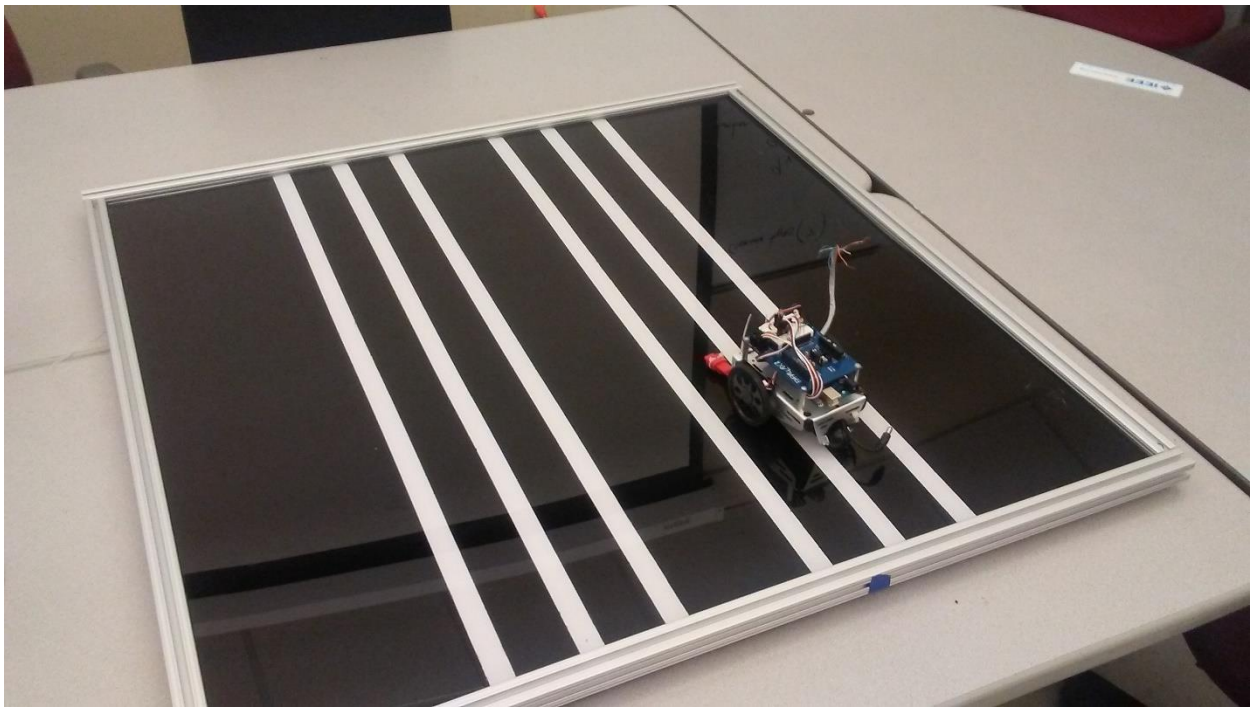
Stage 1: Line Following Drag Race
EGR 101



Revision: 0.3
September 27, 2017

Embry-Riddle Aeronautical University
600 South Clyde Morris Boulevard
Daytona Beach, FL 32114

Revision History

Rev	Date	Author	Description
0.1	Aug 8, 2017	Ghelarducci	Initial build
0.2	Aug 23, 2017	Ghelarducci	Adding rubric
0.3	Sep 27, 2017	Ghelarducci	Mods

I. Introduction:

This document describes stage 1 of the course project using the Parallax Boe-Bots and supplies requirements for completing stage 1.

II. Project Overview:

The project is divided into four stages, each with their own set of requirements and deliverables. Stage 1 is to be a line following drag race. The objective of this stage is for teams to develop the fastest and most accurate line following bot.

Refer to Figure 1 for visual reference to the drag racing course.

