
**SCHOOL OF COMPUTING**

**SESSION 2020/2021 SEMESTER 1**

**SECP 1513 -07**

**TECHNOLOGY AND INFORMATION SYSTEMS**

**DESIGN THINKING**

**SECONDARY STORAGE**

**GROUP MEMBERS** :

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2. ABDULRAHMAN AHMED RAFAT ABDELHAMID (A20EC0523)
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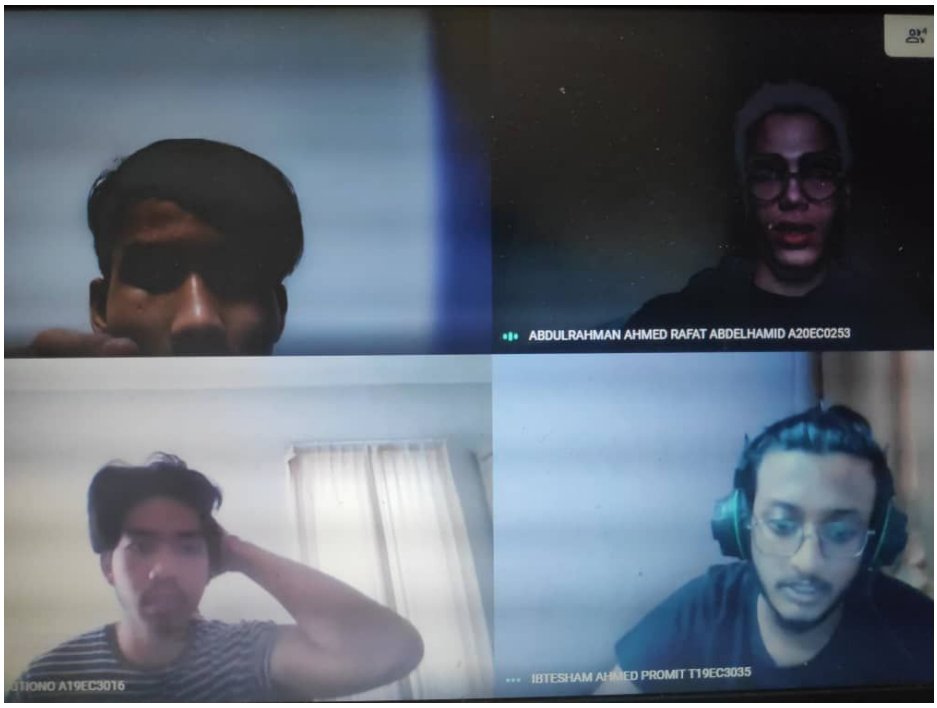
# 1.INTRODUCTION

Data storage is one among several basic, yet vital functions for a computer to perform the tasks. As for now, there are two varieties of storage which is the primary storage and also the secondary storage. Despite essentially functioning as opposites, both primary storage and secondary storage often work together to make ideal storage conditions. For example, once you save your work in Word, the file data moves from primary storage to a secondary storage device to be kept for a long time. This shows that secondary storage is important to complete our tasks and to make the job easier. Secondary storage can also be known as auxiliary storage, external memory, and secondary memory. The secondary storage is a non-volatile storage which means it can store the data and programs regardless of power and the data file can also be kept permanently in the storage. The data that had been stored in the secondary storage will be retained until the user chooses to overwrite or delete it. Besides, the secondary storage can also be used to share information with others. The secondary storage also can be found internal or external. Examples of the internal secondary storage are the hard disk, optical storage drive (CD-ROM, Blu-ray, and DVD) and floppy disk drive. However, this day, we have come out with a better invention which can make the storage to be external especially since the invention of the flash drive. Also, many secondary storage devices are now virtual devices residing on third-party cloud servers hosted by many services such as Dropbox, and Google Drive. Based on what we have learned, we are applying the design thinking method to invent a new device that can be used to store the data files. Design thinking is a non-linear iterative process aimed at educating customers, questioning assumptions, redefining issues and developing innovative design and test solutions. Using the design thinking skills such as empathy, define, ideate, prototype and test, we can determine the device to be useful or not in our daily life.

