



# Building Virtual World in Second Life for MEMS Education

Andrew Bell  
Ivy Tech Community College



BCC, FCC and HCP Unit Crystal Cells in Second Life



SCME Pressure Sensor & me

## Abstract

Second Life (SL) is a virtual world (VW) that was developed in 2003. The possibility of using virtual reality using Second Life was explored by many colleges for nursing, music, chemistry, biology, health care, geology, art, history, space (NASA), STEM and even engineering. My personal journey started June 15, 2008 as part of my coursework at Stevens Institute of Technology. Then in 2012 Linden Labs, the owners of SL, decided to eliminate the educational discount and many colleges left. The once growing group of educators sought greener less expensive pastures but they left their proverbial footprints in VW. In 2015, educators from Ulster University, UK, published an online article entitled "Engineering Education Island: Teaching Engineering in Virtual Worlds". Then on May 18, 2017 I rediscovered SL and began to formulate the plan to use the Ulster's article as a general roadmap to establish an IvyTech Engineering Island in 2020.

The Pandemic, new interest and lower cost have brought back the need for rediscovering how educators used SL in the old days. This presentation will describe Ivy Tech Community College's use and discovery of the potential for using SL for MEMS and Engineering Education. Ivy Tech's Engineering Island was purchased in April, 2020 and has been successfully used in many of the engineering technology courses during the pandemic for student presentation. It is our hope to build a virtual cleanroom so that students that do not have direct access to a cleanroom can develop an understanding of this technology.

## Questions and Answers

### What is Second Life?

**Ans** – Second Life is a virtual reality that is accessible via the internet. You download a viewer, create an avatar and explore by walking, running, flying or teleporting. It is like playing a video game.

**Background** – Second Life was created by Linden Labs and can be used freely by downloading the SL Viewer or you can buy land. SL has both developed and undeveloped land. Undeveloped is a blank area that falls into two sizes and costs.

Region	Setup	Monthly	Size	Avatars	Prim Count
Island	\$174	\$114	65K m <sup>2</sup>	100	20,000
Homestead	\$79.50	\$4.50	65K m <sup>2</sup>	20	5,000

Table 1 SL Invoiced Island Order Site<sup>1</sup>

Developed land is auctioned off as it becomes available. Another option is to buy pre-built venues such as the ones shown in Table 2<sup>2</sup>. These venues come fully developed and include landscape, building, classrooms, furniture, etc. This option will allow you to start quickly.

### Is it used by other colleges?

**Ans** – Second Life has been used by many colleges. The peak usage was about 10 years ago but many colleges jumped in and didn't have a good game plan for the use of Second Life.

## Questions and Answers

	<b>Horizons Community Center Demo</b> Looking for a fun and unusual hangout spot for your meeting or event? The space-age Horizons region greets visitors with a futuristic floating fountain surrounded by a large meeting hall and lounge area. There's also a modern bar where you can dance, socialize and have a drink with your friends and colleagues.
	<b>Academic Campus 1</b> Located in a region reminiscent of a Colorado mountain town, this campus is great for both indoor and outdoor study sessions. It has the largest amount of outdoor space of our currently featured campuses, with a playground, a soccer field with bleachers, and plenty of grassy areas all around.
	<b>Academic Campus 2</b> This campus has plenty of grassy outdoor space, with a soccer field and playground. Not far from the entrance, some benches provide a nice spot to rest and take in the calming green atmosphere and courtyard fountain. A ramp makes the entrance accessible, as inclusivity in design need not be limited to the physical world.
	<b>Academic Campus 3</b> This campus has a brick pathway and an enchanting woody area lining its perimeter. A quaint stone bridge in the back provides a view of the neighboring mountains. The main entrance leads to a front desk and central administration area, with 4 enclosed offices. All of the classrooms are labeled, making this the easiest campus to navigate. The first floor also has 4 classrooms and an auditorium. All gender bathrooms provide an inclusive atmosphere, as well as the accessible ramps leading to the auditorium stage.
	<b>Academic Campus 4</b> This large campus has the most spacious classrooms as well as two separate buildings with a total of 10 rooms that can serve as dormitory spaces or additional classrooms. The ample outdoor space has a stone walkway connecting the two entrances as well as benches and grassy areas by the water.
	<b>Futuristic Demo</b> One of our more ambitious options features a fun, futuristic-themed area that supports up to 90 participants. Visitors arrive in a central landing zone surrounded by a geodesic glass dome that can be used for welcome messages or more user tutorials. There are also two sandboxes that are perfect for team building and collaboration exercises, as well as an expansive solid white structure that features multiple circle-shaped meeting spaces including a huge round auditorium.

