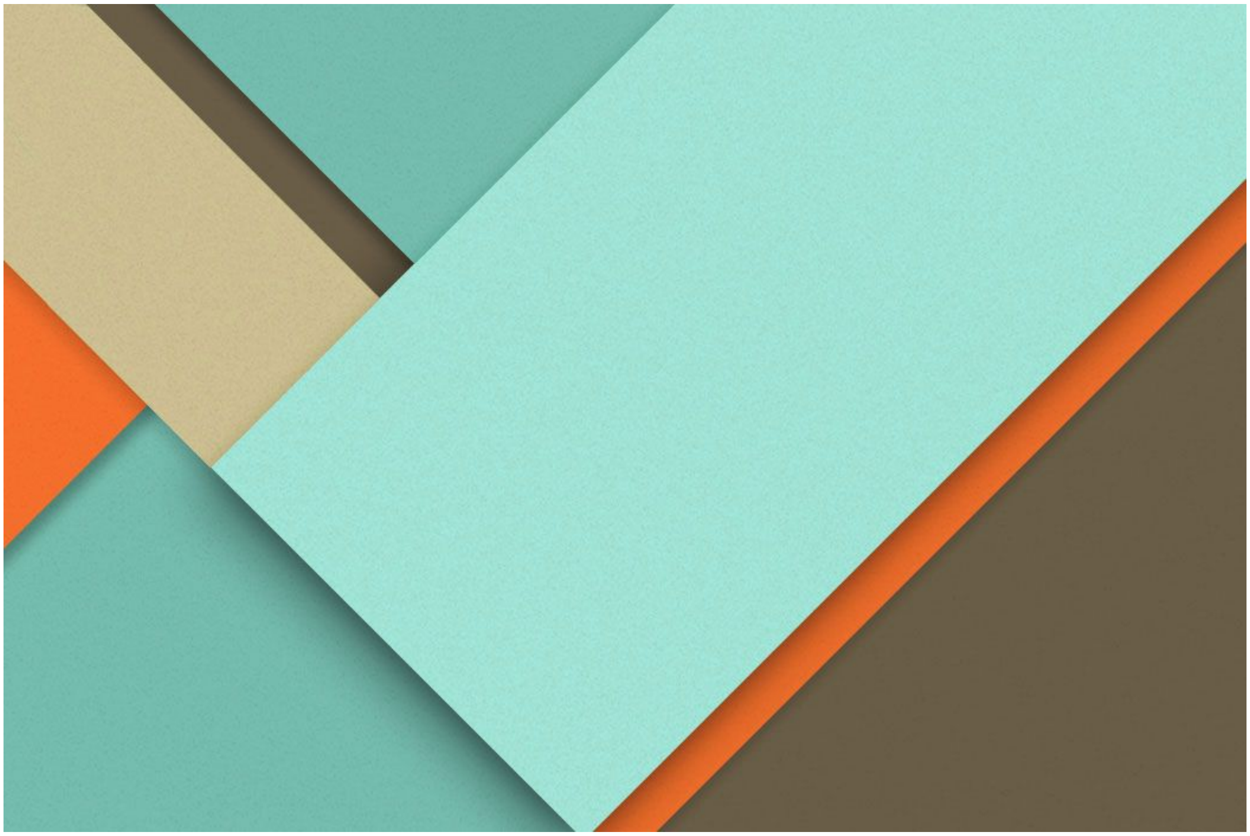

Innovation of the CEED Space

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Project 17

GNG1103

Deliverable F- Prototyping and Customer Feedback

Overview

The staff, students, and community that use the CEED space need an interactive system in order to time and inventory manage more efficiently.

This week, Project 17 has been working on the first prototype of our solution subsystems. This report will be showcasing the testing and prototype planning we have done so far amongst other key details for the development of our system. We will do this using our engineering analysis with design thinking, as well our our problem statement in mind.

To refresh your memory, our solution to our problem statement (as written above) is a Ross Video Dashboard available to the public through a website. On this Dashboard, users of the space will have access to various information such as a clock end of day, machine availability, and basic information on the machines.

