

## Senior Design Team Meeting – Group logbook

### Meeting 1

Date: 9/10/2020

Day: Thursday

Time: 2:30-3:30

### Summary:

1. We had a final discussion on the team contract and signed it.
2. We went over the videos and website given in the pdf file for the project. Upon checking the website of Advanced Input System, are we building the screen with Joysticks, sliders, push buttons and so on in the project.
3. We had discussion on the project and had a bunch of questions for Mitch. Some of it includes:
  - Good way to start the project
  - Is it existing or new project?
  - Is there a good resource to get started?

#### Expectation on the project

- Is there a built screen or something and what are the possible things we need to buy?
- Do we need to write our own OS app and create GUI?
- How are we going to test it? Building our own test bench or do we have standards for the testing?
- Brief summarization of expectations and project

Meeting 2

Date: 9/15/2020

Day: Tuesday

Time: 2:30-3:30

Summary:

- Respond to Mitch's email for meeting time – Tuesday 09/22 2:30-3:30, Andrew responds with Zoom link
- More questions for Mitch
  - Preferred languages? Hardware?
  - Does AIS have any input or preferences for anything?
  - Who will be using this?
  - User experiences look like?
  - Compared to competitor's products
- Make a PowerPoint for meetings
- Cohosting zoom meetings
- Meetings are Tuesday Thursday at 2:30?
  - Tuesday with instructor, hopefully Mitch
  - Thursday with Beyerlein
- Shop training with Jack as a group?
  - Sometime during week of 09/21
  - Not mornings, not T or TH

### Meeting 3

Date: 9/22/2020

Day: Tuesday

Time: 2:30-3:30

- We planned our client interview and the flow of the meeting starting from introduction, followed by q/a based on related subject matter of development, budgeting, and so on.

### **Meeting 4**

Date: 9/22/2020

Day: Tuesday

Time: 2:30-3:30

- The list of questions prepared were refined.
- Questions:

#### **Overview**

##### **Team Introduction and interest**

1. Can you give detailed overview on the project?
2. Can you tell us more about AIS company and the interest of the project? - history designing the interface and what will be different in this one.
3. What kind of customers will be interested and why?
4. Competitive products on the market.
5. What are the enabling technologies? What are some of the key elements?
6. Recommendations on getting up to the speed
7. What is the scope of the project?
8. What are the standard expectations for the final product? (Requisites vs what would be nice to have)
9. Is there any hardware that AIS has in house to share for experimentation? Or are there any basic things to buy for project learning.
10. Is

##### **Features: Design and Manufacture**

11. Can you give more information on screen, interactive physical device we would be making?
12. Can you talk more about the interfacing software and GUI required for the physical interface?
13. What program will be writing the software?

14. What are some of the hardware and software features that need to be prominent with the device?
15. Can you give an overview on the functionality and prototype of the device? (used cases for a particular functionality – different input types (sensors, switch, microsensors and local vendors))
16. Would we be manufacturing any components in the machine shop? (buy vs make)
17. Is there any previous work done in the project? Are we starting this from scratch? (If preexisting, are we working on making it cheaper and sustainable?)

### **Customer Review**

18. What applications are being used with this device?
19. Data rate acquisition rate, maximum latency?
20. *Does AIS have any input or preferences for anything? AIS software and hardware standards?*
21. *Order priority of the testing – first-second and third type*
22. *Who will be using this product? Can you compare this to competitor's products?*
23. *What does user experience look like?*
- 24.

### **Budgeting: Amount, Accessibility and Preferences**

25. What is the budget for the project?
26. Do you have suggestions on vendors to buy the materials?
27. What is the flexibility of budgeting to buy the items as we go on in the later half?

### **Design Testing and Verification**

28. After designing, do we have a standard test bench for quality assurance?
29. Will we be building our own testing procedures?

### **Conducting Future Meetings**

30. We would like to schedule weekly/ biweekly meeting to talk about update/ progress and ask any additional question as we go on. Would this time work for you? What is your preference with the meeting?

- Any more suggestions on questions? Adding/deleting/editing them?
- Are we conducting meetings via zoom? If we are meeting in person, how can we book GJL Design suite or should I investigate book a space in Jeb for long term?
- Reminding the contract edit and finalization with signature and turning it in
- Finalizing when we would be free to get the machine shop certification
- Making sure we have a finalized time a time for client interview!
- Any Questions/ Concerns?
- Reviewing and concluding the meeting.

