

Constraints Document

Project: LIBERTY

Task: General Description of Constraints

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2. ENVIRONMENTAL ISSUES

The system might be affected by:

CON - GEN - 2.1: changing light due to the sun or shadows varying the readings of a light sensor.

CON - GEN - 2.2: the opponent's ultrasonic sensor which would create additional noise

CON - GEN - 2.3: the previous rounds which drained the battery voltage.

CON - GEN - 2.4: the WIFI connection is unstable or overloaded.

3. HARDWARE CONSTRAINTS

The system is limited to:

CON - GEN - 3.1: 3 EV3 Mindstorms kits which each contain:

- a brick with 4 sensors ports, 4 motor ports and a ARM926EJ-S core @300 MHz [**CON - GEN - 3.1.1**].
- a wifi dongle for communications [**CON - GEN - 3.1.2**].
- multiple sensors such as an 1 ultrasonic sensor which detects distances; a color sensor which also detects light levels; and an accelerometer. (See *Test Document - Sensor Characterization* for the accuracy of the sensors.) [**CON - GEN - 3.1.3**].
- 4 EV3 motors and 1 NXT servo motor [**CON - GEN - 3.1.4**].

CON - GEN - 3.2: a 3D printer (Maker Replicator 2), taken from the **Project Description (v 1.2F)** : “In addition, a MakerBot Replicator 2 rapid prototyping machine is available for fabricating parts”.

CON - GEN - 3.3: For any other hardware, taken from the **Project Description (v 1.2F)**: “Only materials in the Mindstorms kits can be used unless permission is obtained from the instructors.” and on the subject of glue: “Glue can be used to secure parts, but it must be of the removable variety.”

4. SOFTWARE CONSTRAINTS

CON - GEN - 4.1: As per the **Project Specification (v 1.2F)**: “All computation must be done on board the EV3 brick(s); no offloading to an external machine is permitted.”

CON - GEN - 4.2: Due to the limitation of the processing power aboard the EV3 brick, the maximum number of threads can be run stably is 3 by experiments

CON - GEN - 4.3: The order of ultrasonic and light localization can not be altered because ultrasonic location offers a rough location of the robot, and only if based on the rough location, light localization will offers a more accurate result.

CON - GEN - 4.4: The wall must be continuous without any gap for ultrasonic localization to perform.

CON - GEN - 4.5: Navigation can only drive the robot along the way. The robot cannot drive between 2 points using minimal distance, as said in **Software - Design; 7.3**.

CON - GEN - 4.6: The programming language to build the system is limited to Java

5. BUDGET

CON - GEN - 5.1: Each team member is allocated 9.75 hours of work time per week for 6 weeks. For this group, this entails a total budget of 292.5 hours. Referring to document: **ECSE211-Meetings-Fall 2017 v1**: “The total time on the project between oct 15th and dec 1st is 6.5 weeks giving a budget of 58.5 hours per team member”