Virtual Museum For Assembly

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The title of this project is Virtual Museum For Assembly. The names of the group members are Darren Sumpter, and Phillip Devreaux. The name of the faculty leader is Dr. Sharad Sharma. The Material copied from other sites include a 3D Car, 3D tires, 3D Jack, 3D computer parts, 3D auto shop, and 3D computer classroom . These materials were all taken from Google Sketchup. The major tools used to create this project were Google Sketchup and Unity 3D.

Goals and Objectives

The goal of this project was to create a realistic teaching environment where users could go to learn how to perform practical tasks such as tire changing and computer building. Furthermore, we wanted our environment to be so realistic that once users performed these practical tasks in the virtual simulation, they would need zero real world experience after using our simulation. Users would just be able to encounter the real life situation with complete confidence in their newly acquired skill set gained from the virtual environment.

Modeling

The environments consist of a realistic car model, car part models, computer part models, desks, an auto shop, a classroom, and a lobby where the simulation initially starts. These parts were used to add realism to the 3D environment. For example, the user starts the simulation in a 3D lobby where they can go up to a wall where there are picture frames put into two categories. The two categories are labeled car care and computer care as show below in Figure 1. Under these two categories, there are clickable pictures placed showing the each task to be performed. When the user clicks one of these pictures, they will be taken into a level to start the simulation they clicked on. The two simulations include either a tire changing environment or a computer assembly environment. If the player chooses the car environment, then he will be placed the an auto shop as shown in Figure 2. If the player chooses the computer environment, they will be launched into the environment shown in Figure 3. The car environment will be used teach the

user to change a tire. The computer environment will show the user the names of the computer parts, and allow the user to assemble a computer as shown in Figure 4.

Next, in the Figures shown below, lights were used to illuminate the environment's interior as shown in Figure 5. A timer was used to show the time taken for the user to complete the tire changing simulation as shown below in Figure 2. Also, keyboard functionalities and mouse callbacks were used to switch between simulations and to switch to tire cam as shown in Figures 1 and 6. Furthermore, the input devices used here were the keyboard and the mouse of the computer. A skybox was used outside of the auto shop to add realism to the environment shown in Figure 7. Next, an audio file is present in the game by default to add sound the users footsteps in the environment.

Action events are used in the environment to animate the tire iron and jack to lift the car, open the trunk, remove screws, remove the tire, and add a spare tire as shown in Figures 11, 10, 9 and 8.
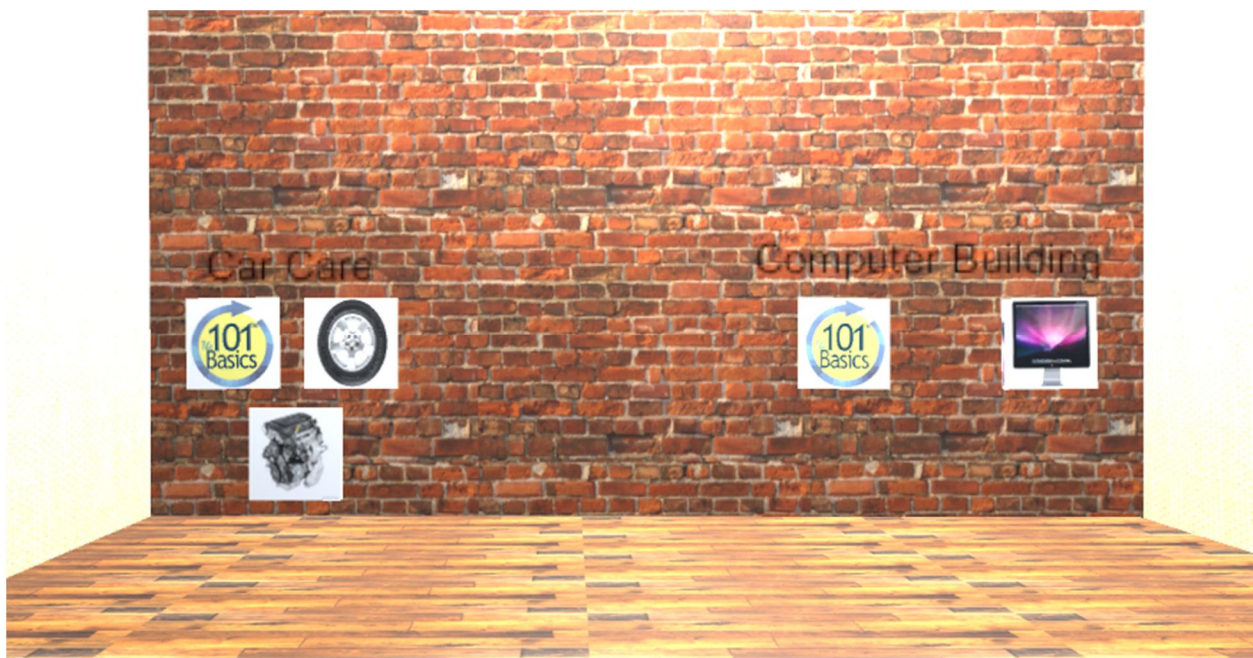

Fig.1 Lobby. This is the lobby environment where users can choose simulations.