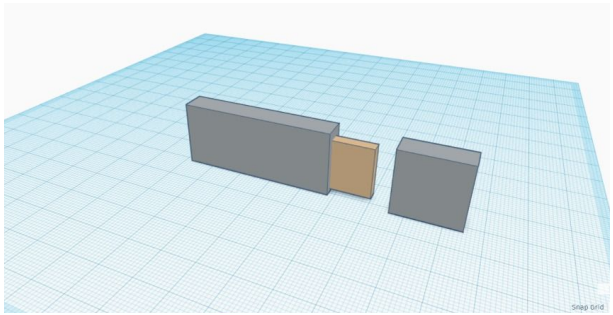
## 2. DETAILS STEP AND DESCRIPTION

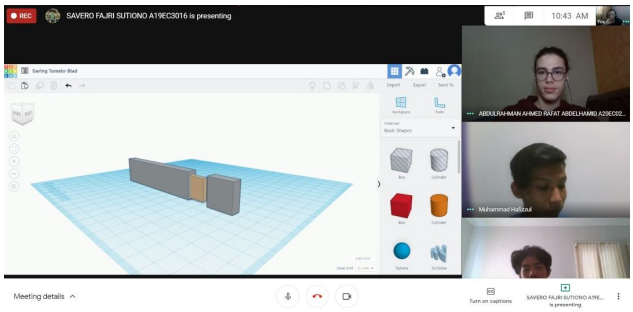
As we have learned, there are five steps in design thinking to develop solutions to the problems which are empathy, define, ideate, prototype, and test. For the first step which is empathy, we have collected various questions and answers to solve the problem that had been faced by a lot of people. We have interviewed two people for the topic and asked their main problem about the storage problem. Their main concern is to store the data files in their device such as their laptops and personal computers but the existing files in the devices have almost reached the maximum capacity of the storage. They need a new way to store the data without losing any important files. We also asked a few questions regarding the topic to know more about their problem. By gathering all the information, we continue to discuss it in the next phase. The evidence of the interview is as below :

Next step is the define phase. In this phase we accumulated all the information that we have collected in the first phase and analyzed it to define the core problems. In this phase, we gathered the information needed to solve the problem. Due to Covid-19 pandemic, we could only meet using Google Meet. We discussed and defined the problem that we had gathered from the respondents earlier. The main problem we have to encounter is to store large data files and programs and can be easily shared with others. We need to find a way to solve the problems using the knowledge that we have gained in this topic. We also exchanged our views regarding the problems that we had gathered.



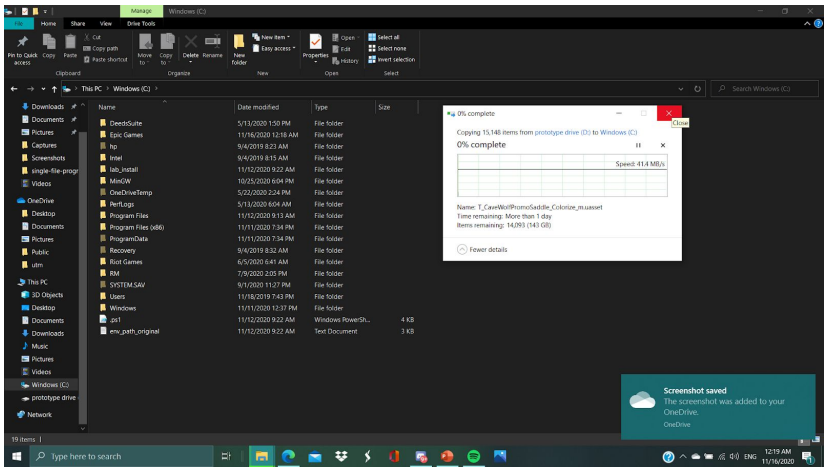
The third phase is the ideate. In this phase we had generated a few ideas that can be used to solve the problem regarding the secondary storage. After viewing the ideas from different perspectives, we had chosen to create a portable device to store large data and program and easier to carry around. This will help us to store the large files and are easy to carry around and also this device does not rely on the internet to transfer the data. The device we created is small which makes it easier to be brought anywhere. We designed the device using available tools on the Internet.