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Testing

In order to test our prototype, we broke our solution down into subsystems and prioritized the testing of each with respect to its risk factor (as outlined in our previous deliverable and available for reference in our appendix). Below are the major and most important subsystems of our design and therefore we are testing them first to a) determine feasibility, b) to get a better time estimate of task completion, and c) Allow them the most time to be worked on. We are testing these because they are functional requirements and are prioritized as high risk due to the fact that if any of these parts do not work properly, a new assessment of our solution will need to be done.

<u>Subsystem #1: The motion sensors</u> (These detect movement in a 3D printer in order to determine whether a machine is in use or not).

We need to test this in order to determine the best spot for our sensors to be placed. This reduces the risk of misplacing the sensor.

Testing that has Been Done:

- Team has looked at the 3D printers to see which moving parts could be used

Testing that Needs to be Done:

-Determine how are we going to mount/ attach these sensors to the printers

-Test different spots on/around the printer in order to find the place that gives the most accurate readings

-We must determine where we are going to mount the sensor and figure out the area it covers, it must cover the area of the printer's workspace

We will know this testing is done when we find a place for the motion sensors which will optimize the area in which the sensors can detect movement without taking false readings from movement elsewhere than the specific printer. Acceptable: will be when we find a place

<u>Subsystem #2: The connection between the sensors and dashboard</u> (This is needed to allow the dashboard to display availability).

This test must be done to make sure that the dashboard is compatible with the sensor. If the sensor is not connected to the dashboard, then the information will not be transmitted.

Testing that has Been Done:

-Dashboard parameters have been created

Testing that Needs to be Done:

-Parameters must be configured to receive signals from the nodeMCU board.

-PIR sensors sending signals to nodeMCU board

-Dashboard parameters changing as result of PIR signals

We will know that testing is done when the dashboard is properly receiving signals from the PIR sensor and changing the machine vacancy parameters.

<u>Subsystem #3: The compatibility of DashBoard with the website</u>

It is important to test the compatibility of the dashboard with the website because it allows our design to be interactive via the internet. It reduces the risk that may come up later on. FOr instance, as the due date is upon us, we only then find out that the website is not compatible with the dashboard, which is a major problem to our solution.

Testing that has Been Done:

-A website builder has been found

Testing that Needs to be Done:

-Uploading live dashboard feed to wix

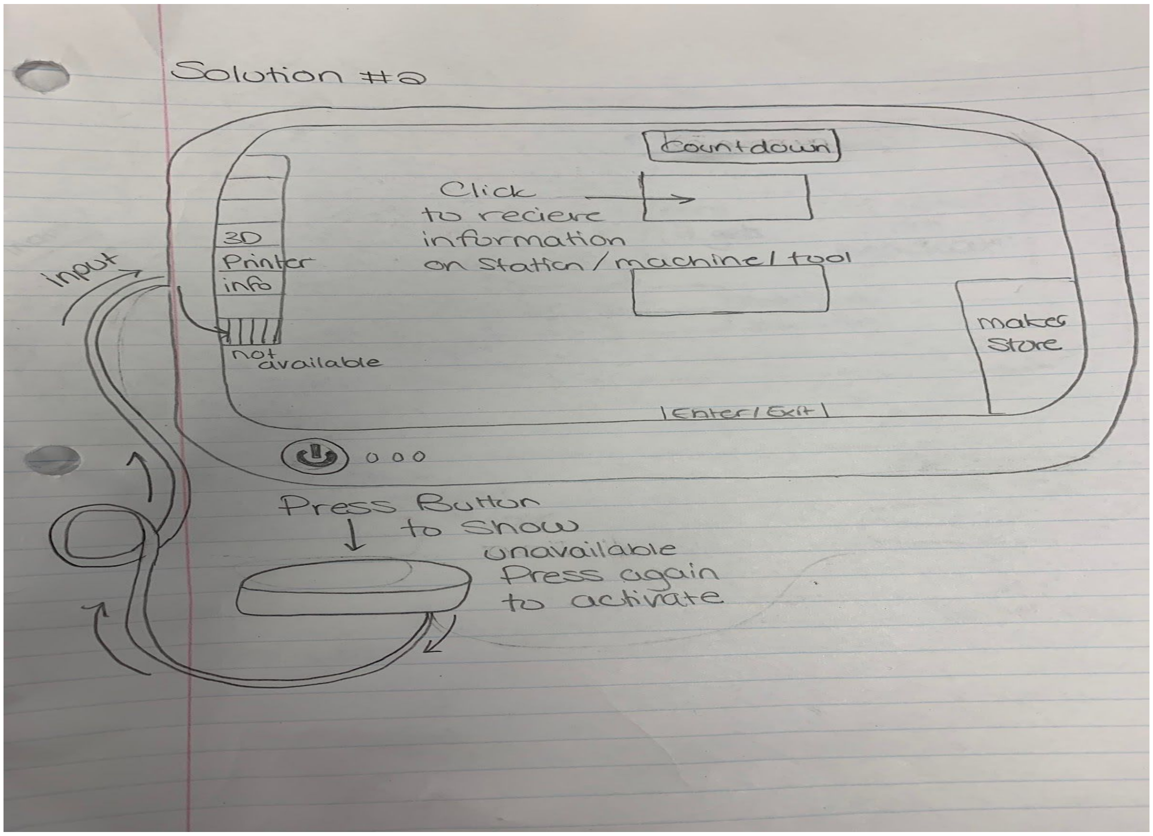
-Ensuring the website refreshes automatically with the dashboard information