Fig. 2 Auto shop. The auto shop for car care is shown here.

Fig 3. Computer Assembly Classroom. This is where the user will virtually assemble a computer.

Figure 4. Computer assembly simulation. This simulation allows the user to click and drag the parts of the computer into the cpu shell.

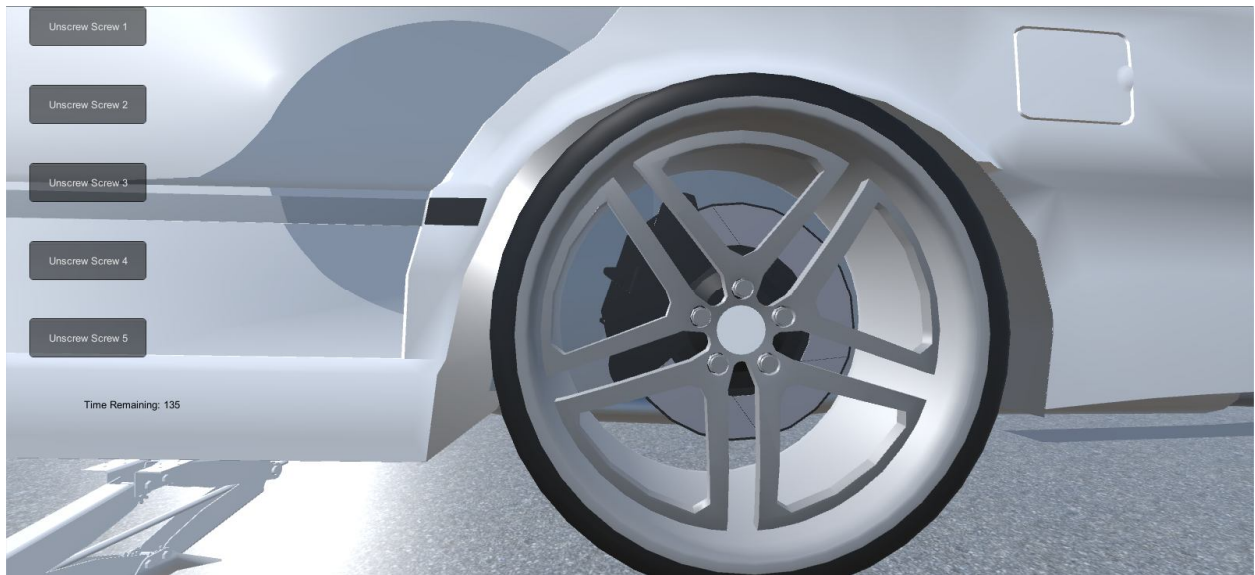Figure 5. Lobby lighting. The lights to light up the environment are shown here.

