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Honors Advanced Topics in Computer Science
Learning Module #5 - RC Car & VR Exploration

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LM #4 LOG

IN SCHOOL

November 13th: Day 1
Block F:
Present - Nico and Lenny:

- Nico and Lenny began to charge and set up the VR, while the VR is charging Nico and Lenny researched the functionality of the VR, and how we can begin to set it up to the laptops. Nico and Lenny were experiencing difficulties with the connection of the USB-C connection to the laptops.

November 14th: Day 2
Block F:
Present - Nico and Lenny:

- Nico and Lenny set up the VR Headset on the desktop computers and began doing research on how to translate camera movement from Unity to an Arduino via watching Youtube videos which is the main basis of Nico and Lenny's learning module.

November 15th: Day X
Block F:
PRESENTATION (SOFTWARE ENGINEERING)

November 16th: Day 3
Block F:
Present - Nico and Lenny:

- Nico and Lenny spent a portion of the class time soldering a motor shield together which helped us to apply our knowledge of soldering. After doing this, Nico and Lenny tried to get the VR Headset to connect to the laptops again. While this was happening, Lenny and Nico analyzed previous RC Cars to assess the functionality of the cars and how they worked so Nico and Lenny had an idea of how to apply their idea for the learning module to the RC Cars.

November 17th: Day 4
Block F:
Present - Nico and Lenny:

- Nico and Lenny began to connect female to male and male to male wires to the arduino shield and arduino IDE to begin setting up the camera movement on the servo that was given to Nico and Lenny by Mr. Detrick. Nico and Lenny were able to find a code to

work the servo and its movement, and also found a helpful article to guide us with the process.

https://www.circuitbasics.com/controlling-servo-motors-with-arduino/
https://learn.adafruit.com/adafruit-motor-shield

November 20th: Day 5
Block F:
Present - Nico and Lenny:

- Nico and Lenny scratched the idea of connecting VR to the RC Car, rather Nico and Lenny are going to control the RC Car via a controller, and spend the bulk of the rest of the learning module building the RC Car, and setting it up to the movement through the controller.

November 21st: Day 6
Block F:
Present - Nico and Lenny:

- Nico and Lenny began gathering the parts for the RC Car which include the Arduino, Motor Shield, Wires, and began building the base to place all of the components on the RC Car.

November 27th: Day 7
Block F:
Present - Lenny:

- Lenny tried to the best of his ability to figure out the mechanics of an RC Car, and how it can be connected with the Arduino and Motor Shield with Lenny being brand new to the process of building an RC Car, Lenny finds much difficulty without the presence of his partner Nico. Nico come back pls.

November 28th: Day 8
Block F:
Present - Lenny:

- Per. Following Mr. Detrick's advice, Lenny mainly focused on programming using the motor shield and arduino while Nico is absent. Lenny successfully set up the wires from the RC Car to the motor shield, and began doing research on how to program the Motor Shield & Arduino as Lenny is a beginner to using the Motor Shield & Arduino. Lenny managed to set up the Servo Motor to the Motor Shield and was thoroughly surprised it started to work after Lenny plugged it in and put the code in Arduino.

November 30th: Day 9

Block F:
Present - Nico and Lenny:

- Nico and Lenny reverse image searched the motor shield to find the exact model. (Nico's idea was absolutely genius) From there Nico and Lenny used ChatGPT to facilitate the functionality of the motor shield, and figure out the code to make the RC Car move. Nico and Lenny acquired knowledge from the AI and will experiment with the knowledge the next day.

December 1st: Day 10
Block F:
Present - Nico and Lenny:

- Nico and Lenny managed to accomplish programming the RC Car movement. To troubleshoot and fix the problem before, Nico rearranged the A & B wires on the motor shield. Nico and Lenny found a diagram for the functionality of the motor shield. Now, after getting the RC Car movement to work, Nico and Lenny will be watching a Youtube video to control the Car movement via Bluetooth on the phone.