Onto the next phase which is the prototype phase, we created the prototype based on what we had discussed. We used a used metal case to create the prototype because it is much stronger and not easily damaged. The prototype that we had created is similar with the design earlier. The prototype also can connect to laptop and computer through the USB port which will make it easier for the file transfer.

The last phase is the test phase. After finishing the prototype, we tested it several times to make sure it works as what we have planned. We tested the product prototype by connecting it using the USB port. It worked properly and managed to solve the problems. Because of the size, this product is easier to carry and can fit in the pocket. It also does not use the Internet to connect and transfer files to the device because not every place has access to the Internet. We also test the durability of our product so we can know how much pressure our product can hold.



# 3. DETAILS DESCRIPTION

## I. Problem

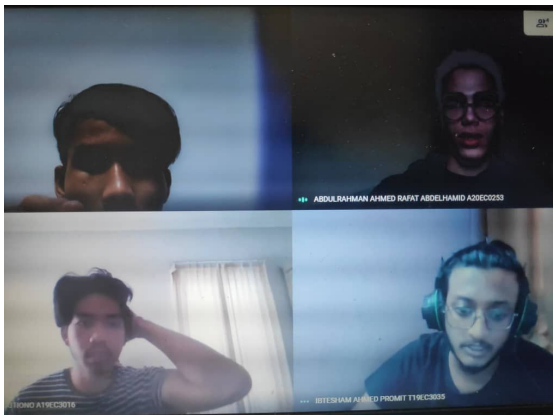
In this project, we need to create a solution to a problem that has been faced by most of us. In order to gather all the information needed, we had done two interview sessions with two different people. The problem that the respondents faced during the interview session is how to store large files and programs and have a large capacity. Their storage in the laptops and computers is almost reaching its capacity and they need a device to store new files. Not having enough space to store data also leads to many other problems such as; makes laptop running slow, lost data, and limited files could be saved. This means they need additional storage to store the data files and programs. They also suggest a device that is small and easy to carry.

## II. Solution

Our group had come out with an idea to overcome the problem. We have invented a secondary storage device that can be useful to store large files. In addition, we also made it smaller but with large capacity to make it easier to carry around. The large capacity of the device can be used to store the files and programs with large sizes. This will make the user keep a lot of files in the device. We also make it smaller and it can fit in the user's pocket to bring it. The device is also a non-volatile device that can make it store any data without using power and permanently save the data. Also, we had constructed the device not to be easily damaged such as dropped from a high place and also can stand a higher pressure. The device is also not reliable to the Internet connection which means the user can use the device to transfer and receive any files in a place with no Internet connection.

III. Team Working

In order to complete this project, all of us have to play their role. At first it is kind of difficult because of the Covid-19 pandemic and we could not meet face to face. However we managed to overcome the difficulties by working in a group and helping each other. We have assigned the tasks for each of the group members. We used the design thinking phases to make our project go smoothly. We also met several times using Google Meet to discuss our project. In the meeting, we also generated the ideas to overcome the problem and discussed the pros and cons for the project. In addition, we also discussed the difficulties and how to solve it. Not to forget, the team members had interviewed the respondents to understand their problems regarding this topic. Lastly, to produce the prototype, each of us contributed our ideas and exchanged our opinions to achieve a final result.




The meeting and discussion using Google Meet.

# 4. DESIGN THINKING EVIDENCE

a. The design thinking process has a total of five phases which are empathy, define ideate, prototype, and testing. The records and evidence of each phase of the design thinking process can be found below.

b. Record for each phase

   i. Empathy

   This is the first interview between our group member and the respondent.