Figure 6. Tire cam. This cam is viewed when removing the tire from the vehicle.
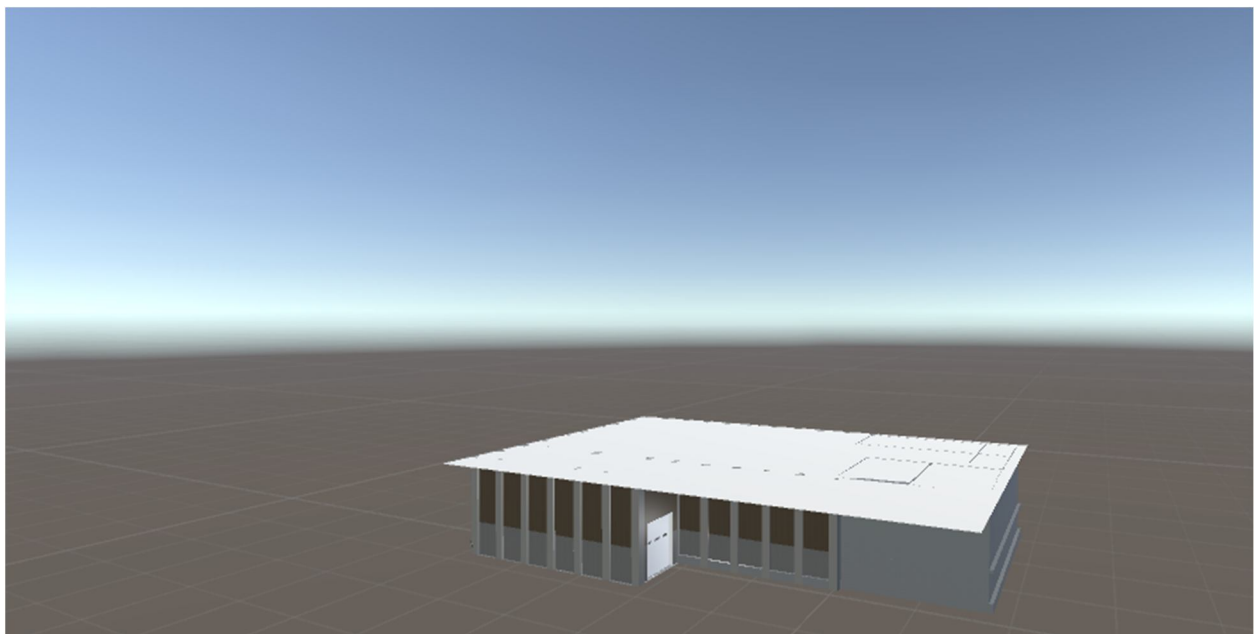

Figure 7. Sky. The sky here is shown outside of the auto shop.

Figure 8. Tire iron and jack animation. Here, the user can press the "R" button to twist the tire iron to the right and lift the jack or press the "L" button to twist the tire iron to the left and let the jack and the car back down.
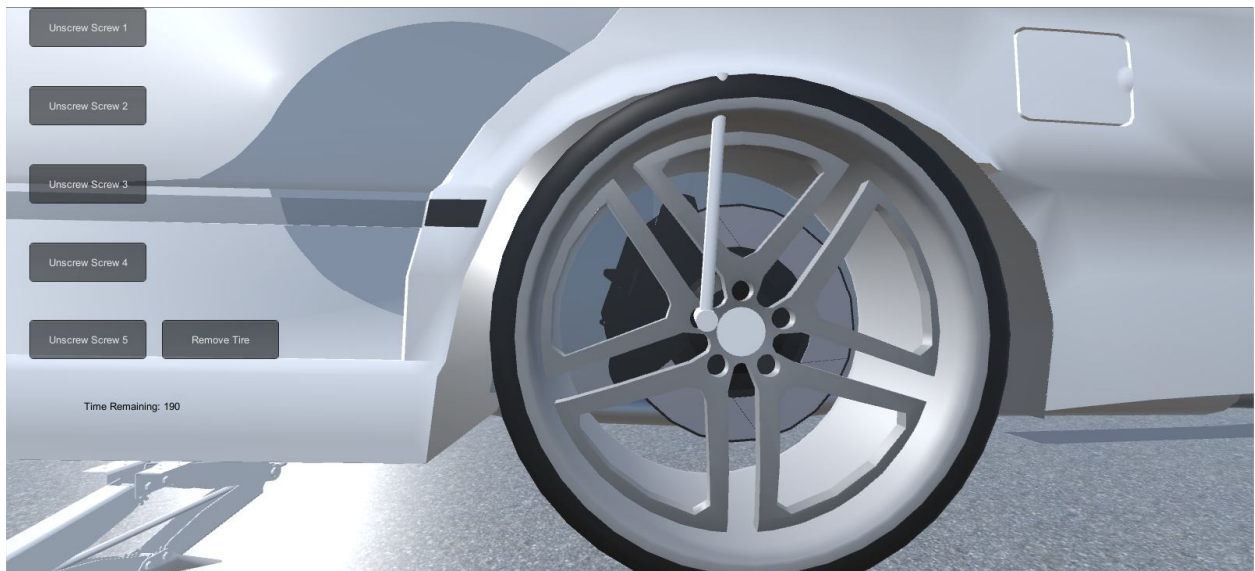

