Table 1:Interpreting the client needs

Question	Customer statement	Interpreted Need
Typical Uses	1. Makerlab/Makerspace: a. I need to know how long the 3D printers are being used for b. I need to keep track of the SD cards used for the 3D prints 2. Brunsfield: a. I need to know if machines are available to use before I get there b. I need to know who is using the machines and if they are trained	1. The solution can display a virtual clock 2. The solution can track storage of parts/tools 3. The solution can display which machines are in use 4. Solution can control who is allowed to access each workbench
Current Situation (Positives)	1. I like that there is room to move around the equipment/machines 2. People sign in when they use the labs	1. The solution can remind users to stand or move 2. The solution can make use of the sign sheet
Current Situation (Negative)	1. I don't like the current store space because I cannot find what I need 2. I don't know if machines are broken until someone tries to use them 3. I don't know how much time left when I starting a new task 4. I don't know who is using each machine or workbench 5. People leave without returning all borrowed equipment or cleaning up their work station	1. The solution can show where the things are 2. The solution can remind users how much time that they can use the machines left for them 3. The solution can remind users put the things they use to the right place before they leave 4. The solution allows users to know how much time is left until the room closes
Suggested improvements	1. I want to easily limit the number of people within the lab 2. I want to know what's happening in the lab even when I'm at home	1. The solution can count the number of users in lab 2. The solution can upload real time data

		to the dashboard

Table 2: Organize and prioritize the client needs

Number	Need	Importance
1	Ability to digitally keep a record of who is using the workspaces from anywhere	4
2	The solution does not physically take up large amounts of space within the lab	3
3	The solution provides staff with an interface of the labs from anywhere	2
4	The solution can remind users how much time is remaining in the day	5
5	Solution is safe to use	1

Structural Needs:

- The system is small and light such that it allows users to move around in the lab.
- Materials that will be durable and last overtime.
- System that can be moved in conjunction with the 3D printers.
- The solution continues to allow users to easily access the contents of the 3D printers.
- The device is aesthetically pleasing.
- The cost is less than one hundred canidian dollars.

Digital Needs:

- The User Interface is easy to understand.
- The User Interface is in English and French.
- The system utilizes dashboard for interacting with the interface.
- The page can be displayed properly on both phone screen and computer screen.
- The digital map is easy to use and highly functional for staff and lab users.

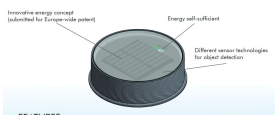
System Upkeep:

- Wires within the system are organized and labelled.
- Use open-source code.
- The programming is simple and easy to follow, using comments to explain the processes.
- System that is reliable and require minimal repairs.

Problem statement:

The CEED facilities at the University of Ottawa are in need of an inexpensive and reliable interactive dashboard that allow staff members to easily manage who is using each lab and workbenches. The solution must be unobtrusive and allow for users and staff members to access the contents of 3D printers and manage the functional elements of the system.

Benchmarking:

Specifications	**LTS TAPS park sensor**	**Active infrared (area reflective) human detection sensor**
Company	LTS AG	Panasonic
Materials	V4A/safety glass	Not specified
Weight	1.5 kg	Not specified
Lifespan	>10 Years	Not specified
Size	155mm x 41.5 mm	Depend on the type
Area of application	Traffic management	Water-based market Amusement market
range	20-30m	5-15cm
Picture		 Thin short type (Mounting direction: V type)
Additional Features	• Charging during Operation • Low lifecycle costs • Short installation Time • Energy self-sufficient • Data in real-time	• Certain detection unaffected by the reflectance of the object • Only connecting DC power supply for operating • Use in adjacent positions is possible

Reference:

https://lts-ag.ch/wp-content/uploads/2019/04/FS-383-10001_Factsheet-Bodensensor_EN.pdf

https://media.digikey.com/pdf/Data%20Sheets/Panasonic%20Electronic%20Components/MA_Series.pdf

https://www.amazon.com/Ring-Wi-Fi-Enabled-Doorbell-Nickel/dp/B00N2ZDXW2?ref_=fsclp_pl_dp_1#tech