



American International University-Bangladesh (AIUB)

Department of Computer Science and Engineering

Faculty of Science & Technology (FST)

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CSC4182 - HUMAN COMPUTER INTERACTION

Section: B

Project Title: Racing game simulator

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Introduction:

Short Overview: Driving simulators are used in driver's education classes provided in educational institutions and by private businesses as well as for enjoyment. In the automotive sector, they are used to create and assess new automobiles or new advanced driver assistance systems. They are also used for study in the fields of human factors and medical research, to monitor driver behavior, performance, and attention. Besides formula one racers are trained and practice by the simulator.

Project Background:

Identification Of problem:

These days, there are a ton of racing games accessible, and playing them is so much fun! In most of these games, the joystick or keyboard is used to operate the car. What if we could manipulate it with our hand motions? Such a feature will add appeal to the games and enable creators to draw in more players. In order to implement this concept, we created a gadget that uses Unity3D and Arduino to allow the player object (the automobile) to be controlled by hand motions.

Background study:

The majority of games played today require a specialized device to be used, such as a video game console, a personal computer, a mobile phone, or a tablet. Two significant problems exist between the games and the game consumers, although the special effects and image processing are gripping for the games created for these devices. First, creating an immersive gaming experience is difficult because consumers can only experience game scenes on the display screen. Second, consumers cannot control the games naturally; only through conventional interaction devices like the rocker, keyboard, and mouse. The virtual reality (VR) headset and Arduino somatosensory interaction mechanism for three-dimensional (3D) game creation was employed in this study to overcome these two problems.

Goals:

The device consists of a simple controller that is made up of an embedded sensor, the accelerometer. The game we will make will be a car racing game made using the Unity web engine. The player would control the movement of the car in the game by simply turning the hand wrist, which would turn the car, accordingly.

Methodology:

Component:

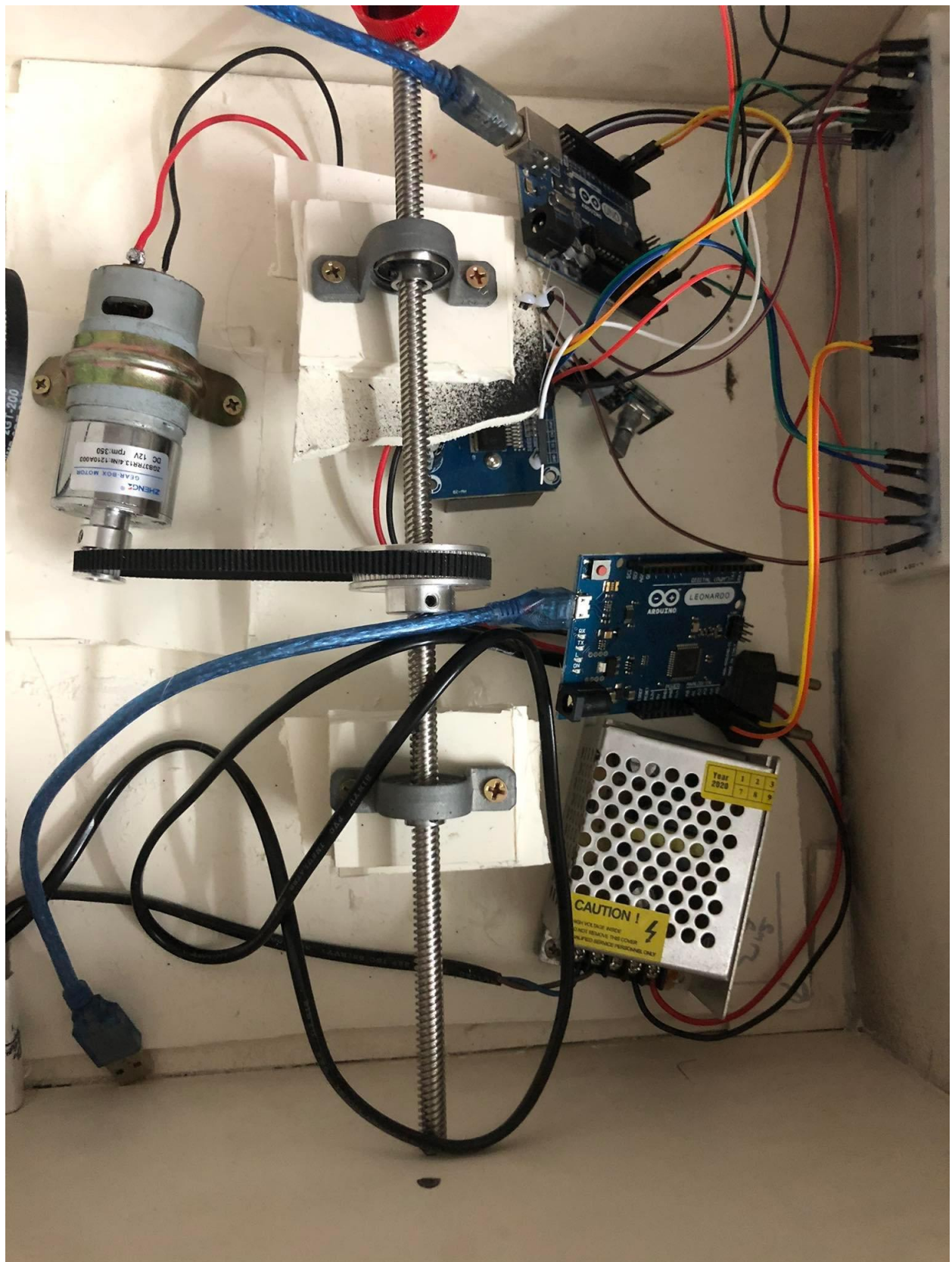
Component Name	Value	Quantity
Gear Box dc motor	12-volt, Rpm 350	1
Power supply	5 volts	1
Steering wheel bx kit	-----	1
Pulluy	8mm	1
Pulluy	6mm	1
Bearing	8mm	2
Twisted rod	8mm	1
Gear driver IDB2	H bridge	1
Bread board	-----	1
Jumper cables	-----	-----
Timing belt GT2		1