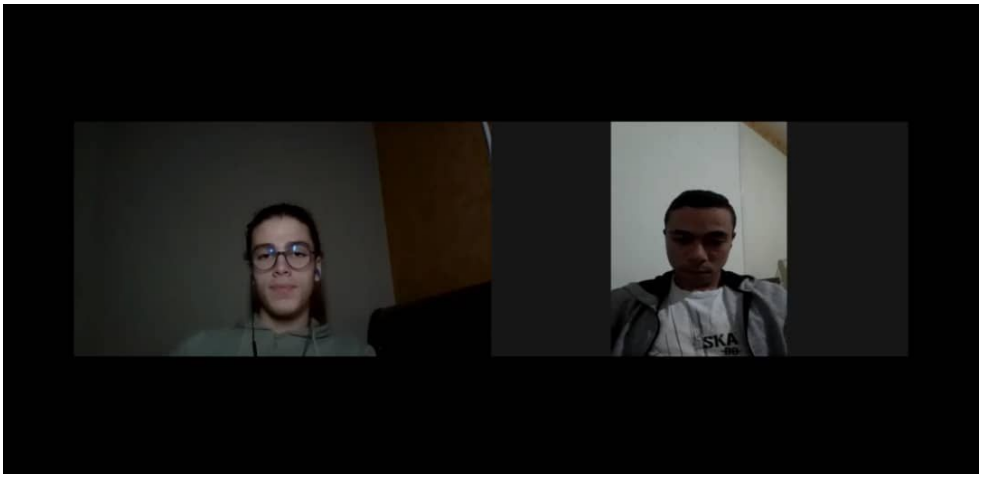
   Name : Aqila (Student)

   Age : 19

   Below is a sample of the questions during the interview

A:hi, my name is ... from group 6, i would like to interview you regarding
 sotrage problems for the purpose of our group would you mind i take your time?
B: sure go ahead
A:ok u can now introduce yourself please
B: my name is ... im a ...
A: so, as we know you are currently a ...., have you ever find any problems to your laptop/pc storage?
B: yes my laptop has a small storage and sometimes it makes my laptop running slow
A: oh i see, is there anything else ?
B: i think thats all of my problems on the storages
A: ok thankyou for your time, i hope we could find the solution that you need

This is the next interview :



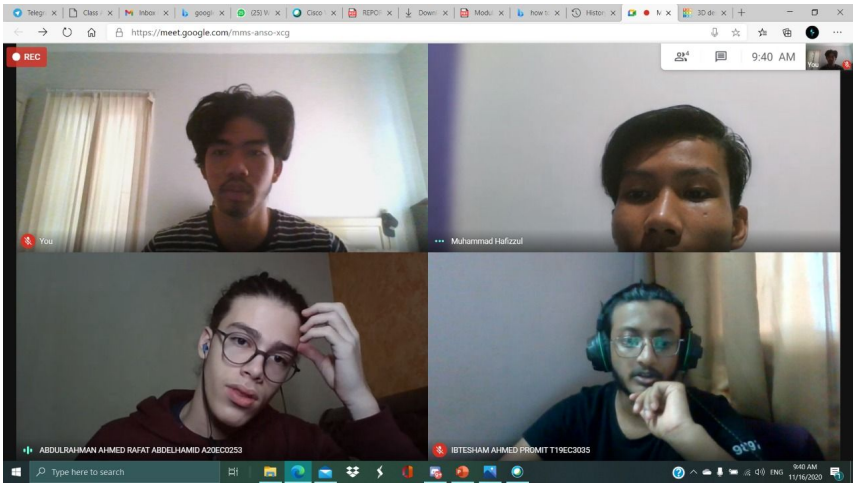
Name : Ahmed Mohammed Fathy (Student)

Age : 18

Below is the sample questions during the interview

A: Hey everyone, I am Abdulrahman Ahmed Rafat, and I'm interviewing Ahmed Fathy, regarding problems that people face with secondary storage and storage in general. Ahmed Fathy if you can introduce yourself.
B: Okay, as you said right now my name is Ahmed Mohamed Fathy, I study International Business Administration at Sadat Academy. I grew up about cinema, films, and cinematography in general. I think cinematography is the only way that you can imply or take your vision to the next level make the people understand the problems that we face in a better through films and photography. I think the major problem that I face is the amount of storage that 4k footage takes, for example, if you just took a clip of a 10min video, it will take about 40GB of storage, and this is the major problem that every cinematographer faces [regarding storage]. I tried SSDs but SSDs have few storage and expensive price, like a Seagate [SSD] costs about 400 [U.S.] Dollars for only 200GB which is a very small [amount of] storage. A 4K 15min video could fill half of this storage which is a big problem for me for storing the videos and the clips.
A: Then why don't you use HDDs?
B: HDDs are too slow, [for example], if you run 4K footage from HDD it's too slow, [as] it has mechanical [moving] parts inside it, so it takes time to operate and read the footage. SSDs are much faster, but they cost more.
A: Yeah, exactly. Are there any other problems that you.
B: No, I think I introduced the major problem that I face.
A: Okay, thank you so much Ahmed for your time!
B: Thank you too!

