*Florida International University*

*School of Computing and Information Sciences*

CIS 4911 - Senior Capstone Project

Software Engineering Focus

Feature Document

User Story #771

**Team Member:**

Christopher Naranjo

**Product Owner(s)**:

Francisco R. Ortega

**Mentor(s)**:

Francisco R. Ortega

**Instructor**: Masoud Sadjadi

# **User Story – Learn to use AR Device(s)**

* As a developer I would like to understand how AR devices work so I can determine how they can enhance user interactions with the paint program.

*Acceptance Criteria*

* Set up SDK for HoloLens(C++/C#) and/or Epson Moverio(Android/Java)
  + Determine which device set project focus on.
* Understand how each device takes user interactions
* Come up with ideas for a standalone paint program, or to add AR functionality to the current one.

Use Case – Learn to use HoloLens and/or Epson Moverio augmented reality devices.

***Use Case***

Learn to use HoloLens

*Details*

Actor: User, Developer

Pre-conditions:

Access to physical HoloLens and/or Epson Moverio device

Device is set-up, and calibrated

Device is able to detect user gestures

*Description*

Use case beings when user does ‘bloom’ gesture to open the start menu on HoloLens. From here the user can open our (to be developed) application. User must be able to successfully use an ‘air tap’ gesture to open an application.

The user story ends when user can successfully open and place a holographic application in a physical space.

*Post-conditions*

Holographic application is opened

Can select, resize, and move the application around.

*Decision* *Support*

Frequency: Often.

Users must be able to open and close applications successfully on device

Criticality: High. Application(s) cannot crash the device, or otherwise render it inoperable

Risk: Low. Basic gestures are simple to learn. Can live-stream what the user is seeing to a computer to assist in teaching

*Constraints*

Physical device is preferred, while a virtual machine is available through Microsoft. It cannot map physical environments, nor take gesture input. Additionally, hardware and software requirements are steep.

*Usability*

Need to learn the two main gestures – “Air-tap” and “Bloom”

*Performance*

Future application needs to be lightweight enough to maintain high-frame rate.

*Supportability*

Application must work with Microsoft HoloLens or Epson Moverio.

**Unit Test**

*Sunny Day Tests*

Test case: Open an application.

Test Purpose: Ensure that the user can open and interact with a single application

Test Setup:

1. Bloom gesture to open the start menu if it’s not already open.
2. Air tap an application
3. Use gaze to position application on a surface then air-tap to place and run it at that location
4. Repeat 1-3 for various applications.

Test Output:

Applications successfully placed on surfaces.

Expected Output:

After placing an application on a surface, it should correctly open and remain anchored to that surface.

*Rainy Day Tests*

Test Purpose: Ensure that the user can open, place, and manipulate applications within the same view.

Test Setup:

1. Bloom gesture to open the start menu if it’s not already open.
2. Air tap an application
3. Use gaze to position application on a surface, and air-tap to place and run it.
4. With first application still visible to the user, bloom and open another application.
5. Repeat 1-4 for various applications

Test Output:

Multiple applications successfully placed in close proximity to each other.

Expected Output:

After placing multiple applications in close proximity, the user should still be able to correctly interact with a specific application by centering their gaze over the intended application.

**User Guide**

HoloLens operates off three basic gestures, and a ‘gaze’ point between your two eyes.

Gestures:

Air-tap – “Left click”

Air-hold – Varies on context, “Left click and hold” or “Right click”

Bloom – “Windows key”

