# Team 95070A CAD Challenge Final Report

When building a robot, one of the most important materials are your tools. Throughout the construction of your entire robot, you use different types of tools—screwdrivers, wrenches, hex keys, zip tie cutters, nut drivers, etc. But, there is a problem with all these tools. They are all individual tools, and during the build and in competition, you have to carry all of these different tools around with you. This can be a hassle, especially in moments of stress when you are running to the queueing table with your robot and making last minute changes, such as making sure screws are tight, your zip ties aren't too long, etc.

Our team has come up with a solution to this problem. Introducing the Robo All-in-One Tool (The "RAT")! The RAT is similar in design to a Swiss Army Knife, except instead of knives, scissors, and a wine bottle opener, it contains a 3/32 and 5/64 screwdriver, two sizes of wrenches (one for standoffs and one for hex nuts), and a zip tie cutter. This design allows you to simply put the RAT into your pocket, and you will have all the tools you need on-the-go!

To use the RAT, you simply use your finger to unfold the tool you need from its collapsed form. This is useful for our robot build because it contains the most used tools when building the robot. There are two sizes of screwdrivers so that you can screw in screws and tighten shaft collars. We have two sizes of wrenches so that you can tighten standoffs and nylon nuts. We also have a zip tie cutter to trim zip ties once you tighten them.
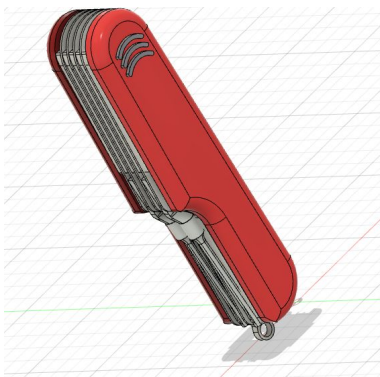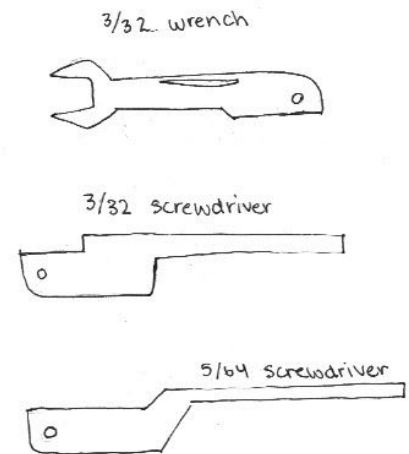
To design our tool, we began with research. We looked at one of our team member's swiss army knife to learn about the hardware behind it. Secondly, we researched designs of 3D printed swiss army knives that people have printed in the past. Our first step in designing was to sketch out the tool. Using CAD files of a regular Swiss Army Knife, we drew the parts of the RAT. After perfecting our drawings, we began CADing in Fusion 360. Using 2D sketches that we converted into 3D parts, we designed each part of the RAT separately, then put them all together in one file.

We learned many things from this CAD challenge. We learned about the importance of planning, designing, and thinking through every step of making something new. We will definitely use 3D design software in the future, as it is a simple way to design and visualize anything you want to make. These skills help us on our robotics team in many ways. Before designing our robot, we CAD our design to visualize everything we are going to build. When writing in the notebook, we include images of CADed parts of our robot. CADing will help in the engineering career path—it is always a good idea to design it, CAD it, and then fix the CAD before you physically build it.