ii. Define



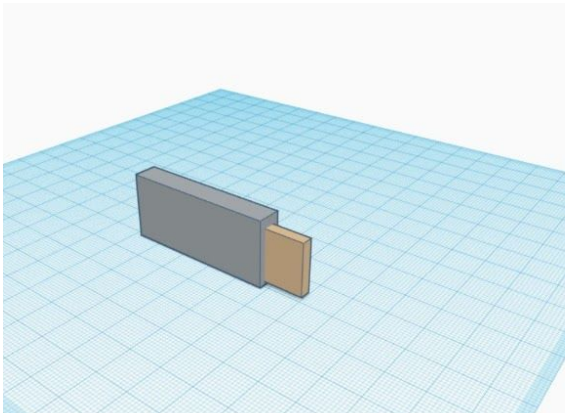

In this phase, we had a video call using Google Meet as we could not meet face to face. During the meeting, we discussed the common problem and came out with a better solution to solve the problem.

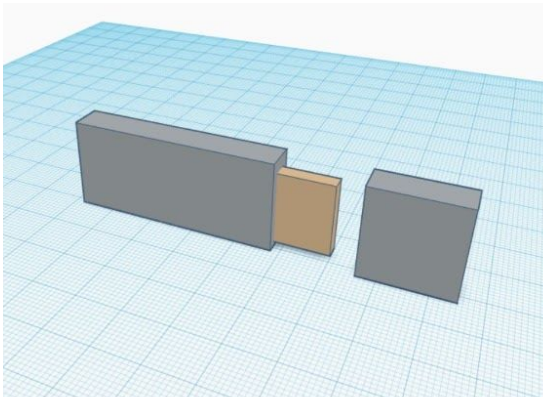
iii. Ideate

In this phase, we had done a brainstorm on how to come out with a better solution for the problem. We started to discuss the function and its design to make sure it works properly.

Then we designed the product so it can have a proper function.

The picture below is the first design that we had created to overcome the problem :





We also improve the product by adding a cap to protect it from water and debris.

iv. Prototype

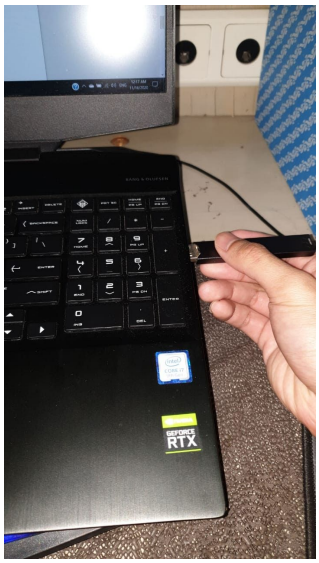
In this phase, we began to produce the prototype by using existing items such as the used metal case. It will protect the device from any shock especially falling from high places.

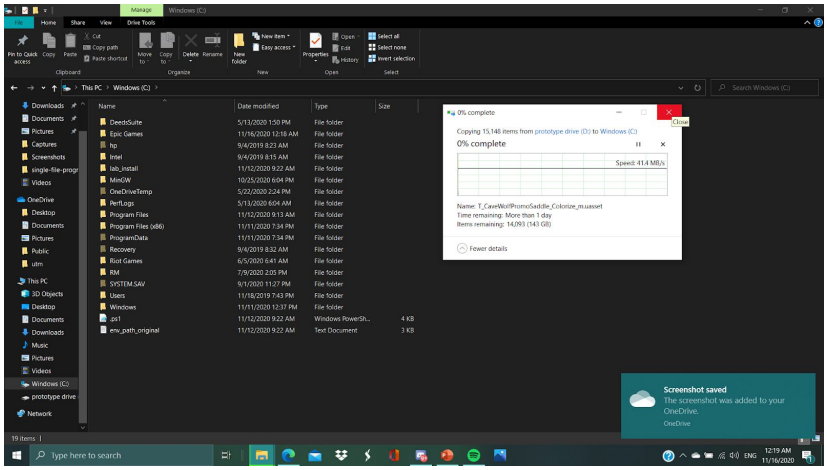
The device also can connect with laptop and computer using the USB port.

