# Robotics II Lessons for 30 March – 3 April 2020

Greetings from my secret, underground bunker. So, we have more information about what will happen with the school year, which includes more classes from home. Mr. Larivee and I have been working on ideas, and he has a meeting with Mr. McMinn Monday afternoon to see how far we can go to make this interesting.

I have spent the last two weeks watching videos and learning how to work with the Raspberry Pi, as well as ideas for projects. If you haven't already done so, please come up with answer to last week's question:

> *If we need an analog to digital converter right now, with only the components you have seen in class, what can we use?*

I'm trying not to give the answer away, but the next question is:

> *How would we get this information into the Pi? (HINT: I am thinking of three.)*

I don't know if I have a school e-mail account, so for now, please send answers to: sanjuandf79@gmail.com.

Please watch this video, then I will share my thoughts.

https://www.youtube.com/watch?v=p40OetppIDg

So, which one do we need to learn? The answer is *BOTH!*

I have yet to find a video that admits that there are no analog to digital converters (ADC) on the Pi. We have microcontrollers that can accomplish this function. Then there is something known as distributed control systems. Using microcontrollers to do the simple tasks that exchange information with a microcomputer to monitor the entire system and make decisions to send back to the microcontrollers so that all parts of a complex system work together and respond to changing situations. There are many companies that have developed these systems, Honeywell and Allen Bradley to name a couple, and they cost a lot! There are many more engineers and instrument technicians that get paid BIG BUCKS to implement and operate these systems. They are found in almost every industry. Just by playing with Arduino and Pi and watching many YouTube videos, I have been able to build a few, ON THE CHEAP.
I know robots are fun, and some applications make good use of these in industry, it is the control system that makes them work together. We still have a lot to learn about Arduino, but you already know the basics and how $C^{++}$ programming works. From here on out, I would like to focus on Arduino solving problems that ***you*** come up with, and we will figure it out together.

Now is the time to focus on Pi and the PYTHON language. It is much easier than I thought. Here are some more videos to watch.

https://www.youtube.com/watch?v=Crsp_He70no

Wow, that is much easier than C++. It's even easier than a language called BASIC, that Mr. Larivee and I used back in the 1980s. Did you notice, you didn't have to compile the program? And you didn't have to load it onto a Pi. We will probably start out just using the IDLE to simulate running code on a Pi. Better yet, we can run PYTHON on Pi to both write and run programs without having to use a laptop to write and compile the code. And we have the a HDMI port built into the Pi, no writing to the serial bus to see the results.

These videos start to look at how to use the GPIO pins of the Pi. That is what makes the Pi better than your laptop for robotics or any other type of process monitoring or controlling.

https://www.youtube.com/watch?v=NAl-ULEattw

https://www.youtube.com/watch?v=41IO4Qe5Jzw

https://www.youtube.com/watch?v=AZSiqj0NZgU

I think this is enough for this week. Once I hear back from the school, I will update this lesson about possibly getting you to load PYTHON at home. Please come up with ideas of things you would like the Arduino to do for you. I have found several of ideas like turning on lights, watering plants, opening and closing blinds, and many more. Look around on YouTube, come up with your idea and e-mail it this week. Then we can research it together and come up with a with how to build a system to accomplish this.

Stay safe!

Mr. C