CONSTRAINTS DOCUMENT

Project: DPM Final Design Project
Task: Describe the constraints present in the project.

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Edit History:
Brendan Marks - 2019/10/20 - Filled the document
Stefan Barbu - 2019/10/20 - Fill in initial software constraints
Aurelia Haas - 2019/10/20 - Filled in 2.0, 5.0, 6.0 and 7.0
Usama Barlas - 2019/10/20 - Filled in hardware constraints
Aurelia Haas - 2019/10/27 - Clarified Budget
Brendan Marks - 2019/11/24 - Fill Environmental Issues section, revise entire document

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2.0 ENVIRONMENTAL ISSUES

There are several environmental issues that must be taken into account:

1. Scratches or marks on the floor affect light sensor performance.
2. Varying lighting conditions could affect sensor readings.
3. Imperfect friction between robot wheels and the floor.
4. Possibly uneven playing field surface.

3.0 HARDWARE CONSTRAINTS

- There are some design limitations that the hardware design must respect. For example, a height clearance *must* be respected by the design for the robot to be able to pass through tunnels of height 25cm.

- Another constraint would be the amount of parts that are provided in the three Lego MindStorm kits provided. There could be a situation in which a part is required that is not part of the Lego kit provided or that has been run out of. The launcher mechanism, for example, may require specifically shaped pieces. For this, a MakerBot Replicator 2® rapid prototyping machine is available for fabricating and 3D printing parts. We may also purchase parts from external resources, provided authorization is given.

- External documentation from leJOS specify that the EV3 motors and the NXT motors can have a maximum speed 100 times the battery voltage.

- The processor provided is a TI AM1808 (ARM926EJ-S core) @ 300 Mhz, which is severely constrained with respect to the complexity of programs which it can run.

4.0 SOFTWARE CONSTRAINTS

The leJOS EV3 runs in a JavaSE-1.7 execution environment meaning only Java 1.7 functionalities can be utilized. For instance Java 1.7 does not have lambda functions implemented and can therefore not be used. For a full list of functionalities, refer to Oracle's Java Platform, Standard Edition 7 API specification.

LeJOS' libraries are provided by the client through a precompiled binary. For our team and for the client to lose such binary would result in a discontinuation of the project. The hardware components of the robot run using the leJOS libraries and cannot be changed.

5.0 AVAILABILITY OF RESOURCES

Refer to the Capabilities document section 5.0 on Availability.

There will be 2 group meetings each week:

1. Design meeting with the respective management representative of the team: Professor Lowther.
2. Group meeting with the team assigned TA: Alexandra Livadas.

6.0 BUDGET

The time constraint is a 6.5 week period between October 16^{th} and November 29^{th} , and consequently there is a total of 58.5 hours of work allowed for each member of the team (9 hours per week, for each person).

Refer to the Gantt chart as well as the timesheet for budget allocation and usage information.

7.0 GLOSSARY OF TERMS

No term definitions are currently required.