




# *ECSE 211 DESIGN PROJECT*

## CONSTRAINTS DOCUMENT

Version *1.03*

*02/26/2018*

*ECSE 211 TEAM 11*

# VERSION HISTORY

| **Title** | Constraints Document | | | |
|---|---|---|---|---|
| **Description** | Week 1 iteration of this document | | | |
| **Created By** | Luka Jurisic, Documentation Manager | | | |
| **Date Created** | 19th February 2018 | | | |
| **Maintained By** | Luka Jurisic | | | |
| **Version Number** | **Modified By** | **Modifications Made** | **Date Modified** | **Status** |
| 1.00 | Luka Jurisic | Created the document. Set out the overall structure that the document should follow | 19th February | Initial work done |
| 1.01 | Luka Jurisic | Completed section 2 and 3 | 24nd February | All other sections remain |
| 1.02 | Luka Jurisic | Completed section 4 and 5 | 25nd February | Section 6 remains |
| 1.03 | Luka Jurisic | Completed section 6. Created a Title page and perfected the presentation of the document | 26th February | Final Version |

# CONSTRAINTS

## 2. ENVIRONMENTAL ISSUES

Refer to section 1.5 in the requirements document.

## 3. HARWARE CONSTRAINS

The final robot design will be comprised of components from three Mindstorm kits, while only using one NXT brick. The brick is comprised of:

- 4 input ports to allow sensor integration
- 3 output ports to allow servo motor connection
- 1 USB 2.0 to allow for software upload
- Wi-fi compatibility
- An LCD display screen
- Requires 4 AA batteries to run

The Lego components provide constraints due to their design. The pieces are all precogitated in their shape and length, and this cannot be manipulated. Thus, it can be difficult to be creative in our design in some regard. However, the provided axes that are placed inside the motors are bendable and weight constraints must be considered accordingly. Similarly, since the pieces cannot be manipulated, the angles of freedom that we are able to utilize are limited.

## 4. SOFTWARE CONSTRAINTS

The client has clearly specified that the design be implemented using the Lego Java Operating System, LeJOS. Thus, all code must be written in java and utilize the classes that accompany the Mindstorms kit. The software implementation must allow for the robot to be completely autonomous, with the only input being processing are those from the sensors. The efficient performance of the robot is an essential part of the user specification; therefore, the number of threads should be kept to a minimum threshold so as not to hinder this.

## 5. AVAILABILITY OF RESOURCES

There will be two weekly meetings; one held every Monday from 10:30-11:00 with our assigned teaching assistant, and another every Friday from 10:30-11:00 with Prof Lowther. In addition, all 6 group members have agreed to clear their schedules on Thursday's in the case that any discussion needs to take place in preparation for the meeting on Friday. Outside of these designated times, communication between the members has been well established with the usage of Google Drive, Slack and Facebook.

Each team member can work individually on his assigned task for the week and cordially update the group on his progress through these means of communication. Conversely, when disparate tasks need to be interspersed into other parts of the design, the respective team members must be present to allow a swift and efficient integration of these different tasks. This continuous stream of communication, delegation, and swift integration will allow the main critical path task to be achieved without fail.

## 6. BUDGET

The only monetary spending expected to be done concerns the purchase of batteries and the printing of a colour poster. The required funding will be split evenly among the 6 group members.

Regarding the time budget, the project has been set a stern competition date of April 11$^{th}$, 2018. This means that each team member will have an individual budget of 58.5 hours. There are 7 weeks from the beginning to the end of the project, and thus each team member is expected to put in approximately 8.5 hours a week into the project. A Gannt chart will outline the division of these hours accordingly per week.