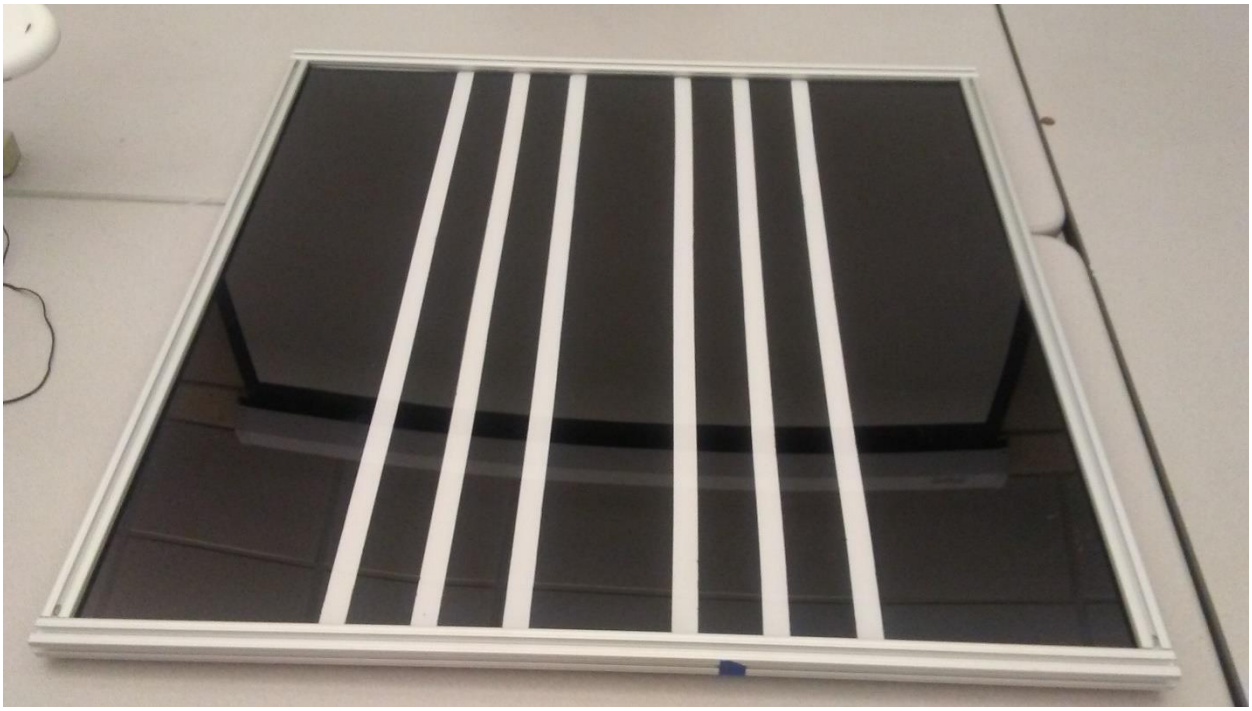


Figure 1: Line Following course.

Below are requirements and deliverable each team shall fulfill and demonstrate.

III. Requirements:

1. Teams shall utilize the Boe-Bot platform during stage 1.
2. Teams shall utilize either two IR line following and/or a RGB sensor to detect a black line.
3. Teams shall development test plans for each sensor and servo introduced during stage one.
   - **3.1.** A test plan shall describe what is being tested.
   - **3.2.** A test plan shall describe the test parameters.
   - **3.3.** A test plan shall define what a passing condition for a successful test is.
   - **3.4.** A test plan shall define what a failure condition during testing is.
   - **3.5.** A test plan shall statement who is conducting the test.
   - **3.6.** A test plan shall follow the test plan examples given during stage 1.
4. Teams shall demonstrate the ability to read from a sensor.
5. Teams shall demonstrate the ability to move a servo driven wheel.

5.1. Teams shall demonstrate turning the robot left.
5.2. Teams shall demonstrate turning the robot right.
5.3. Teams shall demonstrate moving the robot forwards.
5.4. Teams shall demonstrate moving the robot backwards.
5.5. Teams shall demonstrate the action of stopping the robot.