We also came out with an idea to make the device's cap to protect it.

v. Test

We tested the product to make sure it works properly. We connected it to the laptop and checked for the product's function. The images below show the data transfer from the device to the laptop.





Our product successfully transfers a large amount of data from the device.

## 5. REFLECTIONS

a. **What is your goal/dream with regard to your course/program?**

Regarding this course, our goal is to create a better future with a lot of new inventions that can be useful for each person in this world. Using the knowledge that we have earned, we can apply it in our daily lives to make the task easier to be done. In addition, we also can make a change to our world by contributing our ideas and efforts that can be useful and beneficial.

b. **How does this design thinking impact on your goal/dream with regard to your program?**

The design thinking process is really useful especially when we need to create a new invention that can change the future for good. By applying the process, we will understand better about the project. It will make the process go smoothly and all the difficulties can be overcome. The design thinking also gives us the inspiration to develop and upgrade the device to become a better version.

c. **What is the action/improvement/plan necessary for you to improve your potential in the industry?**

To improve our potential in industry, we could learn from this project how to analyze others' problems and provide them with a useful invention. Because in industry they always find a new invention that could help people and make profit out of it. We could also learn from other journals to improve ourselves. We will also need to learn public speaking for the purpose of interviewing people better and hopefully they will be open so we could know what their problems are.

**Savero Fajri Sutiono:**

From this project I have learnt a lot about secondary storage devices. From type of harddisks, head crash disaster, ssd, optical disc, cloud storage, storage area network even type of careers in the storage section which is one of them is disaster recovery specialist who gets a really high salary. And I also improve myself for public speaking through the interview I have made. There are also other things I have learnt that are analyzing people's problems and getting a solution for them which I believe is good.

**Muhammad Hafizzul bin Abdul Manap :**

In my opinion, this design thinking project is really useful and beneficial especially for engineering students. By applying all the processes, we can create an innovation without any problems and difficulties. It teaches us how to follow the right flow and order to create something new. For a person with a dream to become an inventor or designer, the design thinking skills are very important for them especially to develop the idea to upgrade the existing product. We also have good teamwork among the members. We can help each other and contribute the ideas to improve the project. For me, this design thinking project is very useful and beneficial and also can be applied in the future

**Abdulrahman A. Rafat:**

Unfortunately, due to a misunderstanding between me and my group members, we had less than 12hours to work on this project. I'm pretty satisfied with the outcome for such a tight time period. I think we learned as a team how to work together under pressure and come up with good results. Moreover, if the steps of our project were applied correctly with some improvements, it would be a great solution for a lot of people.

**Ibtesham Ahmed Promit :**

## 6. TASK FOR EACH MEMBERS

| NO | NAME | TASK |
|---|---|---|
| 1 | SAVERO FAJRI SUTIONO (A19EC3016) | ● Report writing<br>● Taking interview<br>● Idea generation<br>● Making presentation slides<br>● Prototype design |
| 2 | ABDULRAHMAN AHMED RAFAT ABDELHAMID (A20EC0523) | ● Report writing<br>● Taking interview<br>● Idea generation<br>● Making presentation slides<br>● Video editing |
| 3 | MUHAMMAD HAFIZZUL BIN ABDUL MANAP (A20EC0211) | ● Report writing<br>● Idea generation<br>● Making presentation slides<br>● Prototype design |
| 4 | IBTESHAM AHMED PROMIT (A20EC4027) | ● Report writing<br>● Idea generation<br>● Making presentation slides<br>● Prototype design |