Table 2 Example Pre-Built Locations<sup>2</sup>

Horizons Community Center	<a href="http://maps.secondlife.com/secondlife/Venue/Demo/3/158/128/21">http://maps.secondlife.com/secondlife/Venue/Demo/3/158/128/21</a>
Academic Campus 1	<a href="http://maps.secondlife.com/secondlife/Venue/Demo/6/119/133/23">http://maps.secondlife.com/secondlife/Venue/Demo/6/119/133/23</a>
Academic Campus 2	<a href="http://maps.secondlife.com/secondlife/Venue/Demo/7/128/128/23">http://maps.secondlife.com/secondlife/Venue/Demo/7/128/128/23</a>
Academic Campus 3	<a href="http://maps.secondlife.com/secondlife/Venue/Demo/8/64/116/32">http://maps.secondlife.com/secondlife/Venue/Demo/8/64/116/32</a>
Academic Campus 4	<a href="http://maps.secondlife.com/secondlife/Venue/Demo/9/150/177/21">http://maps.secondlife.com/secondlife/Venue/Demo/9/150/177/21</a>
Futuristic	<a href="http://maps.secondlife.com/secondlife/Venue/Demo/2/133/126/27">http://maps.secondlife.com/secondlife/Venue/Demo/2/133/126/27</a>

