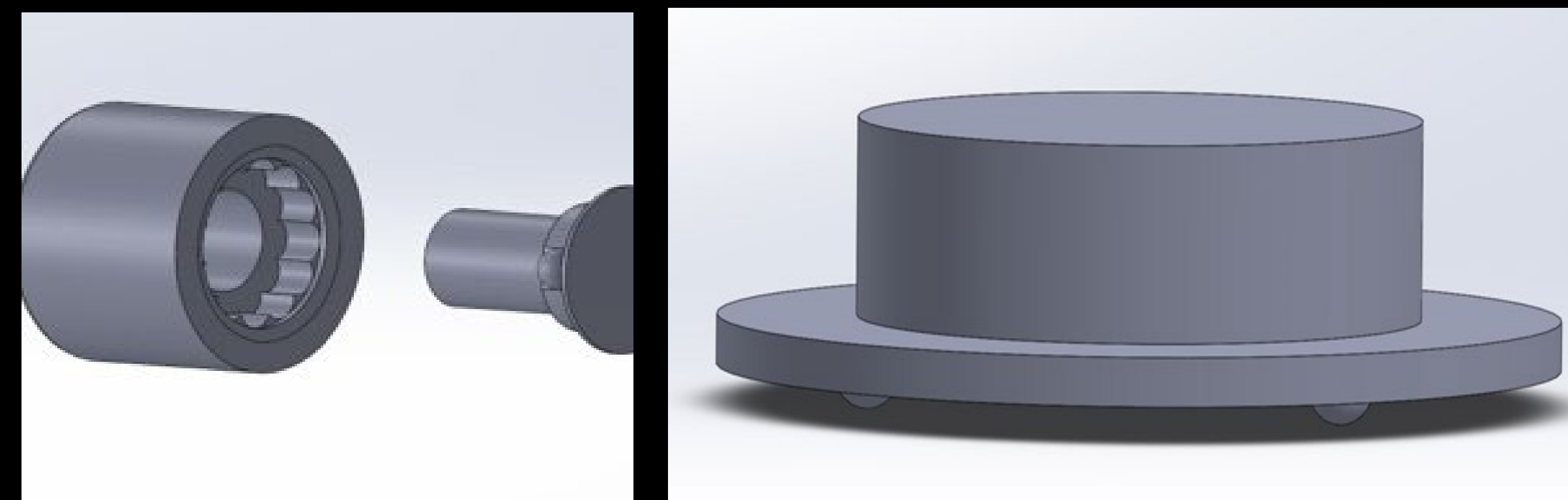


Fig 3: Tangible Object - knob with detents and conductive feet

CLIENT SIDE- TUIO IMPLEMENTATION

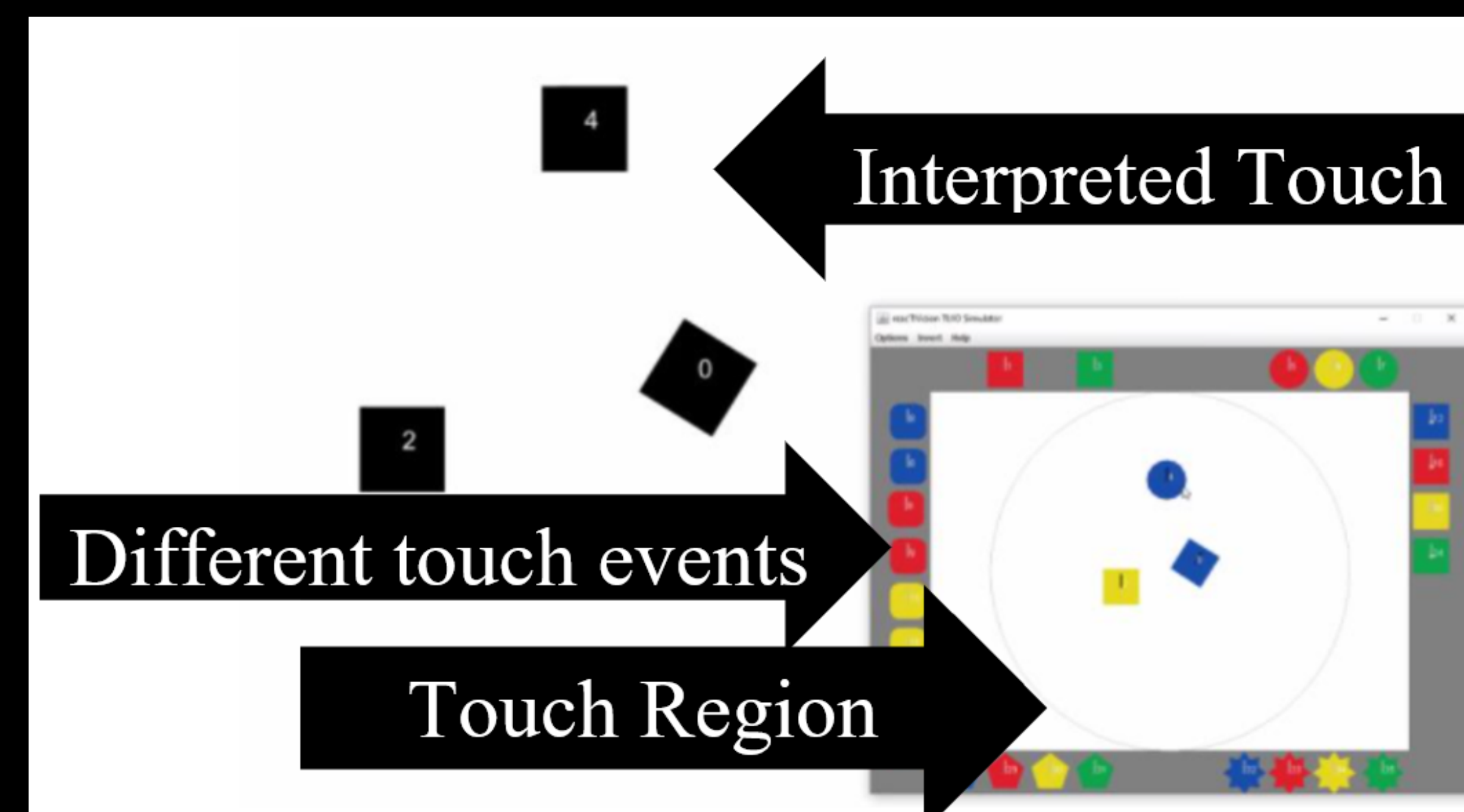


Fig 4: TUIO Protocol and GUI Host System

SERVER SIDE- GUI IMPLEMENTATION

- Start:** Configure setting and controls event.
- Recognized Touch:** Capture the co-ordinates and physical attributes.
- Did not recognize touch:** Stay idle Give error messages. When ready go to the stage recognizing the touch .
- Exit:** After constantly saving the progress

VALIDATION

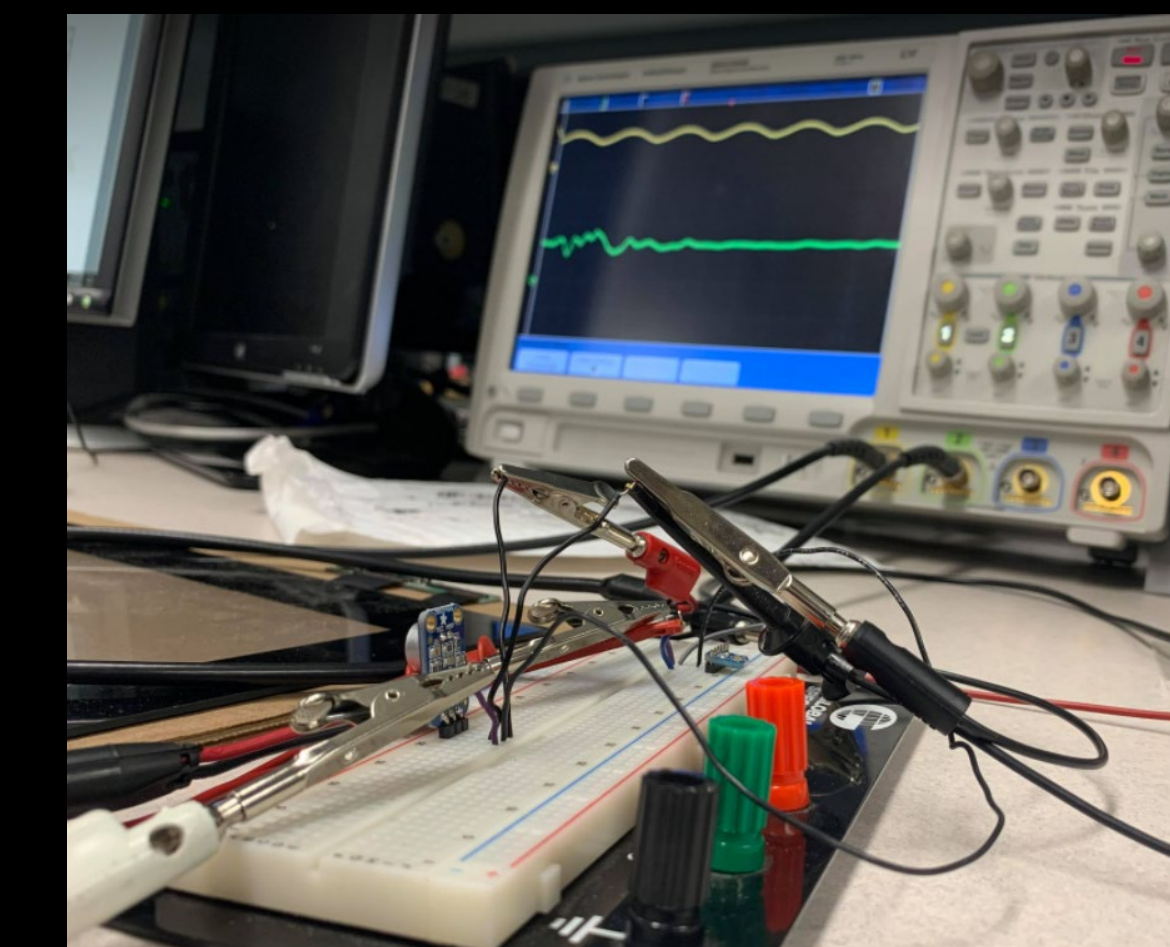


Fig 5: Touch Data Result During Latency Test

- Microphone records sound data associated with a physical touch
- Photo board diode has a small light sensor whose output voltage changes when a touch is sensed electronically
- Both signals are compared on an oscilloscope to determine latency.

NEXT STEP

- Mount tangible object and test for durability
- Build library of input objects
- Accommodate multiple objects on touchscreen at one time

ACKNOWLEDGEMENTS

- Client:** Mitch Butzer, Brett Harned
- Instructors:** Dr. Steven Beyerlein, Dr. Feng Li
- Mentor:** Jack Gonzalez