Implementation planning & Implementation:

At first, try to use rotary encoder but rotary encoder has two pin clk and dt. That's why joystick didn't get intrigued with rotary encoder. To resolve this boot loader problem, used B10K potentiometer instead of rotary encoder. After that, manually scripted to crack mm joy 2 software. Then we connected Arduino UNO R3 with the mm joy 2 software.

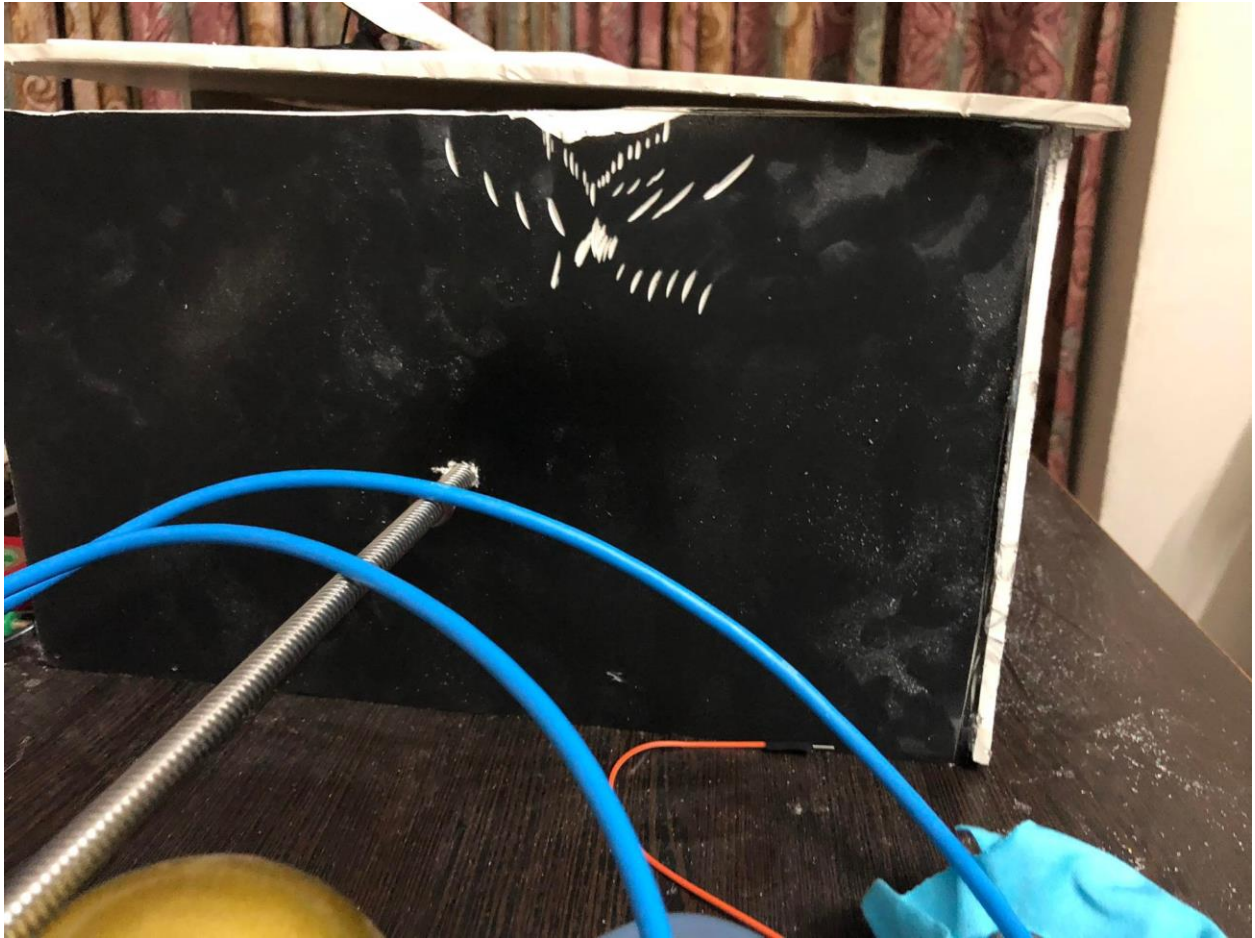
To apply forced feedback, used gear box motor and connected it with potentiometer through bearing belt. Gear box will work as reverse mechanism to potentiometer. So, if potentiometer work clock wise then gearbox motor will work anti clock wise and vice versa. Used Arduino Leonardo for measuring potentiometer angle. If the potentiometer angel reached +30° the force feedback will turn on. To set the direction of potentiometer used int sensor source.

Used analog pin A0 at Arduino and picked mco port as f7. Used rotary encoder switch for paddle and break. PVC board for create overall body.









Result:

The outcome is a simulation experience that is incredibly realistic. Given that all of the mechanical components on my computer are made of wood, the way it built this is also extremely astounding. The force feedback motors are controlled and the sensor values are read using an Arduino Leonardo. The Leonardo was picked because, when plugged into a computer, it can be readily configured to appear as a USB HID (Human Interface Device). As a result, the controller may be used with any game on my computer exactly like it would with any other gamepad.

Discussion:

The project could've been better and easy to conduct if the 3D printer was used. The different components were really hard to collect and faced a lot of challenges but finally the hard work paid off. It can be used in PC for now. Looking forward to make one for both PC and consoles.

Conclusion:

To provide a more user-friendly manipulation mode for vehicle games, this study focused on the integration of Arduino. It also leveraged the interactive design elements of Arduino. The testing findings showed that there is a large range of Arduino sensing devices, making it simple to link them with UNITY games and get good execution performance. As a result, it is expected that Arduino will be able to provide VR developers with more diverse creative studies and combinations in the future. Additionally, it is important to remember that the Internet of Things (IoT) and Arduino are both major development trends for information technologies during the next ten years.