Table 3 Example Pre-Built Locations<sup>2</sup>

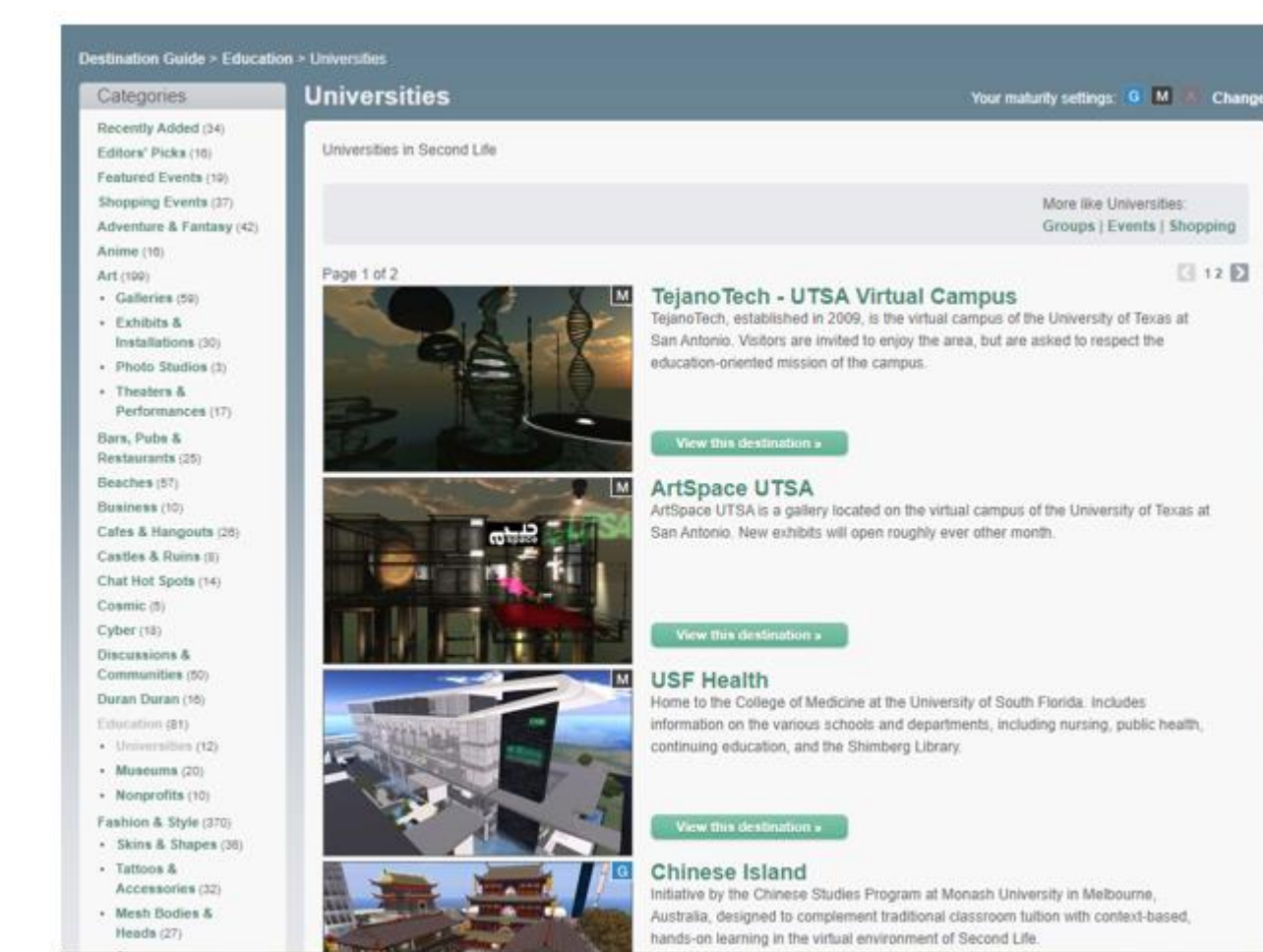


Figure 1 Universities in Second Life<sup>3</sup>

**Background** - Figure 1 shows active and public Second Life sites but represent a small subset of schools that are open to everyone. Many schools have opted to remain private so you would not be able to explore them unless they "open their doors". Figure 2 shows a list of a number of schools that were active in Second Life in 2013.

## Questions and Answers

**Background (continued)** - Many of these sites are now gone since the webpage was updated in 2013. However, with a little digging you might find some of the artifacts on the web of past successes with Second Life. You can also simply search for colleges in-world. When I searched 7/9/2021 I found 758 sites with the word "college" and 1083 sites with the word "university". If the site can be transported to it will have a small icon that looks like a globe at the right of the description. (See Figure 3 for more information.)

