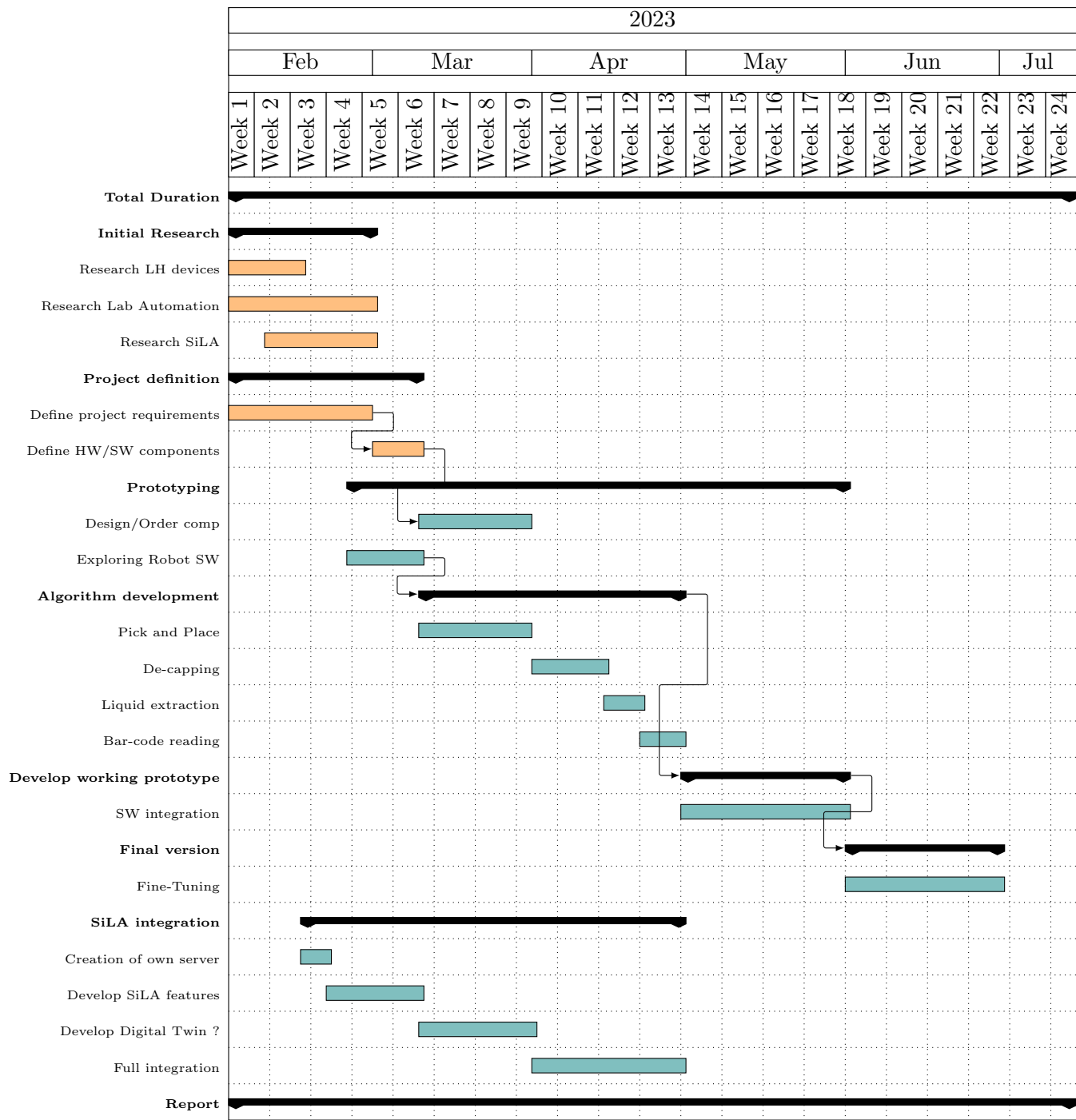# Gantt Chart

Master Thesis

Title: Optimization in automation design for laboratory liquid handling with a robotic arm
Project duration: 01.02.2023 - 15.07.2023
Project description: The proposed idea involves many different engineering topics, with the ultimate task of automating the liquid-transferring process by pouring the contents of a variety of different recipients into the appropriate containers. In order to achieve such task, a robotic arm capable of handling these recipients will need to be programmed accordingly.
A second challenge to be addressed is the optimization of this process, given the number of identical recipients to be handled and the wide array of unique solutions that can be provided to solve the task at hand.
Finally, keeping track of each individual task is important for the future use of these liquids. As such, a system capable of autonomously reading and storing the necessary data will also be implemented alongside the robotic solution.

Preparation: This section will define the specifics of the project and therefore which components and technologies to use. Various stakeholders from the company will be involved in the decision making of which devices should be used and which problems need to be taken care of in the near future according to their priorities. Knowing the main components that could be used, a literature review can take place in order to explore efficient solutions to the company's challenges. Finally, when there is a defined and agreed upon course of action, all the hardware and software requirements should be defined.

Implementation: The main section of this project is investigating and researching different methods to solve the tasks at hand in the most efficient of manners with the ultimate goal of implementing a working prototype which could be developed further into production quality machinery.
The many components which form the challenge (liquid handling, data-reading and recipient manipulation) are to be designed and programmed in a robust manner, ensuring best practices in the field following the previously conducted research.

Milestones

There are four major milestones to achieve for this project to succeed. Starting chronologically, by the end of the sixth week (March 10th), the project requirements should be entirely defined and understood, as well as the necessary outcomes and sub-processes needed to effectively plan and execute the project.
By the end of the 13th week, all or most of the algorithms involved in handling the specified components should be ready to integrate on a full-scale prototype, specially those which are not part of the communication protocols framework.
Week 22 marks the end of the practical side of the project, meaning that a working prototype should be in place with most of its features integrated and no longer working as standalone pieces of code.
Finally, the report will be handed in on the 15th of July, which entails that every process and action taken should be well documented along side the initial research carried out during the first month.