## **Meeting 5**

Date: 9/24/2020

Day: Thursday

Time: 4:00-4:30

- Reflection on client interview
- Answered questions compilation
- Making list of follow up questions
- Snapshot 1 - 13th October

Client interview compilation:

- Standardized, open source. O/p goes out over any physical interface
- P-CAP screen. Finger simulator (puck example - 3-point geometry is the dial)
- **Translator** - USB (MID) touches to control o/p (rotary, switch, js, puck, etc.) - GUI to TUIO driver
- **2 strategy:**
  - HMI interfaces - Stratify path for control side (company that AIS used to be a part of)
  - Existing technology - Completely proprietary
- **TUIO?**
  - host system/GUI
  - C++, C, python, html, java, QT, etc.
  - Group preference in illustrating proof of concept and emulate the touch
  - Open source (unity, Django framework)
- **TUIO Specifications:**
  - 1" diameter for rotary is applicable
  - Frequency in spreadsheet document
  - Switching rate (not looking for a continuous low friction knob)
  - Usage model – blind touch. Haptics providing feedback
  - Joystick – resistive feedback (increase force against step – push forward to see electromagnetic force coming back) - digital or analog –360-degree feedback
  - Switch or Xbox ?? – touch event
- **Spreadsheet documentations with more information for:**
  - physical devices (2 touch screen 12")
  - Digi key
  - tuna knob
  - specifications on USB HID protocol and setup to pc
  - Software to analyze wave link
- **Testing**
  - Mitch will give things for testing and input will be provided
  - Would know when you depressed switch, get a touch event when it breaks over

- Most testing gets done with .cpp (MS visual studio) - if want to use some other software package from another company that's fine
- Microsoft supports a lot of touch events, but need to get TUIO into the GUI framework
- **Working Specification**
  - Needs to be able to process normal (finger) touches and object touches, finger touches wouldn't necessarily have to go through the TUIO interface
  - From data standpoint, streaming of data
  - The 3 cross hairs would rotate on the interface, then see one that would be another touch
  - Touch and tangible objects should co-exist where touch rotates the knob and give output which will be analyzed.
- **Manufacture of basic devices:**
  - Copper tape
  - 3D printing basic shape, glue on conductive pieces that are needed. (Or machine them)
- **Additional information:**
  - Life expectancy for physical contact on the glass, don't want to fetch onto the glass. Piece of Teflon???
  - Max latency - 300 msec . Use mic to hear when 1 detent is hit, then measure difference to output using oscilloscope/protocol analyzer.
  - Digital - 4 to 8 quadrants, would rather have analog, more angular position.
  - Touch and tangible objects coexist
  - Data standpoint – output of TUIO – control manufactures stream of data package which is GUI i.e. we can see all output processed by GUI interface.
- **Best way to get started on the project**
  - Electromechanical - review the tuna knobs
  - figure out what the other enhancements are necessary to "integrate to physical touchscreen glass".
  - Observe the waves translated from screen sent by Mitch.
  - Start with designing and experimenting.
- **Targeted Consumers:**
  - The targeted group is a trained operator, probably medical - ultra sound. We would use it for table movement of the patient - in/out of the CT machine/tunnel.
- **Budget**
  - - allowance up to \$2K. If significant fraction is going to be used, check in with Mitch, as equipment maybe locally available in AIS. In case, if a screen gets broken, contact him for more help.
- **Meetings:**
  - Check in every two weeks at least. Review in two months or so
  - Tuesday at 2:30 works for Mitch for meeting
- **Mailing:**

"Drew Brown"

Mechanical Engineering department

University of Idaho

875 Perimeter Drive, MS 0902

Moscow, ID 83844

### **Meeting 6**

Date: 10/1/2020

Day: Thursday

Time: 4:00-4:30

- Update from Tuesday's meeting: We figured out how the touch screen works; Connected the screen to PC. We can control the PC using the screen
- What next?- Getting the waveforms: trying to compare the latency time of product and study more properties on device; More research on links Mitch provided
- Snapshot 1
  - Discussion on what we want to present.
  - Setting a deadline to achieve certain goal.
  - Date – 10/13
- Reminders:
  - Project schedule due 10/6
  - Logbook and portfolio due 10/8
- Shop training – figuring out a time that works!

### **Meeting 7**

Date: 10/6/2020

Day: Tuesday

Time: 2:30-3:30

- Email someone (Dr Li) about getting a lab station for touchscreen set up
- Come up with simple programming tasks
  - Qt recognize touch screen?
  - Parse out touch reports
  - Angular position, resolution of knobs, etc

- Be sure to record all tests we've done
  - Including the tuna knobs
    - They work with Reilly's phone but not Drew's?
- Maybe if we get far enough we can come up with a dynamic control that can be moved around?
  - However first goal is getting it to stay glued down?
  - Come up with a good way to attach objects first
    - What are the constraints?
    - Trade off from a mechanical attachment standpoint to touch detection?
- Ultrasound technician – be able to turn knob and feel the detents without looking at the screen
  - Also hear the detents
  - Drew can probably do some research on this? Or all of us
- Snapshot coming up soon – come up with PowerPoint
  - Pictures of tests we've done
  - Objects interacting
  - USB data analyzation
  - Mitch's picture that he sent us on parsing the USB data
  - Could also have a demonstration
    - Touchscreen interacting with windows using windows driver – wow!
  - Send something by Friday to Beyerlein/group email!
- Logbooks due Thursday
  - Send to Beyerlein

### **Meeting 8**

Date: 10/13/2020

Day: Tuesday

Time: 2:00-3:00

- Snapshot 1 presentation was reviewed with Notes/ comments/ information on snapshot
- Updating the progress
- From Dr. Beyerlein:
  - Snapshot PowerPoint updates
- From Mitch:
  - Endpoint0 is a generic initialization data that is sent over.
  - Our concern is Endpoint1
    - Touch screen report is here.

