Problem/Opportunity:

Innovation has increased exponentially over the past several years for the professional and the hobbyist alike. When 3D printing was first designed it was done by machines that cost hundreds of thousands of dollars. Today, 3D printers are cheap enough that almost anyone who wants one can afford one. However, these 3D printers deposit only a plastic filament. While still impressive, plastic isn’t acceptable for all designs. For this type of scenario we can turn to 3D printers that print in 3D.

Similar to plastic 3D printers of years past, metal 3D printers are currently very complex and expensive. While plastic printers melt a plastic filament and deposit it in a very thin layer, the most common form to 3D print in metal is via Direct Metal Laser Sintering, or DMLS. In DMLS, a thin layer of powder is deposited then a high power laser traces the desired path and fuses the powder into a solid by melting it locally. This process is extremely accurate, although also extremely expensive.

The purpose of our project is to create a cheaper 3D metal printer following the design of plastic 3D printers. We will combine a CNC machine with a MIG (metal inert gas) welder and use the welder to deposit wire. Building upon previous layers of deposition, we will be able to print 3D metal objects. The final products the printer will be producing will be internal components of industrial water pumps. Because of their use, all parts will be precision honed, so highly accurate prints are not a concern for this project.

Key Observations and Learning:

As there were many different aspects of this project, there was a lot to be learned. As is the case in all engineering projects, we had to make decisions on different tradeoffs, starting as early as deciding on what type of controller we wanted to use.