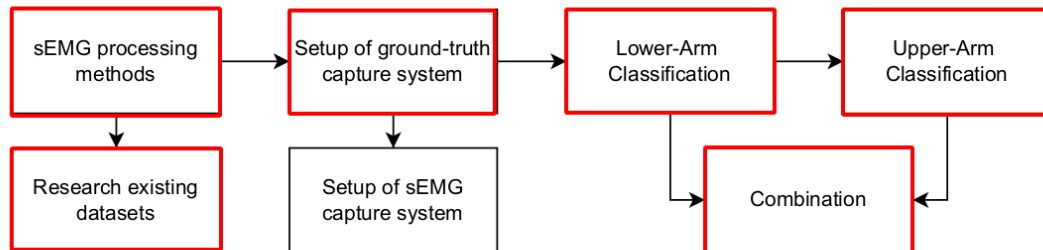


# 1 An Overview of the Achievements and Holdups

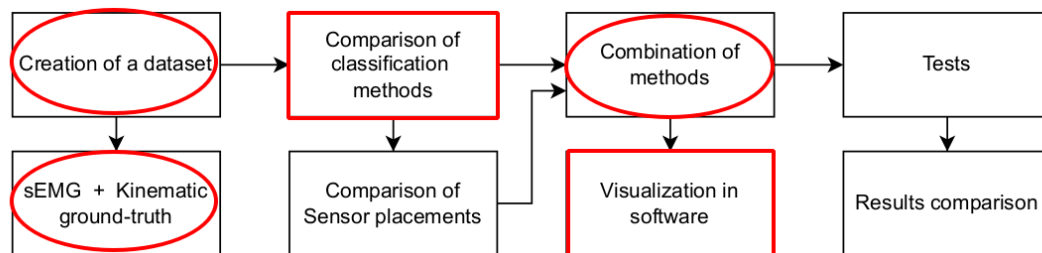
## 1.1 The Plan According to the Contract

I have taken the original development plan from the contract to visualize my progress. In the diagram, **red squares** are completed tasks, and **red circles** are the tasks i am working on, but have experienced lab difficulties.

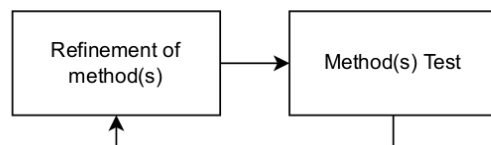
### Phase 1 - Research



### Phase 2 - Development



### Phase 3\* - Implementation



## 1.2 Pitfalls and Holdups along the development

I have spent a lot of time on software that ended up not being compatible or working in the way it should be expected to, notably:

- Finding and using an existing prosthetics simulation proved difficult, with software not working, being paid/unavailable, deprecated etc.
- Setting up Gazebo and developing a working simulation took too much time, so i changed to CoppeliaSim.
- The Camera system having a hard time giving poses for the 3D markers.
- Connection issues with hardware synchronization

### 1.3 Current Achievements

The things i have accomplished so far in the development period:

- Created a rigidbody, Simulated hand in CoppeliaSim, that is anatomically correct, ROS communication compatible and able to be controlled into different life-like poses.
- Designed different types of Neural Networks able to perform regression of joint angles based on sEMG inputs from the muscles of the lower-arm.
- Created a motion capture glove that is able to be used in lab to get joint angles of the hand while recording muscle activity.
- Read, Summarized & Sorted state-of-the-art techniques of prosthetics control for the report.
- Defined a recording session test based on state-of-the-art methodology.

### 1.4 Plan for the Rest of the Thesis

I plan to focus on the things that are most important for my thesis, the things listed below are what i find important, but i hope you would share your perspective on what my focus should be:

- Get hardware synchronization to work and create a dataset using the recording glove and the sEMG sensors for the lower-arm.
- Once the above works, Explore fine tuning of my created networks for the dataset.
- Create tests where i also place sensors on the upper-arm/ shoulders.
- Test the hypothesis that we can use the upper-arm/shoulder data to further increase regression.
- Test and assess the results of the AI-based regression in the prosthetic simulation.

I hope to have multiple people contribute to the dataset as we originally planned, but i think it will depend on when i get the system properly working.