



Project: It's Alive!!

When You Must Design, Build, Test, and Demonstrate Your Robot Creation

INTRODUCTION

Super Space Giant...maybe not quite so giant? Every Raging Intergalactic Menace once started out as an Adorable Tabletop Novelty, or prototype (even the Intergalactic Empire cannot afford full-scale mock-ups!). Your final project is to use your BOE-Bot and the available add-ons to create a prototype. A prototype of what? You tell me.

OBJECTIVES

The specific goals for this exercise are:

- **Exercise and reinforce** team skills: cooperation, delegation
- **Design** a BOE-Bot modification to solve a specific problem
- **Create** detailed design specifications for your modifications
- **Implement, test, and redesign** your prototype as necessary
- **Program** PBasic subroutines to optimize bot performance
- **Present** your prototype to an assembly of your peers

TEAM ASSIGNMENTS

Assemble your own three-person teams no later than **Tuesday, 09 April 2024**. Sign up on [the shared Google spreadsheet](#).

PROBLEM SPECIFICATIONS

You are tasked with imagining a problem which you can solve by creating a BOE-Bot prototype. Please do not claim any of the sensors or attachments until you have been approved for your specific project.

- **Brainstorm a potential problem** (just like you did on Exam 02!) that could be solved by modifying your BOE-Bot. Pay attention to scale; your problem might exist on a larger (or smaller!) scale than your Bot. Your Bot is just conveniently sized to serve as a proof-of-concept prototype.
- **Create a clear and concise problem statement**. Once you decide on a problem, carefully craft a problem statement. Your statement should make clear why the problem is really a problem, and how your prototype robot represents a potential solution.
- **Consider criteria and constraints**. Develop a set of both engineering criteria and constraints for your prototype. You should be able to cite at least three examples of each.
- **Requisition your parts**. You have access to all the sensors included with the standard [Accessory Pack](#). There are also a limited number of [Gripper Kits](#), [Crawler Kits](#), and [PING\)\)\)](#) sensors. Determine exactly what you need to build your prototype, then use the shared spreadsheet to requisition what you need. Limited parts are first come/first served, so if you wait, the part you want may no longer be available.
- **Plan your project**. Once you have converged on a problem and a parts list, you will need to develop a project plan. Use a Gantt chart to organize your team and to make explicit what specific tasks are required, when they must be completed, and who will be responsible for them.

DESIGN AND BUILD

Get to work as soon as you get the green light! Your team will have a total of 6 robots to work with; everyone should agree on which bot(s) you will modify (consider redundancy!). Please be sure to keep all loose pieces corralled in the case, and be sure not to mix up your bots and parts.

CODE AND TEST

There are manuals on the shelf in CCCS 112 which give you specific code snippets for some of the devices. The product pages on the Parallax web site also link to code downloads! Check these sources first; your Project Supervisor almost certainly does not know off the top of her head the proper code syntax.

DOCUMENT, DOCUMENT, DOCUMENT

You should be documenting each stage of your design and testing, to be included with your final project packet.

The design packet that you will submit must include:

- **Project Planning**: Your problem statement, the criteria and constraints, the parts list, the Gantt chart—all of these should be collected into a professional document.
- **Design Notes**: These can be informal, but document your design process. Did your design change or evolve during the process? Why? How were design decisions made? How did your group encourage creativity? How were different ideas or differences of opinion resolved?
- **Build and Test Data**: How did you construct the prototype? What considerations or allowances did you need to make during the build and test process? Fully document your testing procedure (photos, videos, or whatever is appropriate). How did the bot perform? Include data!
- **Fully Annotated Code**: Make sure that the code you have written compiles cleanly, performs properly, and is adequately annotated. *Comments are very important*, and poorly or incompletely commented code will be scored ruthlessly.
- **Finalized Design**: Once you have tested and revised your prototype, summarize its final state. Does it do what you meant it to (relative to your original problem statement)? Does it perform the task/solve the problem you intended, or did you have to modify your goals in any way?

The project packet may contain informal rough sketches, notes, etc. which document the design process as it happened. You will submit your original source code file (do not print it out on paper!). Your original problem specifications and finalized design should be professionally prepared.

PRESENTATION AND DEMONSTRATION

You will be presenting your modified robot to the class on **Wednesday, 24 April 2024**.

- **You will have fifteen minutes** in which to demonstrate your prototype BOE-Bot. Sign up using the shared Google sheet for your preferred timeslot. Please make sure that your entire group is present for your demonstration.
- **Explain the task/problem** that the bot has been modified to address. Why did you select that problem? What is it about it that interests your group? You should prepare some slides to support your presentation.

- **Describe the design process** and the modifications you have made. Did you use off-the-shelf parts, or did you build something unique? Were you able to recycle code, or did you have to program new subroutines? Did you find applicable code snippets online?
- **Document your testing process.** Did you get it right the first time? Or did you have to modify/tweak/re-code? Be absolutely honest about any pitfalls that you encountered.
- **Show off your product.** Demonstrate how your bot fulfills its design criteria. Again, be honest about any problems, and how you might address them in the future.

PERFORMANCE ASSESSMENT

Submit your design packet, as well as your source code, along with your modified robot no later than **6:00 PM on Friday, 26 April 2024**.

Please also be sure to create a copy of the [Google sheet](#) (this is a new sheet, not our usual shared sheet!) and complete the **self-assessment form**. To submit, you will share the form with me no later than **6:00 PM on Friday, 26 April 2024**. Note that **you must use the Google sheet provided, and you are sharing it directly with me only** (to remain confidential). Please evaluate and assign your group points honestly; if you plan to give your team full marks across the board, you should be prepared to justify your perfect scores in the comment section of each evaluation. Over-inflating your performance will not be rewarded, but honest assessment will add points to (and failure to submit any assessment will subtract points from) your team score.

Your team performance will be evaluated using the rubric below:

ASSESSMENT	CRITERIA / VALUE	POINTS EARNED
DESIGN PACKET	Planning: Clear statement of the problem; relevant engineering criteria and constraints; well-constructed Gantt with pertinent tasks	12 points
	Design: Complete and comprehensive as per criteria outlined in handout	12 points
	Test Data: Complete and comprehensive as per criteria outlined in handout	12 points
	Finalized Design: Formal statement of project completion; complete and comprehensive as per criteria outlined in handout	12 points
PROGRAM: BOT MODIFICATION (FILENAME: TEAMNAME.BS2)	Compilation: Program compiles cleanly	2 points
	Execution: Program executes correctly (yields correct results)	5 points
	Annotation: Program is sufficiently commented	8 points
PRESENTATION	Presence: Entire team is present, on time, prepared, and professional	5 points
	Participation: Each team member has a role in the presentation	6 points
	Content: Presentation content fulfills criteria outlined in project handout	8 points
	Quality: Well-prepared, well-coordinated between members, smoothly delivered, professional-looking ancillaries (where used)	8 points
SELF ASSESSMENT	Your individual team- and self-evaluations; failure to submit these assessments using the form and format required really will have a negative impact on your project score!	10 points