



Team Brief™

Intelligent Systems Sensory Imaging

Rotation 2, Interval 2
Segment 2

Attention captains! Have each member of your Suite Team read aloud one of the following paragraphs of the Greenhouse challenge. Then, answer the questions together.

1. The Suite Team will be responsible for putting together a proposal on your prototype of a greenhouse.
2. Each Suite Team member should complete this Team Brief by working together at the team table. Keep your completed Team Brief in your student portfolio for reference while you are completing the team challenge during Interval 3.
3. You will complete a proposal including the information you gather on this Team Brief. The proposal should include all items that address your greenhouse. Your completed proposal will be presented during Interval 4.
4. You and your Suite Team will complete a prototype of your greenhouse and its many elements for use in your presentation during Interval 4.
5. Each Harbor will work on a different portion of the prototype as indicated in this Team Brief.
6. In preparation for your presentation and proposal, please read the team challenge and answer the following questions. You may also refer to any of the books in your Harbor libraries for additional information.

Challenge: *Greenhouse*

Your team's challenge will be to design a greenhouse using robotics and intelligent sensory systems that would meet a set of strict requirements and be self-maintaining. You will be asked to submit a design document that details the greenhouse structure and operating systems. You will then be asked to construct a robotic prototype for one component of the greenhouse that proves your capability to complete the project.

The situation:

An environmental consulting firm has hired your team of botanical engineers because of its unique talent in design and construction of exotic plant habitats. The company would like you to assist them in rescuing five species of tropical plants threatened with extinction by an oil spill heading towards the last known site where all five species are still known to thrive. The greenhouse must preserve each species for one year while the spill cleanup is completed. The five plant species are interdependent on each other, yet have individual needs for their survival. Their habitat requirements are:

- Species #1 — lives underwater, needs strong sunlight to filter through water, and feeds on pollen dropped by species #2.
- Species #2 — lives on the shoreline, needs heavy nitrogen content from the soil provided by droppings from birds and insects, and blooms twice a year.
- Species #3 & #4 — live in shallow tidepools constantly refreshed with water daily, need to be tightly mixed with each other, need shaded or low light, and feed on nutrients from surrounding limestone cliffs.
- Species #5 — a tree that lives along ocean beaches, creates tall canopy of leaves that shade the shore, and feeds on nutrients washed up to shore by species #1.

Your greenhouse should provide a feeding system for delivery of nutrients, the proper environmental habitat, temperature controls, correct lighting, a changing supply of water, and an effective fertilization mechanism. Your report should concentrate on how robotics and intelligent sensory systems can create a self-maintaining environment.



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Questions:

1. What component of the greenhouse will you be building as a prototype to present to the company representative?
2. Choose the type of robotic system(s) that you will build. What kinds of manipulators will the robotic system feature?
3. What kinds of joints and axes of motion will your prototype need? Explain what drive power(s) will be necessary.
4. Design and draw your robotic system.
5. Define the degrees of freedom necessary and the work envelope for your prototype. Sketches may be helpful.