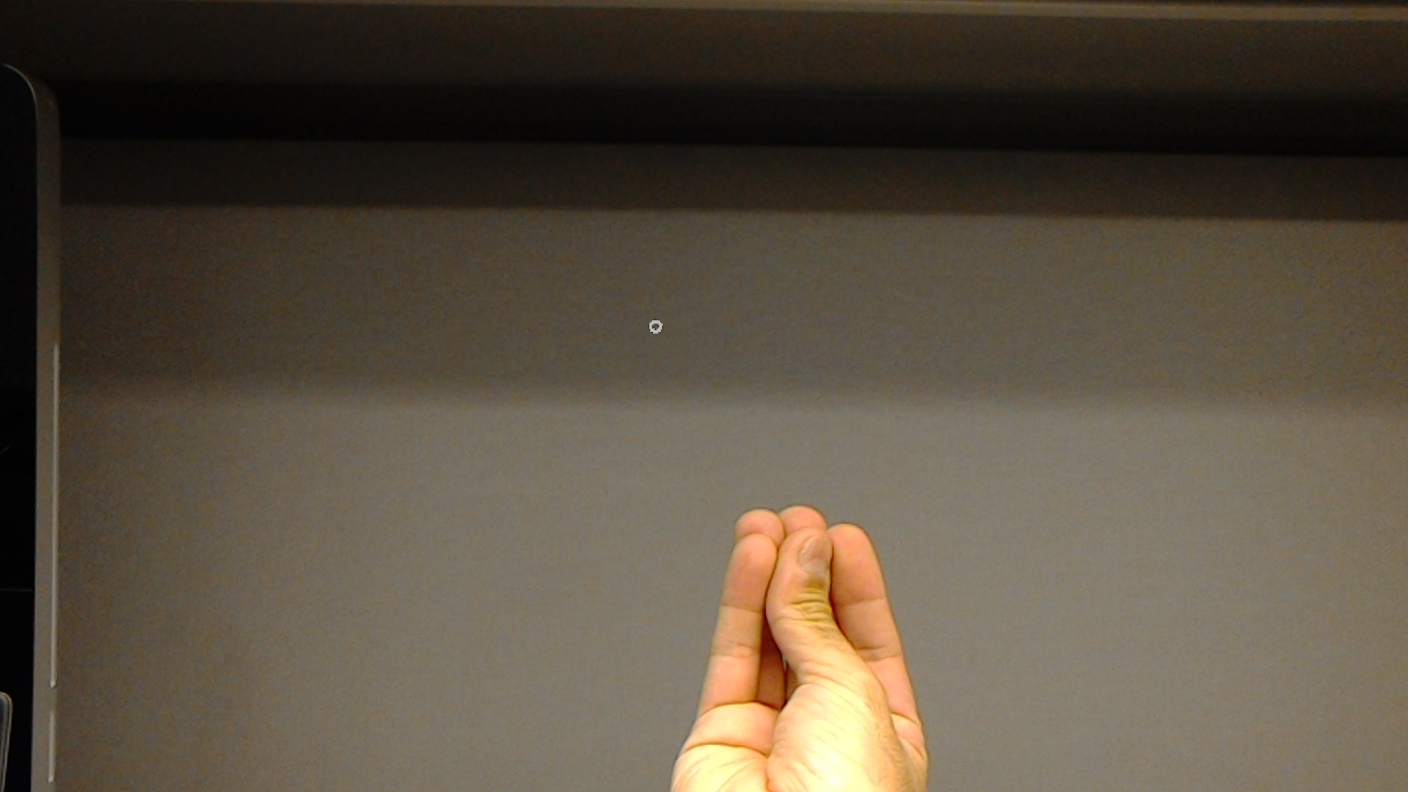
Gaze – “Mouse pointer”

When the device is first put on, you may first notice a small dot in the center of your field of vision. This is your gaze point, and will function as your mouse pointer when not using Air-hold.



*This picture is misleading in that; the gaze point is not that small when actually wearing the device.*

You will notice that the gaze point is a small dot, this is telling the user that HoloLens does not detect any hand-gesture in front of it currently.



*Bloom ready position*

Once a hand is placed in a ‘ready position’; *a position for the beginning of a gesture*, the dot will change to a circle. This indicates that HoloLens has correctly read your hand and is anticipating a gesture. In this case, this is the start of the ‘***bloom****’* gesture. Once you separate your fingers, the start menu will pop up under the gaze point.



