|  |
| --- |
| EE495/CME495 |
| Robotic Positioner Project Planning |
| Revision 1 |

|  |
| --- |
| Thomas Hu, Jordan Smith, Jason Wong  12-3-2019 |

# Project Planning

## Introduction

This chapter is used to provide detailed information on the current status of the Doepker Industries Robotic Positioner system for the EE/CME 495 class for 2019-2020. The current project schedule is presented, along with the current risks faced. In addition, a system bill of materials and overall project budget is provided.

## Risks to Project Performance/Schedule

The project risks for this project have been reduced from those presented in CD2 – EE495/CME495 Robotic Positioner Project Plan. The following risks were alleviated:

* The risk of having long equipment lead times have been largely avoided by selecting components from vendors with shorter lead times. Components have been ordered by Doekper Industries and are expected to arrive in December.
* The risk of outsourcing production to Doepker Industries is gone as the system has now been designed and the design schematics have been provided for manufacturing.
* The risk of the system being operated in unexpected environments has been avoided by defining with the client what kind of environment the system shall be designed to operate in.

A list of risks that may impact the quality of the final product or project schedule include:

* Component reliability - there is a possibility that the components ordered will not be reliable due to being new products, or due to being specialty components which may not have been tested to the extent of a component meant for larger market.
  + This can be mitigated by ordering components from more experienced vendors in the market, as well as avoiding ordering products that were recently introduced to the market.

## Milestones

Listed in Table 2‑1 are major project milestones and their expected completion dates. The dates have been adjusted from the dates listed in CD2 – EE495/CME495 Robotic Positioner Project Plan to present more realistic milestone dates:

Table - Project Milestones

|  |  |  |
| --- | --- | --- |
| **Milestone** | **Date** | **Completed** |
| Begin Unit Production | December 26, 2019 |  |
| User Manual | January 26, 2019 |  |
| System Verification Plan | January 6, 2020 | 100% |
| Perform Factory Acceptance Testing | February 13, 2020 |  |
| Final Report | April 10, 2020 |  |

## Gantt Chart

See below for an image of the project’s Gantt Chart including the remaining tasks left to be completed for the project. If desired, a Microsoft Project or PDF file of the Gantt Chart may be requested (email [thomas.hu@usask.ca](mailto:thomas.hu@usask.ca) to request a copy).



Figure - Project Gantt Chart

## Work Breakdown Structure

Attached below in Table 2‑2 is the work breakdown structure for the remainder of the project, which details the team member responsible for each task in designing the system and how many hours are budgeted for each task. It is important to note that the task numbers of the table are aligned with the task numbers of CD2 – EE495/CME495 Robotic Positioner Project Plan, to prevent confusion in future project management updates.

Table - Work Breakdown Structure

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Task Number** | **Task Name** | **Assignee** | **Hours Budgeted** | **Task Start** | **Task Deadline** | **Predecessor** | **Task Completion** |
| **8** | Acquire System Components | Jordan | 6 | Mon 12/23/19 | Mon 12/23/19 | 5.2.2 |  |
| **9** | Perform System Development | Thomas | 85 | Fri 12/6/19 | Fri 1/17/20 | 5 |  |
| **9.1** | Develop Software | Jason | 25 | Fri 12/6/19 | Fri 12/27/19 |  |  |
| **9.2** | Build Hardware | Jordan | 20 | Thu 12/26/19 | Fri 1/3/19 |  |  |
| **9.3** | Perform System Integration | Thomas | 30 | Mon 1/6/19 | Fri 1/17/20 | 9.1, 9.2 |  |
| **10** | Create System Verification Plan | Thomas | 37.5 | Fri 12/20/19 | Mon 1/6/20 | 4 | 93.3% |
| **10.1** | Define Use Cases | Thomas | 10 | Fri 12/20/19 | Sun 12/22/19 |  | 100% |
| **10.2** | Define Test Cases | Thomas | 10 | Mon 12/23/19 | Fri 12/27/19 | 10.1 | 100% |
| **10.3** | Write Test Procedures | Thomas | 15 | Wed 1/1/20 | Fri 1/3/20 | 10.2 | 100% |
| **10.3.1** | Review Test Procedures with Client | Jordan | 2.5 | Wed 1/1/20 | Fri 1/3/20 |  |  |
| **11** | Perform Acceptance Tests | Thomas | 40 | Mon 1/20/20 | Thu 2/20/20 | 10 |  |
| **11.1** | Perform Integration Testing | Jason | 20 | Mon 1/20/20 | Tue 1/28/20 | 8, 9 |  |
| **11.2** | Review Integration Test Results with Customer | Jordan | 2.5 | Wed 1/29/20 | Wed 1/29/20 | 11.1 |  |
| **11.3** | Perform Factory Acceptance Tests with Client | Thomas | 7.5 | Thu 1/30/20 | Fri 1/31/20 | 11.2 |  |
| **11.4** | Write Factory Acceptance Report | Thomas | 10 | Mon 2/3/20 | Fri 2/7/20 | 11.3 |  |
| **12** | Write User Manual | Thomas | 30 | Fri 12/6/19 | Thu 12/26/19 | 5 |  |
| **13** | Prepare Final Project Presentation and Demonstration | Jason | 40 | Mon 3/2/20 | Fri 3/20/20 | 5, 11 |  |
| **13.1** | Make Final Project Presentation | Jason | 20 | Mon 3/2/20 | Tue 3/10/20 |  |  |
| **13.2** | Review Presentation with Client | Jordan | 1.5 | Wed 3/11/20 | Wed 3/11/20 | 13.1 |  |
| **13.3** | Present Final Project Presentation | Jason | 1 | Fri 3/20/20 | Fri 3/20/20 | 13.2 |  |
| **13.4** | Prepare Project Demonstration | Jordan | 15 | Mon 3/2/20 | Thu 3/19/20 |  |  |
| **13.5** | Demonstrate Project | Jordan | 2.5 | Fri 3/20/20 | Fri 3/20/20 | 13.3 |  |
| **14** | Write Final Project Report | Thomas | 60 | Mon 3/2/20 | Fri 4/10/20 | 11 |  |
| **14.1** | Review Report with Client | Jordan | 2 | Mon 3/30/20 | Tue 4/7/20 |  |  |

## System Bill of Materials

Include Arduino that Jason ordered.

ATTACH BOM

## Project Budget

It is estimated that 175 hours have been spent working on the project from the dates of September 20, 2019 to December 5, 2019. A rough breakdown of the hours spent during certain time periods is shown below.

Table - Project Billable Hours

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Project Management Update #1 (09/20/19 – 10/17/19)** | **Project Management Update #2 (10/17/19 – 10/31/19)** | **Project Management Update #2 (10/31/19 – 11/21/19)** | **Remainder of Term**  **(11/12/19 – 12/05/19)** | **Total Hours** |
| 19.5 hours | 24 hours | 57 hours | 74.5 hours | **175 hours** |

Based on the time spent working on the project, it is estimated that the total project cost is **$5,832.62**. This estimate was derived from the APEGS 2018 annual average engineering graduate salary of $64,922. The hourly wage was derived assuming a 52 week per year and 37.5 hours worked per week figure. The hourly wage of each group member is therefore $33.3 an hour.

## Future Hours

From the Work Breakdown Structure in Table 2, it is estimated that about **263.5 hours** will be spent working on the project from the time period of December 6, 2019 to April 7, 2020. Therefore, the remaining project budget is **$8,782.25**.