December 4th: Day 11
Block F:
Present - Nico and Lenny:

- Nico and Lenny tried to solder the copper wires onto the motor shield, but were having difficulties since after the solder was placed onto the area we were soldering, the wire would not stick, thus making the process much more difficult. Lenny and Nico will continue to troubleshoot the issue the following day.

December 5th: Day 12
Block F:
Present - Nico and Lenny:

- Nico and Lenny figured out the copper wires were the main issue for the solder not sticking in the motherboard. So what Nico and Lenny did was use the female and male wires and connected the male part since it was a different material which allowed Nico and Lenny to keep the wire and solder in place. Nico and Lenny finished soldering the Bluetooth chip and its corresponding wires that day. Nico and Lenny also installed the battery onto the motor shield.

December 6th: Day 13
Block F:
Present - Nico and Lenny:

- Nico and Lenny soldered the wires to the servo part of the motor shield to control the back wheels. This allowed Nico and Lenny to drive the RC Car forwards and backwards.

Now, Nico and Lenny will set up the movement of the RC car via the bluetooth chip Nico and Lenny installed previously.

December 7th: Day 14
Block F:
Present - Nico and Lenny:

- Nico and Lenny researched and looked for a video on Youtube to aid Nico and Lenny in controlling the RC Car via Bluetooth and came across a video which showed us the code, and the app needed to control the RC Car. When Nico and Lenny downloaded the app, and downloaded the code onto the arduino, Nico and Lenny were still having issues. However, towards the end of the period, Nico and Lenny pinpointed the exact problem which was the power source. Nico and Lenny only had 1 battery connected to the motor shield, and will try 2 batteries the next day.

WOW! Amazing DIY Bluetooth Robot Car - Control with Your Smartphone

December 8th: Day 15
Block F:
Present - Nico and Lenny:

- Nico and Lenny test drove the RC Car using the smartphone app connected to the Bluetooth Chip Module. The movement was in perfect order, all the directional movements worked the way they were supposed to. Nico and Lenny replaced the RC Car with a new one which had better turning movements.

WORK AT HOME (Minimum of 1 hour for each 5 days of a LM)

11/19/2023 → 10:00 AM ⇒ 1:30 PM **(NICO)**

> Nico worked at home to figure out how to set up a VR project in unity and how to take values from the headset and make them do things. He also played around with the Quest2 itself, factory resetting it so that he could set up a developer account rather than a normal user account. In order to do this he also had to install the quest app on his phone and pair with the device in order to then have the option in settings to enable developer mode. In order to do most of this, he opened a dialogue with ChatGPT to walk him through the steps to get past any unforeseen errors that articles didn't explain.

12/7/23 → 8:30 PM ⇒12:00 AM **(NICO)**

Nico worked on quite a few things at home. His first priority was making a function to get the servo to spin which was harder than expected because most servos have 3 wires, but the one that comes with the RC car only had 2 because it was an analogue servo. Giving it enough power was quite a challenge, but eventually he just set it up as though it were another DC motor which did the trick. Then he shifted focus to bluetooth. He resoldered a wire for the Arduino that had come out and then was able to connect to the HC-06 with the Quest2. After this, he spent a lot of time attempting to write code based off of examples he found online which did completely different things, to send a message from Unity to the Arduino. In theory his code could work, but when the project was built and run, it didn't do anything so he'll likely bring home the project again to try and debug it soon because Nico's only able to work on his computer at home on this project.

This link was used to solve a problem with being unable to use the System.IO.Ports class in Unity.
https://forum.unity.com/threads/cant-use-system-io-ports.141316/

This link was the main source of example code even though it does something completely different with bluetooth.
https://stackoverflow.com/questions/62990241/connect-unity-game-with-arduino-bluetooth-module-hc-05-or-esp32

12/2/23 (Saturday, December 2nd) **(LENNY)**
Starting Time: 11:35 AM
Ending Time: ~ 1:45 PM

- Due to Lenny's lack of knowledge on using an Arduino IDE, and Arduino Motor Shield to program an RC Car, Lenny learned more about the functionality of the Arduino Motor Shield via Youtube videos and articles.