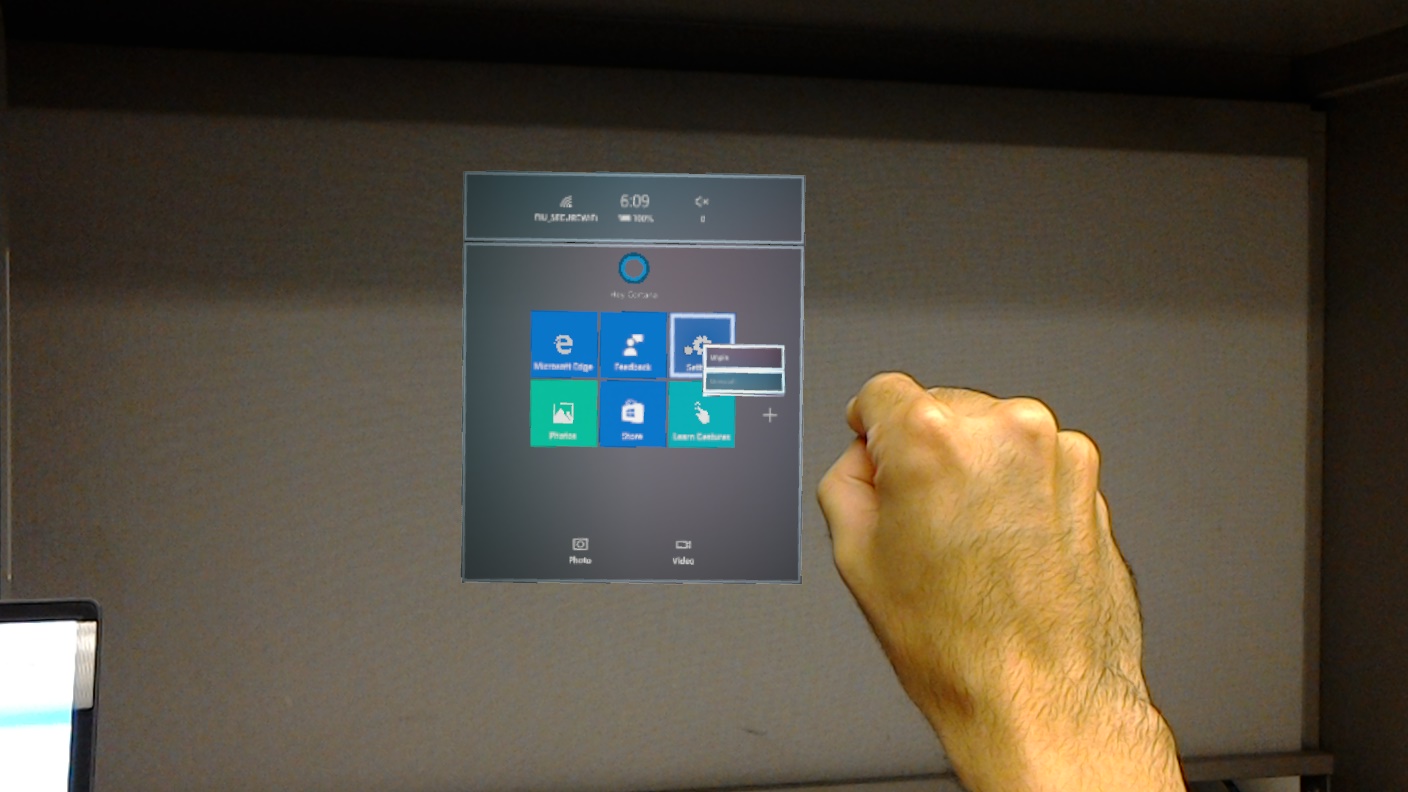
*Bloom to open start.*

From here, you can use the ‘**air-tap**’ gesture to select an application. Have your palm facing away from you and raise a single finger.



*Air-tap ready position*

From here you can do two gestures, ***air-tap*** and ***air-hold***. If you quickly ‘tap’ your raised finger, you will open the application that your gaze if focused one. Whereas if you hold it over the application, it will bring up additional options for that application. Be aware that ***air-hold’s*** action varies depending on context.