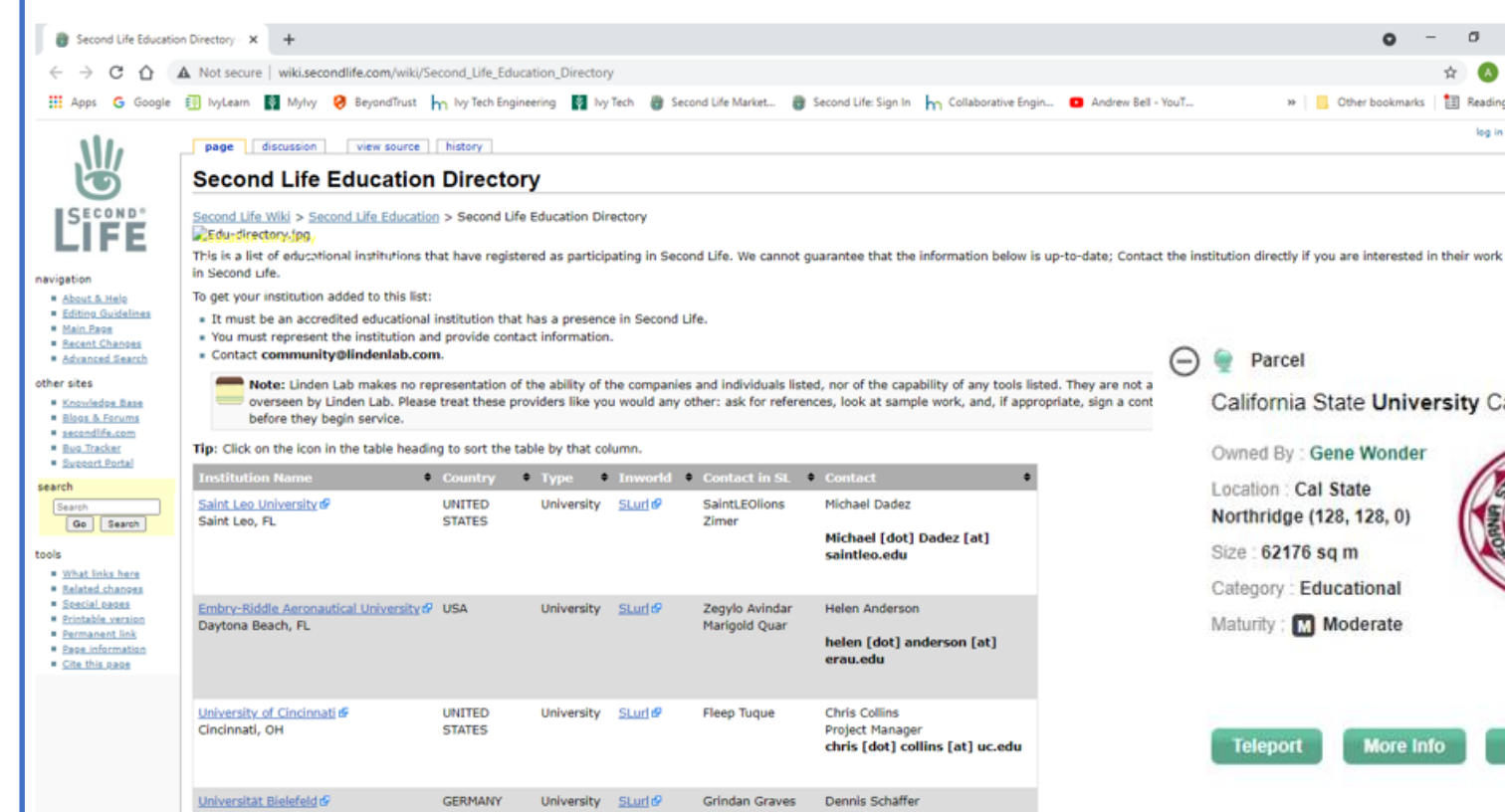


Figure 2 Second Life Education Directory<sup>4</sup>

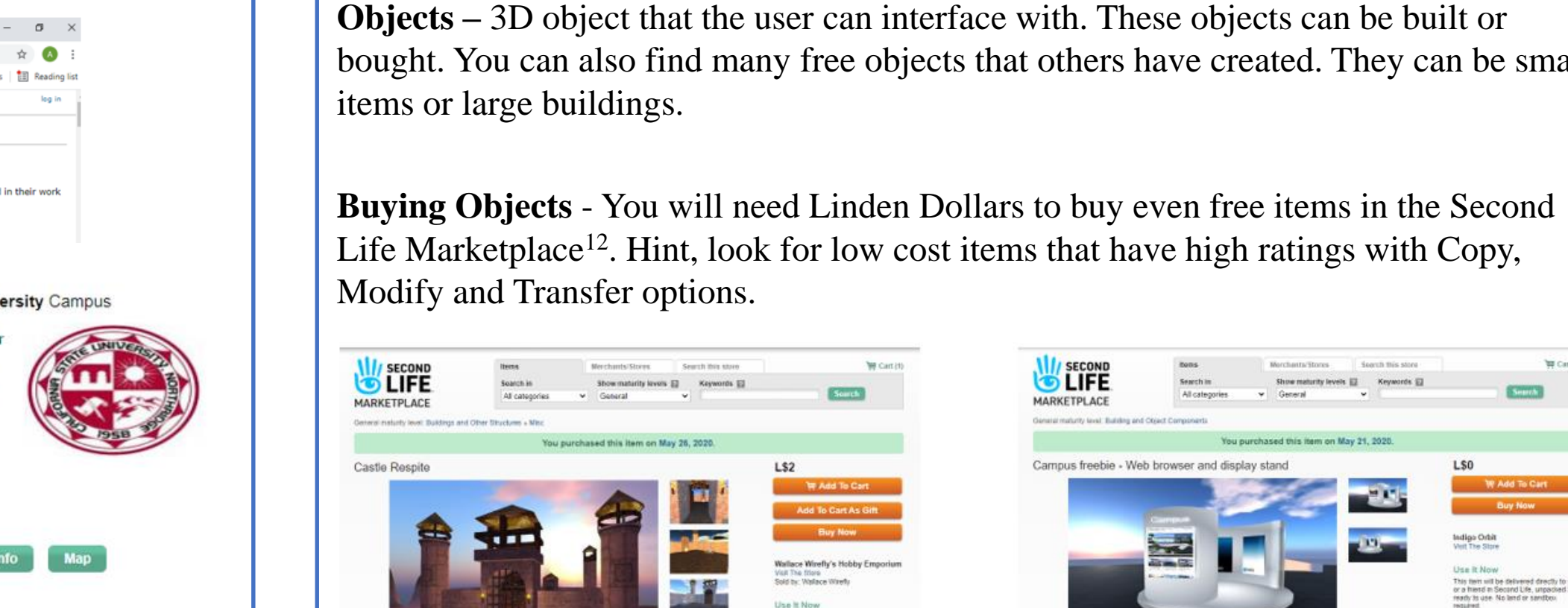


Figure 3 Example Site for Teleport

### How do we get it?

**Ans** – The Second Life Viewer is free to download<sup>6</sup>. Most PCs and MACs should be able to run SL but to check you can review the System Requirements site to see if your PC meets the requirements<sup>7</sup>. Then you will need to join<sup>8</sup> (register). At this point you will want to pick a username and password. The username will be your avatar's name. After registering this will establish your birth date in SL. My avatar name is **ivytechengineer** on Second Life. There is also another Second Life viewer, Firestorm<sup>9</sup>. This viewer seems to be pretty stable and has more features for building in-world. This viewer is also free. After you have an avatar you will need to learn how to walk, run, sit, fly, teleport, etc. in-world. It is very easy<sup>10</sup>. There are many places you can visit in-world to see what others have done to develop virtual realities.