We will know that this testing is done when we can successfully open the website on a device and have a live version of our Ross Video Dashboard displayed on a consistent basis.

The Development of Our Prototype

From our planning stage we have now developed two prototypes. Our first being a sketch of our dashboard and our second being an actual dashboard display with other components. The second prototype has been built from the customer feedback of the first.

Stage One


Solution #2
Countdown
Click to recieve information on station/machine/tool
3D Printer info
not available
input
makes Store
Enter/Exit
Press Button to Show unavailable Press again to activate

This was the first rough sketch which we showed to the managers of the CEED space in our last client meet. A button was to be pressed in order to signal to the Dashboard that a machine was not available. The dashboard was laid out like a map of the CEED space which was to be interactive for the user.

Customer Feedback

The feedback we received was that this was the most valuable solution for them resource wise. They like the idea of having information available on machines because it can be tiresome a) answering the same basic questions and b) having these questions take away from more important/difficult questions that could be answered. They feel that the pressing of the button would give inaccurate data due to the display being dependent on someone physically pushing the button(some are too lazy and some will forget etc.). When we brought up the idea of the motion sensor they believed it would be more useful.

The feedback we received from Rob was that we needed to better manage our costs and to start with one prototype before we expand our idea (ie start with one motion sensor and make sure it is working well before trying to do four). He gave us pointers on materials and where a good place to find them would be. He thought we were trying to solve a variety of problems but allowed that if we have time, they are all in a similar group. He suggested we thoroughly test our sensors. Additionally, he suggested we focus mainly on the dashboard before attempting to put it on a website as we have a time constraint.

Stage Two

We developed a very basic dashboard for a visual aid when showing clients the main functions concept of our board. This is the base of our dashboard and will help us get feedback from clients. We will use this dashboard to primarily test its compatibility with our website and connection with the printers. This will later develop into a basic working model of our Dashboard interactive map solution. The button idea was removed and motion sensors were chosen instead due to customer feedback. We also added an extra feature for staff where they can see information such as how much product should be in one location. This feature will allow them to clean the space more efficiently and indicate to them whether a product needs to be found or replaced.

Block Diagrams

Input: movement
Output: system telling that a machine is unavailable
Error: ????
Disturbance: malfunction of sensor, system can be down, no wifi
Controller: motion sensor
Actuator: arduino board
Plant: machine or the CEED space?
Sensor: motion sensor