*Air-hold; notice the additional context menu has been opened*



*After successful Air-tap.*

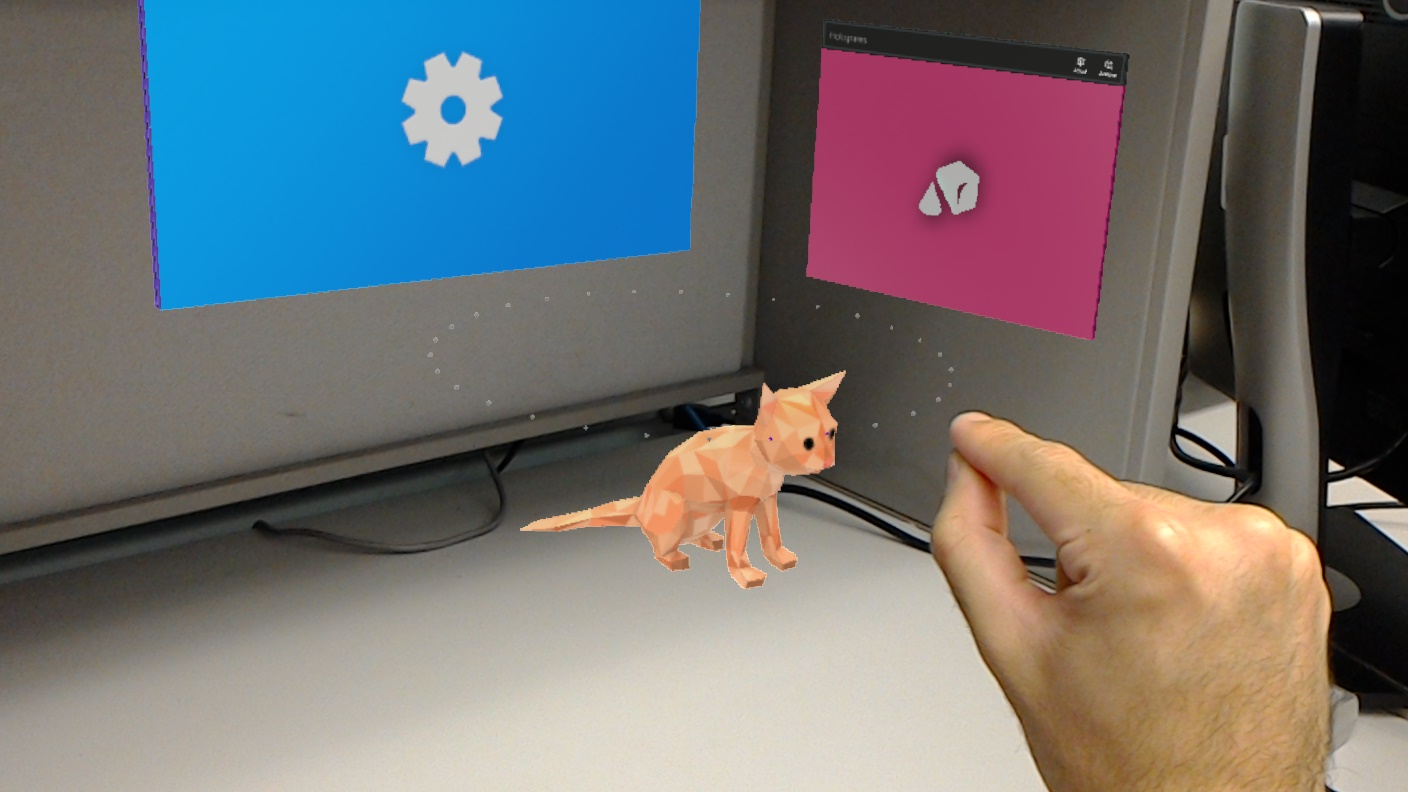
Additionally, for applications that can be placed on the physical objects, they initially start with a screen as shown above. You can shift the placement of the application by shifting your gaze (moving your head) around, and then air-tap again to anchor the application to that point.



*A few applications (settings) anchored to perpendicular corners of desk, and a holographic cat sitting on the desk.*

In the above image, you can see that the application on the right side of the user’s view is currently a solid color. This informs the user that it currently is in an ‘inactive’/sleep state. To reactivate it, simple center your gaze on it and air-tap.

Additionally, if you air-hold on the cat a small ring of dots will appear on it. Moving your hand (while still holding) along the axis of the dots will rotate that object.





*Air hold for cat rotation*