**Background** - For integration into courses we have been using in-world presentations for many of the electrical engineering technology courses. Student create PowerPoint posters using one of the 96x48 poster templates. Then the poster is uploaded by the student as an assignment in IvyLearn (Canvas). The instructor downloads the posters and saves them as images. These images are then uploaded to the [www.ivytechengineering.com](http://www.ivytechengineering.com) webpage. FTP programs like Filezilla or WinSCP were used to upload images of the posters are placed within course folders. These files could then be accessed in-world using via the URL using the Media feature which can be added to face of objects. PowerPoint slideshows, poster and even YouTube videos can be added in-world.

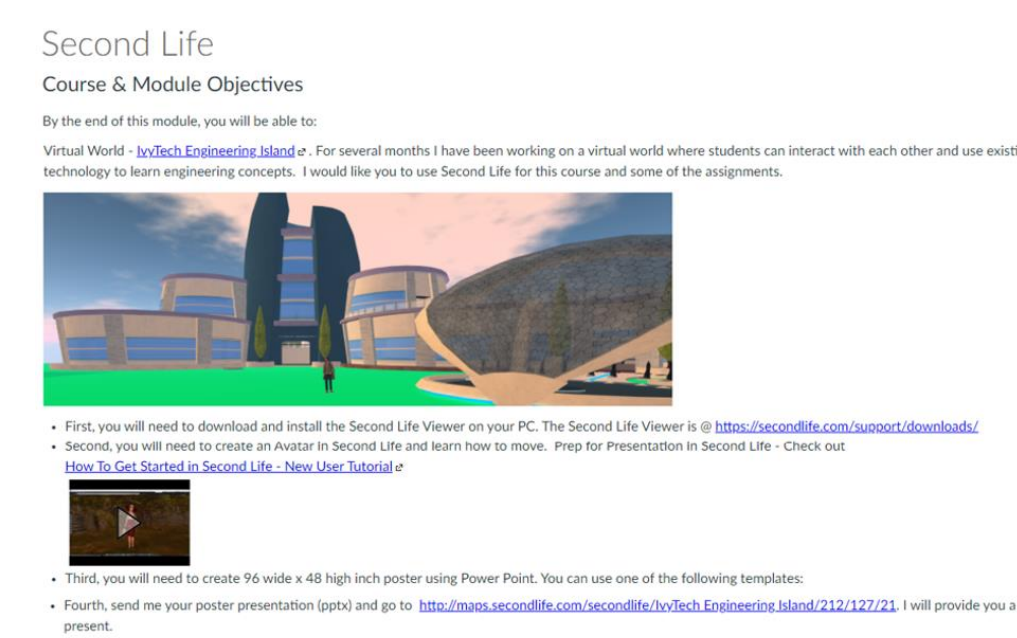


Figure 4 Second Life - Canvas

## Questions and Answers

### What's next?

**Ans** – Build your world and explore others. The sky is actually the limit for what you can do in Second Life. It is a robust, intuitive learning environment that provides many possibilities for exploration, sharing, creativity and education and it is very inexpensive and requires minimal cost per student (free to students, no VR headset required). For the instructor there are many resources available to develop the virtual environment.

**Objects** – 3D object that the user can interface with. These objects can be built or bought. You can also find many free objects that others have created. They can be small items or large buildings.

**Buying Objects** - You will need Linden Dollars to buy even free items in the Second Life Marketplace<sup>12</sup>. Hint, look for low cost items that have high ratings with Copy, Modify and Transfer options.