### **Meeting 9**

Date: 10/22/2020

Day: Thursday

Time: 4:00



1. Updating the progress
  - a. Drew: Working on getting new license of solid works and will work on the outline for the suction knob
  - b. Preyusha and Reilly: Working on getting free version of QT; going over some tutorials; will start working on getting the interface for the project
2. What's next - Design Validation
3. Wiki Page – Wiki Master: Andrew

### **Meeting 10**

Date: 10/27/2020

Day: Tuesday

Time: 2:00-3:30

- Troubleshooting Solidworks for Drew
- Knob development - Drew
  - Has some development done on the school computers
  - Some design drawings done in his notebook
  - Degrees per click
    - 8 detents per revolution would be nice according to Mitch – 45 degrees per detents
    - For user feedback
    - Interacts between the foot and the user knob
  - From Mitch: foot design
    - Foot that travels on the glass
    - Come up with something that can be reused/parametrically (?) expanded so it can potentially used with multiple objects
    - Shouldn't mar the glass, individually designed/manufactured, etc
    - Optimized for glass interaction
- For touch development starting
  - Hone out the basic touch function
    - Something that tracks and is perhaps offset (so you can see the tangible object be tracked)
  - Analyzer gives out state of the touchscreen
    - Universal information
    - Takes space of the touchscreen and TUIO is giving the mapped global space??
    - In Control
      - Don't TUIO process anything, just pass through
      - Just see that it works
      - Control class that you can see through Qt that can pop up on the display

- Just want to show an icon in a certain position, but don't want to change the whole bit map
  - Touchscreen digitizes the whole section, but we only want the dial/knob/tangible object to make changes
  - Dial control mapped into GUI
- Generate a file showing touch data info coming in
  - Can show normal touch report, as well as different object touch reports.
- For near future goals:
  - Try getting a touch report file through Qt from TUIO
  - Descriptive document/description of touch
  - 3d pdf exported from Solidworks – Drew/Jack

### **Meeting 11**

Date: 11/03/2020

Day: Tuesday

Time: 2:30-3:30

Discussion on development:

Knob:

- Update on design and 3D printing.
- Questions
- Comments / Suggestions

GUI Flow chart:

- Update on flow design.
- Questions
- Comments / Suggestions

### **Meeting 12**

Date: 11/10/2020

Day: Tuesday

Time: 2:30-3:30

- Different kinds of control touch
  - Two different classes for one type of knob
  - Knob, slider, joystick
    - One or two axis
- As soon as touch generated
  - Touch event or control event
    - Touch event = finger
    - Control event = object (knob, joystick, etc)
  - Touch generated down the process channel?
- Collect data into a file format and analyze what to do next
  - Debugging
  - Don't need to process data in real time and then get rid of it?
- Can collect data in usb analyzer and parse it from there
  - Little more complex
  - AIS does this a lot
    - Pulls the data out raw – excel and plots it there
- Multiple touch isn't as important as we thought
  - Pretty unlikely that people would be touching the screen with a finger and using an object at the same time, probably only need 2 maybe 3 touch support depending how each object works.
  - The screens that we have only support 2 touch
- Material that Drew wants is probably fine for objects
- Single touch and multiple touch from  
<https://code.qt.io/cgit/qt/qtbase.git/tree/examples/widgets/touch/fingerpaint/main.cpp?h=5.15>
- Drew printed out objects with 16 detents/360 degrees – 22.5 degrees per detents
  - Mitch wants a minimum of 8, max of 32 – 45 to 11.25 degrees resolution, respectively.
- A node is about 5 mm in diameter
  - A finger is generally about 10mm – covering 2ish nodes
- Snapshot thing next Tuesday (11/17) at 2:30

### **Meeting 13**

Date: 12/01/2020

Day: Tuesday

Time: 2:30-3:30

- Snapshot 2 – Friday 11/4/2020 - 9:10-9:30
- One slide poster reviewed with Dr Beyerlein
- Plans on meeting and working on updating the poster
- Discussed about 10-touch touch screen shipped and plan for upcoming goals

**Meeting 14**

Date: 12/07/2020

Day: Tuesday

Time: 2:30-3:30

- Feedback on Snapshot 2
- Updates on design and planning for next semester
- Talked about final deliveries for the semester: Project Portfolio, wikipage, logbook