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Topics in CS1

Professor Szecsei

## Musical Blocks

### Original Project Pitch Summary:

In my musical blocks project, multiple Cozmo's will look around for a block to pick up. Since there will be less blocks around than there are Cozmo robots, some of them will find blocks and some will not. Those that do find blocks will win and should celebrate accordingly. My original, baseline goals are to have the Cozmo's roam around in a confined area before being triggered through networking to begin play and after the round (when all the blocks have been found), have those that found a block celebrate and those that didn't get sad.

### Project Development:

When starting this project, I made sure to begin by laying out the idea of how I would implement my project. I decided on making two different codes, one for the master to run the game without a Cozmo and another for all of the computers controlling a Cozmo. These codes were to connect via networking. At first, I tried to make the code as good as possible without involving the network. I ran into one big problem during this timeframe that cost me a lot of time. I was attempting to keep Cozmo moving around in a confined area but couldn't find a way to do so. I tried using the memory map as well as creating bounds and checking Cozmos position. This is a problem I never truly got past and ended up having to give mostly up on. Now, the Cozmos just spin in place instead. During this timeframe I also had a couple successes. I was able to get music to play through pygame and start it at a randomized time, as well as have it run for a randomized time that comes from an interval you can specify. Once I begun using the network, I started with just trying to get one Cozmo to do the correct activity. Then once I felt that was enough to move on I opened it up to two Cozmos which was much more difficult because the Cozmos don't always play nicely together. During the debugging process with 1 or 2 Cozmos I had many successes and failures. Most of the failures came because of my lack of understanding with how the network works as well as trying to patch up specific problems rather than wholistic fixes to improve the code. This led me down a path that eventually made it hard to troubleshoot problems inevitably giving me less control over my code. While I originally was very stressed out about Denise's suggestion of making new code starting from scratch by working through the logic of my code with comments, then adding in my old code in chunks, it ended up being very beneficial to

solving problems with my network communication and getting rid of useless variables and loops. This helped fix my problem of them not always continuing to look for a block until they are found as well as celebrating appropriately if they have a block or not when the game is over. Now that this logic is fixed I am continuing to work on more than 2 Cozmos to have multiple rounds and multiple blocks. This has been tested very few times and runs okay, but I have yet to master it. Another problem I am having with the Cozmos that I can't fix without human intervention as far as I'm aware is when the Cozmos take a block that has already been found. My fix to that is to take the blocks away once it has been picked up. Lastly, I am still unsure if having others on the network will greatly affect my code, so this is one possible fatal flaw to my design. Overall, I am very happy with how my project has ended up. Through the countless hours and challenges that went into this project I have learned a lot about python, installments of software, networking, and the real world struggles of linking software to the hardware that runs it.

#### Set Up Instructions:

##### Connecting to the Network:

- Go to the Cozmo network and enter in the correct password (if you are using a different network you will need to enter in that IP address and port number into the code)
  - In the case you need to force send a message in the network or want to see what is being sent in the network...
1. Open the command prompt
  2. type "python" then hit enter
  3. type "import socket" then hit enter
  4. type "s = socket.socket()" then hit enter
  5. type "s.connect(("10.0.1.10",5000))" then hit enter
  6. Then to receive the messages type "s.recv(4048)" then hit enter or to send a message type "s.sendall(b'YourMessage')" then hit enter

Need to have git downloaded and installed to clone the repository

-To clone the repository:

1. Copy the cloneable link from this github  
<https://github.com/kaylamf25/MusicalBlocksCozmo>

2. Open the command prompt and navigate to the file or area you would like to clone to
3. Type “git clone” then paste the link and press enter
4. Now open the file from wing or some other software capable of handling python

Need at minimum 3 computers and 2 Cozmos. You will always need to have one more computer than there are Cozmos.

Master (one computer that will “run” the game):

-Have a music file downloaded of what song you’d like to use and change the filename in this line:

```
pygame.mixer.music.load("The_Hamster_Dance.mp3") #211 seconds long
```

Based on the length of the song change 211 in this line:

```
startTime = random.randint(0, 211-waitTime)
```

to however long your song is in seconds

Other computers (have a Cozmo set up and attached):

-Need pygame installed

1. type “pip install pygame” then hit enter for windows

For a mac it may be pip3

-If you would like to see what each cozmo is seeing you need to install tkinter, numpy, and pillow you use the same technique for installing pygame but just replace the word pygame with tkinter, numpy, and pillow.

-If you would not like to see what cozmo sees you will need to comment out these lines:

1. import tkinter
2. import numpy
3. import PIL

And take out “,use\_viewer=True,force\_viewer\_on\_top=True” from the `cozmo.run_program` line

-If there is a problem saying that there is no device connected (like a phone) for apple download iTunes

-If the sdk needs to be updated for Windows type this statement into your command prompt: pip install --user --upgrade Cozmo

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Professor Szecsei- all of the time and help with the network and setup of Cozmo's and laptops and helping me through problems in my code

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Matt Dargan- Helped me get my feet wet in python coding as well as helping me update my sdk a couple times.

<https://www.pygame.org/download.shtml>

#### YouTube links to my videos:

<https://www.youtube.com/watch?v=GVSc39Bhq30>

[https://www.youtube.com/watch?v=tAkCx\\_hYtPk](https://www.youtube.com/watch?v=tAkCx_hYtPk)