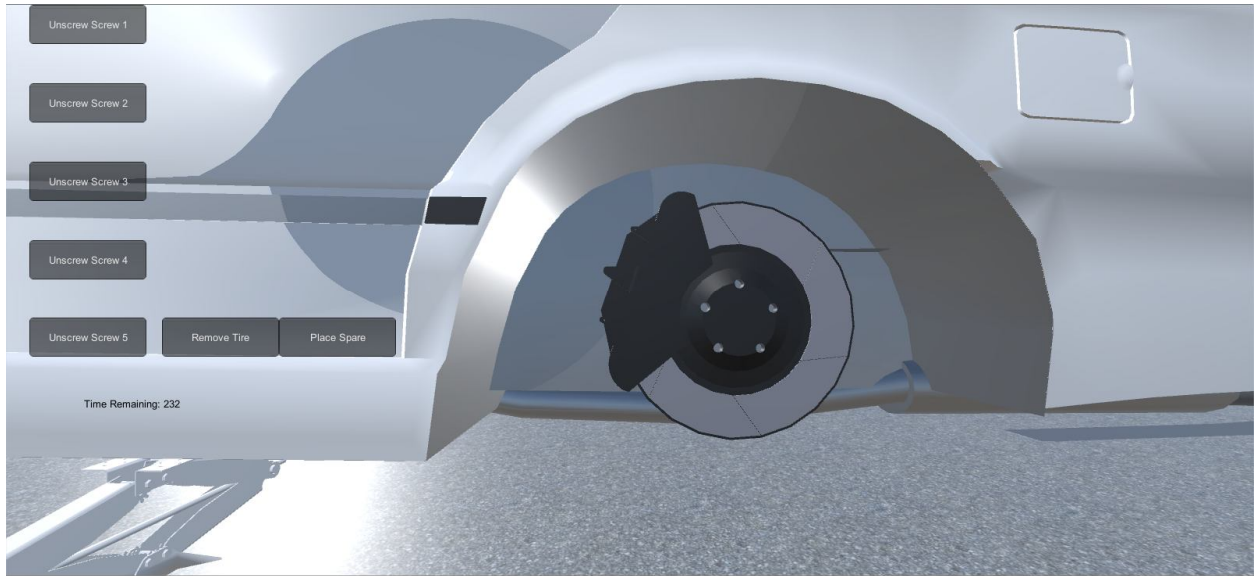Figure 9. Remove screws. Here, the user can remove the screws from the tire.

Figure 10. Tire removal. Here, the user can remove the tire in order to place the spare onto the vehicle.

Figure 11. Spare placement and end of simulation. Here, the user can place the spare and end the simulation.
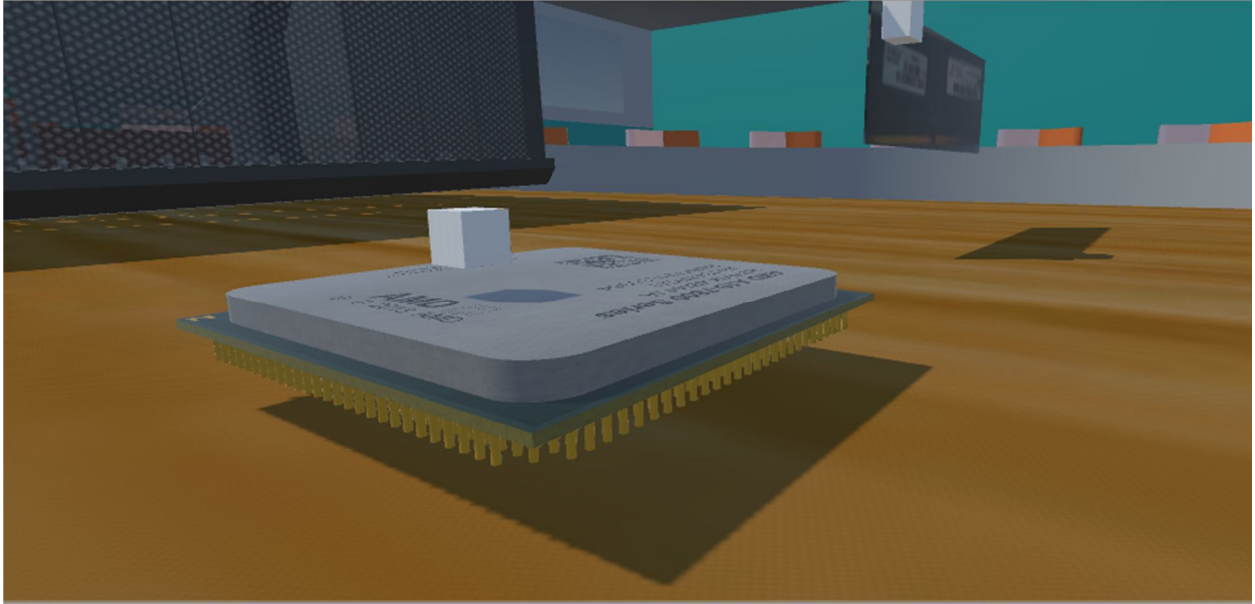
Figure 12. Chip. Above, we see a highly detailed computer chip.