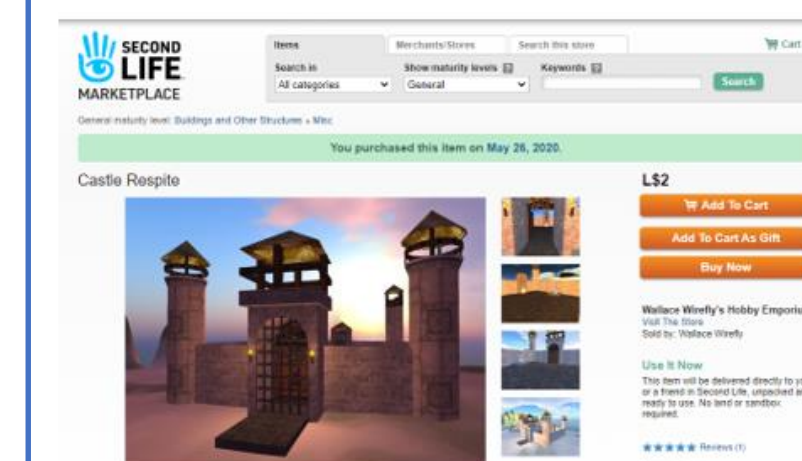


Figure 5a Example Item Purchased



Figure 5b Example Item Purchased

Figure 5a and 5b show items that were purchased and used in the IvyTech Engineering Island. You can also visit the store for the item being sold and contact the creator in-world using IM or notecards. IM is really just Chat in-world and notecards are text files that can be shared. Sometimes the store owner will contact you but many may not be as active as they once were. Just be patient.

**Building Objects (in-world)** – It is a little tricky objects in-world but there are some great YouTube videos that I have used. Please see the Building Virtual World reference<sup>13</sup> for building in-world for more information on building in Second Life.

### Building Objects (build and upload)

It may also be very helpful learning about Blender, a free graphical program that can be used to build models for Second Life. If you are new to Blender there are a number of excellent multi-part tutorials that exist. I have summarized many of the ones I have found for you @ <https://www.ivytechengineering.com/abell118/references/Blender/>

### Anything else?

**Ans** – Behind SL objects is a whole other level of sophistication to include "scripts". Scripts are the code that allow objects to do things in-world. A fish swimming around, an object changing color when you touch it, the giving and taking of notecards, floating text are all examples of just some of the scripts that can be used to bring life to objects. Again, I have summarized some of the reference info @ <https://www.ivytechengineering.com/abell118/references/SecondLifeInfo/>

## What's Next



Figure 6 In-World YouTube Videos

<http://maps.secondlife.com/secondlife/IvyTech%20Engineering%20Island/64/94/210>

## Conclusion

Using Second Life has opened up many possibilities for teaching and learning. Instructors can add graphical course content that allows for user interaction with models. The models can be built by students and uploaded to SL for a very small cost. Scripts can be added to models to enhanced learning interactions. No VR headsets are required and most school PCs should be able to run the SL Viewer. and Students can present posters, interact with models, create and discover as they learn about MEMS. The goal is to build a virtual cleanroom that will allow students to interact with the cleanroom equipment and environment. Second Life also allows for access to web-based material in-world so this should enhance student learning because the course material can be integrated with the visual environment. Also, gamification can be added to SL to further engage students in learning.

## Acknowledgements and References

A special thanks goes out to Dr Matthias Pleil and SCME for his continuous support.

- 1 - SL Invoiced Island Order Site <http://specialorders.secondlife.com/>
- 2 - Explore Virtual World Meeting Spaces <https://www.connect.secondlife.com/explore>
- 3 - Destination Guide>Education>University <https://secondlife.com/destinations/learning/universities>
- 4 - Second Life Education Directory [http://wiki.secondlife.com/wiki/Second\\_Life\\_Education\\_Directory](http://wiki.secondlife.com/wiki/Second_Life_Education_Directory)
- 5 - **Virtual Worlds Teaching Manual** by Gregory Perrier, August 2020, <https://online.nvcc.edu/it/docs/sl/Virtual-Worlds-Teaching-Manual.pdf>
- 6 – Second Life Download - <https://secondlife.com/support/downloads/>
- 7 – Second Life System Requirements - <https://secondlife.com/support/system-requirements/>
- 8 – Join Second Life - <https://join.secondlife.com/>
- 9 – Second Life Viewer - <https://www.firestormviewer.org/>
- 10 - How To Get Started in Second Life - New User Tutorial <https://www.youtube.com/watch?v=4Y26VOR3ksU>
- 11 - Second Life Teaching Tools: Shared Media (Web on a Prim) - <https://www.youtube.com/watch?v=oN8ELVbNfCI>
- 12 - Second Life Marketplace <https://marketplace.secondlife.com/>
- 13 – Building Virtual World <https://www.ivytechengineering.com/abell118/references/BuildingVirtualWorld/>