Figure 1. Isometric view

Figure 2. Isometric view from different angle

Figure 3. Front view

Figure 4. Drawing of Marmiba
For my personal SolidWorks project, I chose to create a marimba, a type of percussion instrument. Throughout high school, this was an instrument I played year round, and became a large part of my life. While at first glance, it may seem to be a purely musical interest, I have also always love the engineering and physics that go into the making of the frame which supports the instrument, as well as the acoustics that dictate the size of the bars, resonators, and the materials used.

Most of my project was extrudes, such as the various bars that constitute the frame and the musical bars themselves. In making the angled bars on the frame, I learned how to make a plane that is offset from one the three standard planes by a specific angle. I then used the loft feature to make the cylindrical angled bar go to a flat square, so that it could attach to the bottom bar. Since the resonators are hollow (so as to allow the formation of a standing wave and make the instrument louder) I shelled each resonator out. Trying to make as many small details as possible, I made the screws which affix many of the joints between bars. In order to create the screws, I used the draft feature when extruding to make it wider at the bottom, like the actual
screws are. I then used the helix feature to make the path for a swept cut. When drawing the profile of the cut, I had to learn how to make a plane which would be perpendicular to the start of the helix, which involved referencing both the whole helix and the point at which it started when making the plane. Another small part I made was the connector for the accessory bar (the long bar running the length of the marimba in the back) which required fillets and chamfers to get the correct shape.

While not the hardest part of the model, making the resonators was a long and tedious process as after making the sketch, I had to extrude each one individually, because they are all of different lengths. Afterwards I had to shell each one individually as well. The more technically difficult aspects of this model was the connector bar in the middle, which has the angled bars. This was difficult because learning how to offset a plane at a specific angle was tricky, and was not always intuitive. There were times where I thought I had the correct angle, but upon extruding a bar I realized that the plane was at the angle I wanted the bar to be, and the bar was perpendicular to the plane.

While obviously learning how to use SolidWorks in this portion of Engineering Design, I also learned much more. For instance, I learned to have more patience with programs like SolidWorks, through the many errors and other difficulties encountered whilst designing models. As the course went on I found it more helpful to think rationally, and try to solve the problem before getting frustrated that something was wrong. I also learned that 3D modeling is not as hard as I expected it to be, as I found SolidWorks to be fairly intuitive and seemingly daunting tasks were not as difficult as I originally expected.