**Finger Tracking**

1) Detect fingertips

- Segment hand from rest of image

- Isolate fingertips (curvature, rgb image as well, pattern recognition?)

2) Track fingertips

- Based on previous position of fingertips

3) Hand position tracking

- Constantly updated based on position of fingertips – palm center tracking

- Might also use the default Kinect palm tracking if it's good enough – I think this only gives position, might also need orientation and more information

Part 1: No blocked fingers

Part 2: Possibility of fingers being out of view

- Use previous position of fingertips (and velocity?) to get a predicted position of the fingertip

Part 3: Testing the effect of different environments (lighting, etc.) to make it robust

**Gesture Recognition**

For high level gestures:

- Use built-in Kinect gesture training (gestures that **don't** involve fingers)

- For gestures that involve palm and fingers – write our own training algorithm that matches gestures against a database of known gestures (which are recognized with finger position and palm position)

- Build a database of sign language gestures – find someone who knows sign language (?)

**User Interface**

Teaching program for sign language

Come up with a “track” or curriculum for teaching sign language – look for existing ones?

**Minimum Deliverable**

Absolute minimum – API for finger and hand tracking

Next step – Gesture recognition and library of gestures

Next step – learn the alphabet

Final project – sign language course in the app

Super bonus – use data from people using the app to improve the gesture library (would you like to send anonymous information to help improve the app?)

**Technical Concerns**

Fingers blocked from field of view for extended periods of time – error accumulates

Entire hand moving out of field of view in gestures

Efficiency of doing this in real time

**Non-Technical Concerns**

Access to the beta for the developer program for the Xbox One

Publishing licenses (?) they said they'd open them up to anyone

**Papers**

RGB-image-based finger detection - <http://arxiv.org/ftp/arxiv/papers/1212/1212.0134.pdf>

Markerless Augmented Reality tracking - <http://www.cs.ucsb.edu/~holl/pubs/LeeT-2009-TVCG.pdf>

Another one - <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.157.4790&rep=rep1&type=pdf>