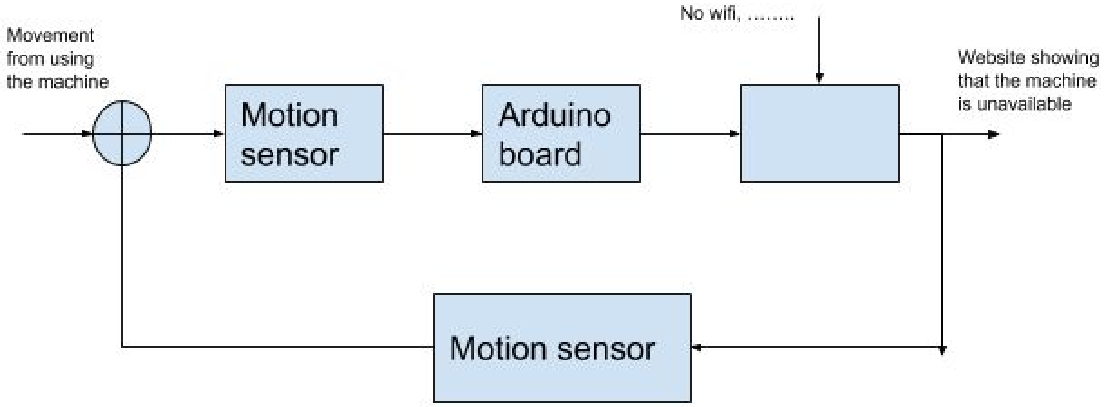
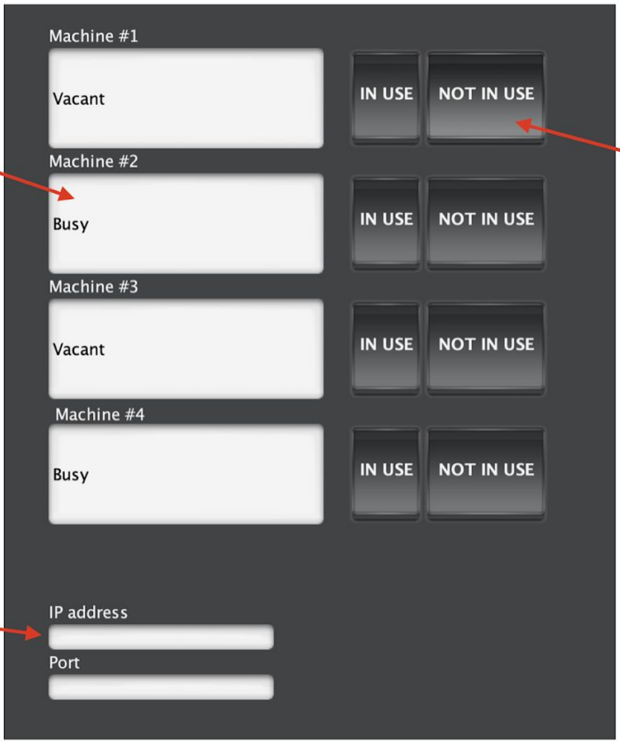

No wifi, ...
Movement from using the machine
Motion sensor
Arduino board
Website showing that the machine is unavailable
Motion sensor

Diagram:



Machine #1: Vacant
Machine #2: Busy
Machine #3: Vacant
Machine #4: Busy

Display of whether or not a machine is being used

Buttons to toggle between Vacant and Busy (Will be activated by nodeMCU signals in final prototype)

Parameter control for nodeMCU's IP address and port

Dashboard Visual:

Customer Feedback

We have created this dashboard since our last client meeting with CEED space managers. We will be showing this to Ross Video Representatives on our November 5th client meet. Feedback and information gained from this meeting will be recorded and used to further develop the dashboard aesthetics and functionality.

Upcoming Milestones

I. First Client Meeting with Ross Video

November 5th, 2019

A professional pitch is needed for this client meeting to best showcase our product at stage one. We have a list of questions ready for our meeting with Ross Representatives and are ready to record their feedback in hopes of meeting their standards.

II. Client Feedback of Ross Video Geared Dashboard from members of CEED Space

November 9th, 2019

After adapting our system according to Ross Video representative feedback, we would like to get feedback from users of the space (preferably at least one from each of the following categories: student user, public user, staff, management).

III. Deliverable G Due

November 7th, 2019

Goals

1. After our meeting with Ross Video, get a clearer picture of their needs and tailor our dashboard so it better meets their standards.
2. Complete our report for Deliverable G.
3. Better the aesthetics of our Dashboard.
4. Test our new prototype of dashboard on users of the space.
5. Have our order approved and order our materials.
6. Continue our testing.
7. Begin the working programming behind the dashboard.