Dating entries:

January 1st: Document was created

January 2nd: Starting our entries

January 5th: Adding our beginning info, which was the information about the kinds of prosthetics

January 9th: Adding more info, just working on some more background research for our logbook

January 12th: Working on listing our materials and more information

January 13-14th: Completed ethics and project information

January 16th: Ethics was approved

January 21st and 22nd: Worked on our hypothesis on the cysf platform. We discussed predictions for which materials we think would perform the best based on friction and texture properties

January 24th: Articulating hand arrived (Way ahead of time so study will be started earlier than we predicted)

January 27th: Worked on research and gathering alot of information to make sure our study goes well

January 28th: Worked on variables and procedure

February 2nd: Did more work on research

February 2nd to 10th: Found all our materials and started buying them, Ayaan did break his finger which slowed us down a bit

February 10th, worked on researching materials and discussed how we think they would perform

February 14th, While testing our articulating hand a bit, we found out that the articulating hand could not grip a pencil, but it could grip a pen with a part of rubber. When we put it on the smooth metal part, it slipped right away showing how the texture and grip of a material is major for holding objects. This wasn't part of our actual testing, just something we noticed. Does say alot about how rubber might perform in our actual testing.

February 14th, worked on finishing hypothesis and variables and most of our research, in our hypothesis we talked about which materials we think will be the best and just talked a little about why

February 16th, finished research, which included our material study, and the different kinds of grips, and started working on a bit more of our procedure since some of our materials haven't been brought yet

February 18th, received our trifold which we will be starting around March
February 20th, started testing with rubber, did finish our procedure

February 23rd, finished rubber testing
Rubber did really great, we noticed that it managed to hold most items with ease and only really showed flaws when we tested dynamic disturbance, which was just essentially moving the metal rod that connects the hand to the base, which shook the hand and simulated real life movement.

February 25th, polished up logbook and added more sections

February 28th, finished testing of plastic and silicone
Plastic did pretty bad and didn't perform much differently from the articulating hand itself, not a great material in general
Silicone did amazing, while testing we noticed it just had virtually no issues, and could grip all objects with ease, resisted dynamic disturbance really well too.

March 1st, finished fabric testing
It didn't really do that well, kept on making all the objects slip, we think it's because the fabric we used was polyester which has low friction

March 1st, We finished all of our testing, started analysis and we will do our conclusion once we are finished. Fabric wasn't the greatest material, it really struggled with gripping most objects which we think is because of its low friction

March 2nd, finished analysis, conclusion, working on finishing application and making sure everything is well written

March 3rd, finished everything on the CYSF platform

We came up with our topic after looking at some current medical problems, though this one is smaller compared to others, and we decided to do it in order to research something that was interesting and new to us, and we formed our idea after a bit of trial and error in finding good

testable questions that would benefit people with prosthetics and allow for our research to be good.

Timetable:

January 1st to 15th

-Establish our topic and start gathering background information
-Get our hypothesis, research, variables, and procedure down
-Form our testable question
-Start adding what we need to our logbook

January 10th to February 6th
-Start working on the sections of the online portal and trying to get everything that doesnt require testing done

February 10th to 20th

- Our articulating hand arrives and we can start our study and finish testing

February 20th to March 1st

- Finish everything else and complete all we need to do

March 4th to April 8th, finish trifold and prepare for science fair

Background research:

Types of Prosthetic Hand:
Passive Prosthesis: This is just to replace your existing limb, and fill in the part you don't have like fingers for example. Usually the first type of prosthetics that people use when they lose a limb. Since it doesn't have high tech, it is usually for cosmetic purposes, as you have to move each finger by yourself. This is easily adjustable and adaptable. This is the closest to our testing model.

Body Powered Prosthesis: Operates using a pulley system and you use the residual muscle you have to pull on a cable that allows your prosthesis to move.

Myoelectric Prosthesis: a myoelectrical prosthesis is an electrical device that responds to electrical signals coming from your muscles. Myo means muscles and it is most commonly used for household activities like gripping stuff, clenching, etc… Electrodes on your skin read your muscle contractions and send signals to the prosthetic hand to open or close. Unlike the body powered prosthesis, it is more efficient and uses less power making it a better option

Materials:
Articulating hand

Silicon, Rubber, Foam, Plastic Fingertip Pads, Fabric
Plastic cups, coins, plastic water bottle, small balls and pencils/pens

Testable question: Improving Grip Performance in an Articulating Prosthetic Hand Using Different Materials.

Tests: Precision Pinching (how small of an object it can hold for a duration of time), Power Grip (Used for tasks using stabilization and strength instead of precision), Tripod Grip, Cylindrical grip

Our testing isn't going to be 100% accurate compared to actual prosthetics because of the sheer amount of resources and time that we don't have, so we will have to make do with an articulating hand and doing a test that will mostly determine the types of materials that will allow for stronger grip in order to help mainly passive prosthetics with some kind of movement. The grip can allow many other prosthetics to work because our hand is manually articulated, we are not measuring neural motor control (myoelectric) . Instead, this test evaluates how different materials affect grip precision when positioning fingers carefully to hold small objects.

Hypothesis: We hypothesize that our prosthetic hand model will grip objects more effectively when the hand is covered with higher friction materials such as rubber or silicone, compared to lower friction materials such as smooth plastic and foam. We hypothesize this because materials with higher friction allow for more resistance between the object and the fingers, which reduces slipping.

Variables:

Independent: The type of gripping material we use for the prosthetic fingers
Dependent: Grip performance -> how long the object stays gripped in the hand, if the object slips, how well it performs under dynamic disturbance
Controlled: Same prosthetic hand stand, same holding position for the hand, same object and shape, same environmental conditions (Where the testing happens)

Links:
https://my.clevelandclinic.org/health/treatments/prosthetic-hand
https://www.cysf.org/wp-content/uploads/logbooks.pdf
https://www.theottoolbox.com/grasp-patterns/