Figure 13. CPU fan. This picture shows the CPU fan that the user will put into their computer.
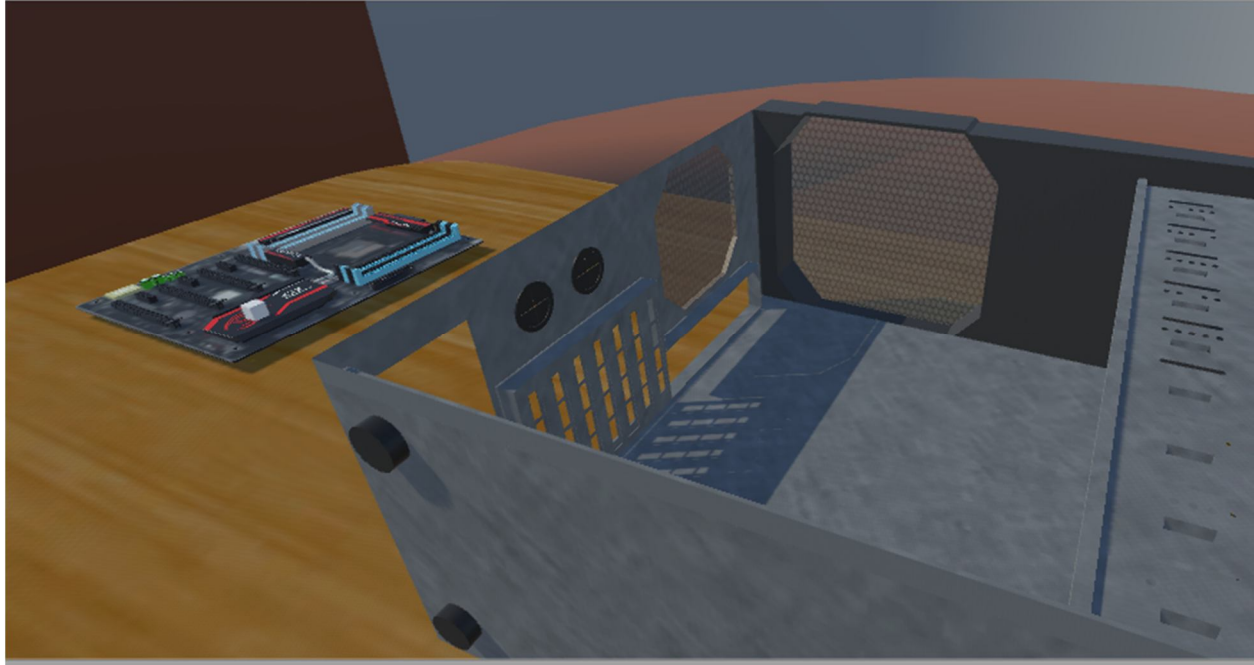
Figure 14. The motherboard and shell of computer. This is where all of the computer parts will go.

Realistic textures in the environment include the shiny hard coat paint on the car, realism of the materials on the computer objects, and shiny metal material on the tire iron, jack, and wheels. In addition, the materials in the lobby include a realistic brick wall, and wooden floor materials. Next, this application can be used in a auto mechanical school or for personal use to teach users practical skills like how to change a tire or how to name parts of a computer, and how to assemble the parts of a computer. Also, virtual reality is the appropriate technology because in a real life setting, users are using their hands from a first person point of view when changing a tire or assembling a computer, so with the first person point of view that virtual reality offers, virtual reality will complement these simulations perfectly. Users could use the HTC VIVE or Oculus Rift to get hands on (first person view) learning experience as if they were actually in the environment. Next, the problems that occurred when creating this project were first getting the tire iron and jack to stay in the trunk of the vehicle during the car care simulation before retrieving them. Because the objects had rigid bodies, upon playing the simulation, the objects

would cause the car to lean backwards. Also, when a user runs into the vehicle in the car care simulation, the vehicle slides across the level. For future improvements, the reduction of onscreen button GUI could be reduced, a button tutorial could be added prior to start of simulation, and the present shortcomings stated above could be fixed. The software used in this project includes the following: Unity 3D and Google Sketch Up. The hardware used in this project includes the following: CPU, keyboard, and mouse.

      In conclusion, the purpose of this project is to create an environment that is so realistic that once users perform the virtual simulation, they will need zero real world experience after using our simulation.