***Meeting #3 Notes***

Main Aspects of the project:

* Software used
* Coding
* Design
* Weight
* End effector

**Technical Benchmarking**

Numerical values for robot arm movement:

<https://www.nickbenoit.me/three-dof-robotic-arm>

Source code for robot programming:

<https://github.com/SmartArduino/SZDOITWiKi/wiki/2-4ch-DC-motor-%26amp%3B-16ch-servo-shield---motor-and-servo-shield>

| ***Physical Aspects*** | ***Technical Aspects*** |
| --- | --- |
| 3 degrees of freedom | Inverse kinematics |
| Removable/replaceable end effector   * Arm should be able to hold 1kg of weight | Coding on G code |
| Good battery life(should be able to work for at least 24h)   * Minor repairs every 3 months * Major repairs every 6-12 months | Open source code |
| Low Cost (>$100) | Pivot mechanism |
| Fits through a M2 gap | Easily usable by anyone |
| 100+ psi compressor | Aware of surroundings with the use of sensors |
| Light weight   * maximum of 20 lbs or disassemblable but each part has a maximum of 20 lb | Low processing power |
| Needs to enter harsh conditions( low oxygen and cold conditions) |  |

**Target Specifications**

| Aspects | Thor | Nick Benoit | Our Robot |
| --- | --- | --- | --- |
| Degrees of freedom | 6 degrees of freedom | 3 degrees of freedom | 3 degrees of freedom |
| Inverse kinematics | Uses forward kinematics | Can use both inverse/forward kinematics | Uses inverse Kinematics |
| Coding on G code | Programmed in python using PyQt5 | Uses C++ and MatLab to code | G-Code |
| Removable/replaceable end effector | Has an end effector that is able to be removed and replaced | Has end effector and cannot | Has a removable/replaceable end effector  3D print separate joints and main components |
| Arm should be able to hold 1kg of weight | Able to carry 750 grams of weight | Able to carry 203.94 grams | Able to carry roughly 1kg of weight |
| Open source and articulation | Open source with 6 degrees of freedom | No open source and 3 degrees of freedom | Open source with 3 degrees of freedom |
| Good battery life(should be able to work at all times)   * Minor repairs every 3 months * Major repairs every 6-12 months | N/A | Has to be plugged into the computer and power source at all times. Needs human intervention to function | Will be plugged in at all times from any power source. |
| Pivot mechanism(pivot on the end effector) | Has a pivot | Has no pivot | Has a pivot |
| Cost | $511.17 CAD | N/A | Roughly $100 CAD |
| Fits through a M2 gap | 624.15 mm long | N/A | When fully assembled, the robotic arm has a height around 65cm-70cm when fully extended |
| Usability | By using Asgard (Graphical user Interface) the user needs to have a in-depth understanding of Asgard | User needs to has some knowledge of C++, Matlab and the hardware of the robotic arm | User will be interacting with G-code at a very basic level, only needs to activate code(very simple like pushing a button. etc.) forcode to run |
|  |  |  |  |
| Compressor PSI | Doesn’t come with a compressor | Doesn’t come with a compressor | 100+ PSI compressor |
| Aware of surroundings | N/A | Nick Benoit is aware of its surroundings using the camera and Matlab | Will have sensors that will recognize objects; therforce aware of its surroundings. |
| Light weight   * maximum of 20 lbs or disassemblable but each part has a maximum of 20 lb | 3-4 Kg of PLA  0.5 Kg of ABS | N/A | Base- 10lb  Joint- 0.5 lb-1 lb  Arm (Total Weight)- 5 lb -10 lb  End effector- 3 lb-4 lb |
| Can function in harsh conditions(low oxygen and cold conditions) | Thor is able to function in harsh conditions | No need to enter harsh conditions | Wil be able to work in harsh conditions |
| Low processing power | 12V needed to run | N/A | Will be able to plug into a 120V outlet(standard) to recharge battery |
| Must have a camera to scan work area  -Light source to ensure consistent brightness | Not equipped with a camera | Using Matlab, Nick Benoit has a camera but not light source | Equipped with camera and light source |
| Arduino | Uses Arduino | Nucleo-F746ZG development board was used with an Mbed OS | Uses Arduino |

Thor - <http://thor.angel-lm.com>

Nic - <https://www.nickbenoit.me/three-dof-robotic-arm>

Final Statement:

After looking back at the Client meet, we noticed there are some main aspects that they would like the core to be focused on. We have been able to rank said functions based on the notes given and based on the initial model of the robot arm, Thor. This gave us the knowledge to update some of the more general thoughts we had in deliverable B, where we could not decide on the vague options. This included things such as which programming language was going to be used, how it would be coded, certain aspects of the arm which we may have overlooked. After much deliberation, we figured out which tasks need to be covered first before moving on to what we have perceived as least concerning to the functionality and the usage of the robot arm.