6. Teams shall demonstrate the ability to detect the color black.
7. Teams shall demonstrate the ability to average sensor readings.
8. Teams shall demonstrate the ability to detect the color white.
9. Teams shall demonstrate the ability to utilize a loop structure.
10. Teams shall demonstrate the ability to utilize an if-else structure.
11. Teams shall demonstrate the ability to utilize variables.
12. Teams shall demonstrate the ability to utilize Serial communication.
13. Teams shall construct a flow diagram that represents their software design
13.1. Teams shall demonstrate the ability to represent loops and conditional structures with their flow diagram.
14. A team's Boe-Bot platform shall not exceed a run time of 30 seconds during execute of the course.
14.1. The course shall be defined as three parallel black lines.
14.2. The Boe-bot shall follow the middle line.
14.3. The lines to the right and left of the middle line shall be defined as boundary lines.
14.4. The Boe-bot shall not ~~touch~~ exceed the boundary lines.
14.5. All three parallel black lines shall not exceed a width of 1 inches.
15. Teams shall construct a final stage report.
15.1. Final stage report shall include all test plans, test results, meeting minutes, flow diagrams, and final results.
15.2. Final stage report shall follow format given in section IV.

IV. Report Formats

This section discusses the formats you are expected to follow when writing your documents. This is an overview only, providing basic document structure and suggested format for some specific items. Details of effective writing, specifics of citing references, and similar things will be dealt with as part of the review process for your report.

Each report has the following basic format:

- Title page: Report title, "EGR 101, Section NN, Fall 2017," Team identification, Team members, date, revision number.
- Revision Page: A table listing the date of each revision, revision number, and brief description of why the document was revised.
- Introduction: Describing the purpose of the report, and an overview of the result when appropriate.
- Body: This is the portion that changes most depending on the type of report. There may be several sections for design and final reports (background information followed by detailed information specific to this project). Requirements documents and test plans tend to have a single section, with subsections as appropriate.
- Acronym List: This is simply a list of acronyms used in the report.

- References: References to all external documents cited in the report. For example, this document should be cited in all reports as establishing the need for the report.
- Appendices: Usually used for more tedious things that would break up the flow of the body. Source code and raw data go here (or may be supplied electronically and referenced here).

Another form of document is the meeting agenda and meeting minutes. It is advisable that you use an agenda, keep meeting minutes, and share minutes with your group members. An agenda can form the basis of the minutes, with the details filled out as the meeting progresses. You should have someone designated to track minutes, and especially issues and action items at each meeting. This practice will make your work go much more smoothly – in a project of any complexity, it is essential.

One reason to meet regularly is to track action items. The format by which you track action items is up to you, but a suggested format is to make a table with one row for each action item, and columns representing the item number, person responsible for it, title and description, and status (open or closed). Open action items are not yet resolved. Closed action items are not removed from the list, but remain on the list as closed. If you are diligent about this, your action item list serves as a record of your team's activities when the project is completed.

A typical agenda should have the following:

- Meeting title, location, and date
- Announcements: upcoming dates, any new information
- Progress Reports: usually an update from each team member
- Unresolved Business: discussion of any items not resolved in previous meeting (the action item review may be used in place of this).
- New Business: Identification of new actions, issues, tasks.
- Action Item Review: Check status of each action item, make sure new ones are added to the list, make sure item is assigned to a specific person.

V. Deliverables:

	Deliverable	Description	Due Date	Rubric (points)
1	IR test plan	Written plan for the testing IR line following sensors		5
2	RGB test plan	Written plan for the testing RGB sensor		5
3	Servo(s) test plan	Written plan for the testing servo control		5
4	Line following flow diagram	Document your teams software design before implementation of code.	*Before course demonstration*	5
5	Course demonstration	Complete three runs on the drag racing course. Best runtime will be recorded.	Oct 11th 2017	20
6	Stage 1 Report	Compilation of all test plans, diagrams, meeting minutes, and final results.	Oct 16th 2017	10

Please reference to example material given during this stage for test plans, meeting minutes/agenda, and reports.