ID4100 – Creative engineering project

Project proposal – LEGO Mindstorms Testing Platform

Project objective: To design and build a Testing platform using LEGO Mindstorms kits for researchers to verify Planning, Artificial Intelligence and Control algorithms on a real-world system. The localization and low-level motion controllers of a team of LEGO robots with different drive systems are made available for the researcher to deploy their behavior algorithms.

Learning objective: The student shall learn concepts in motion planning, control theory, real-time tele-operation and computer vision.

Motivation: In robotics, researchers working on high level algorithms are in need of a testing platform for verifying algorithms on a real world system. Prototyping platforms like Pioneer3 or Turtlebot are expensive for the Indian scenario. Thus, researchers limit themselves to working on simulators or build their own crude prototypes which are often not robust. The LEGO Mindstorms kit provides a low-cost, highly re-configurable, programmable rapid prototyping platform which can be used to build a testing area which provides a robust localization and navigation system and researchers can concentrate on the higher-level planning algorithms instead.

Methodology: The proposed system consists of three modules – Vision subsystem for localization and tracking, control subsystem for navigation, tele-operation subsystem for remote control.

- Each subsystem shall be separately developed over a month's period.
- The integration of the three subsystems and testing shall be done in the final month.
- The work shall be done at the Control Engineering Lab, Dept. of EE.

Assessment rubric: The student shall be assessed on their progress on both the learning objective as well as the project objective. This shall be assessed from

- The demonstration and oral examination during review meetings
- The progress on incorporating the functionality into the prototype.

(Faculty mentor)

(Student)
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