  Resources Linked Below:

  Motor Driver | How to use Arduino Motor Shield to drive different types of DC M…

  https://www.instructables.com/Arduino-Motor-Shield-Tutorial/

  Within this article below specifically, there were many sections so Lenny viewed the sections he deemed to be important in helping his partner, Nico, with the learning module of the RC Car.

  https://docs.arduino.cc/learn/starting-guide/getting-started-arduino

12/7/23 (Thursday, December 7th) **(LENNY)**
Starting Time: 8:30 PM
Ending Time: ~ 9: 25 PM

- Relating to the topic of the RC Car, Lenny was intrigued to learn more about the mechanics of how an arduino and motor shield could be used in different ways for RC Cars. Lenny watched and analyzed the videos linked below to see if he can gain some insight on why certain parts work in an RC Car using his knowledge from watching the Arduino and Motor Shield videos.

  DIY Smartphone Controlled RC Car

  WOW! Amazing DIY Bluetooth Robot Car - Control with Your Smartphone

  https://www.youtube.com/watch?v=Q36NbjPMV5k

  https://www.youtube.com/watch?v=hI0UBvpuRTw

  Arduino obstacle avoiding + voice control + Bluetooth control Robot | DIY Arduin…

  Upon analyzing many of these videos, Lenny started to notice many compatible parts that were used in the videos, similar to what Nico and Lenny are using for their RC Car. The main

components are the Arduino IDE, Arduino Motor Shield, some sort of motor to control the wheels, and a power source (batteries or another external power source).

MAKE-UP WORK FROM ABSENT (40 minutes per day)

Days to Make Up: 11/27 & 11/28
12/2/23 → 11:00 AM ⇒ 3:20 PM (With a Lunch Break from 12:30 ⇒1:30)
Nico:

- In an attempt to get VR to work after having failed completely last time he took the headset home, Nico began from scratch to try and get a basic program from Unity to run on the Quest 2 headset. From his last attempt, the headset was already in developer mode, so all he had to do in theory was follow any YouTube guide to get it to work. He first tried to follow a tutorial from the channel "Valem Tutorials" which seemed to work, but when running the program nothing happened. After a LOT of digging, Nico found a ton of errors that needed fixing that were related to plugins, extensions, and settings that he had to fix. He then found a specific video explaining in detail exactly what settings should be used so that eventually, after a lot of messing around with things, Nico was able to get a program from Unity to play on the headset which felt like a massive achievement considering the amount of time it took to get to that point.

  Valem Tutorials - YouTube → How to Make a VR Game in Unity - PART 1

  How To Build a Unity VR project to the Oculus Quest (and other devices)

RESOURCES PAGE:

- Used to facilitate bluetooth communication between unity and the arduino without having to pay for a plugin.
  https://github.com/bentalebahmed/BlueUnity\

- Used to expand the basic knowledge of arduino, and the mechanics of each of the components on the Arduino Motor Shield.
  https://www.circuitbasics.com/controlling-servo-motors-with-arduino/
  https://learn.adafruit.com/adafruit-motor-shield

- Video Nico and Lenny used to guide Nico and Lenny through the process of setting up the RC Car movement to a smartphone.
  WOW! Amazing DIY Bluetooth Robot Car - Control with Your Smartphone

- Links below were used for Lenny on his learning for Arduino to further enhance his knowledge on this topic for future learning modules.
  Motor Driver | How to use Arduino Motor Shield to drive different types of DC M…
  https://www.instructables.com/Arduino-Motor-Shield-Tutorial/
  https://docs.arduino.cc/learn/starting-guide/getting-started-arduino

- More links below that used the Arduino and Motor Shield in an RC Car which Lenny analyzed to see what parts of the videos Lenny could take out and draw similarities to the videos that Lenny watched linked above.
  https://www.youtube.com/watch?v=Q36NbjPMV5k
  https://www.youtube.com/watch?v=hI0UBvpuRTw
  Arduino obstacle avoiding + voice control + Bluetooth control Robot | DIY Arduin…