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# Growbotics

Robotics Workshop Series



In collaboration with  
KCL Robotics Society

Aran Sena

[aran.sena@kcl.ac.uk](mailto:aran.sena@kcl.ac.uk)

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1. Do not eat the lego.
2. In event of fire/fire alarm, follow our instructions - proceed to fire exit and wait in assembly area.
3. Do not wander off - let me know if you need to go anywhere (bathroom/phonecall etc.).



Safety

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# Revised API

[kclrobotics.com](http://kclrobotics.com)

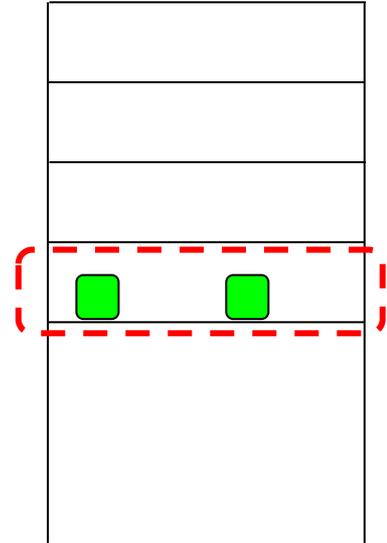
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# Crane 1: Horizontal Detection

1. Move arm horizontally across shelf. (+1)
2. Detect plant on shelf - stop and beep. (+1)
  - 2 plants on the shelf in random locations
3. Stop at end of shelf. (+1)
4. Return to start position. (+1)

Penalties:

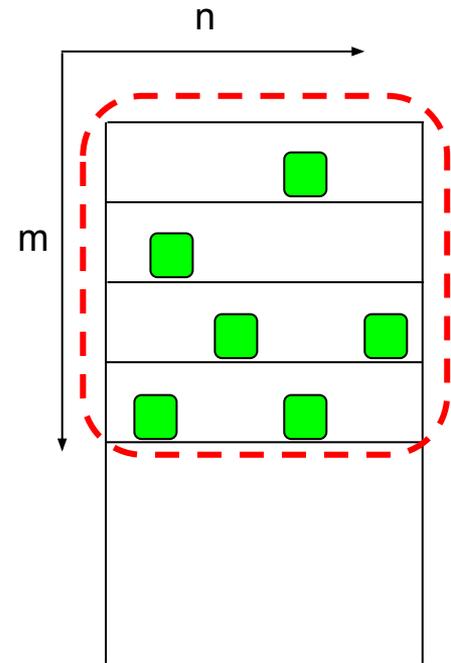
- Penalty if you stop and beep at an empty position. (-1)
- Penalty if you don't stop at end of shelf. (-1)
- Penalty if you don't return to start position. (-1)



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# Crane 2: Multi-Level Detection

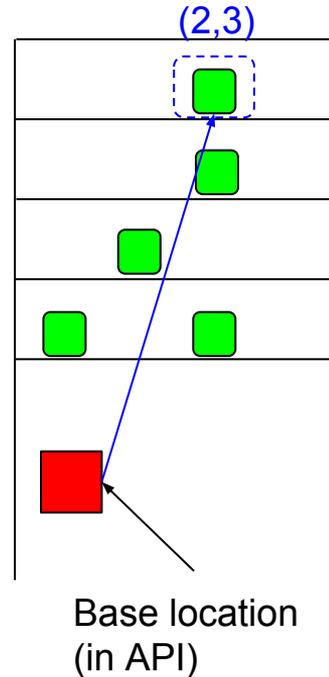
1. Same tasks as Challenge 1, as well as...
2. Move arm vertically up to shelf, aligned. (+1, point for each correct move)
3. Return 2D array with the *occupancy* of the shelf
  - This will tell us how many plants there are, and their (n,m) index.
  - 1 or 2 plants on each shelf. 3-6 plants total
  - (+4) for correct total



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# Crane 3: Positioning

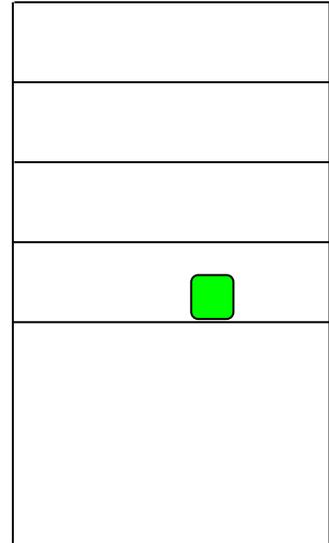
1. Write a function that accepts two numbers (n: plant number, m: shelf number) and then moves the crane to the correct plant in the shelves.
2. The robot should return to base in between each position (doesn't need to attempt to collect the plant).
3. Correct shelf (+1)
4. Correct plant (+1)
5. Return to base (+1)



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# Crane 4: Plant Picking

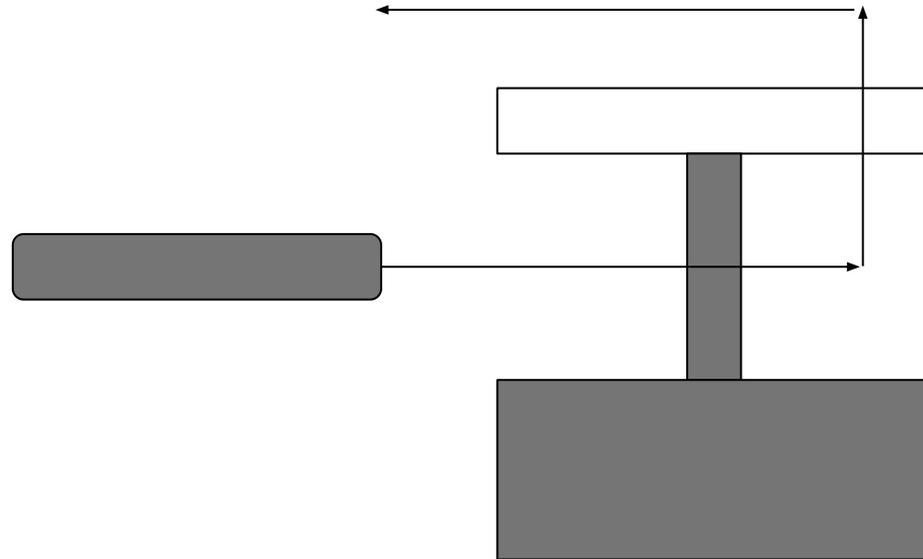
1. Starting in front of a plant, write two functions that allow the crane to pick up and put down a plant.
2. 1 Point: Extends arm to plant
3. 1 Point: Picks up plant from shelf, retracts arm
4. 1 Point: Extends arm, puts plant back onto shelf, retracts arm
5. 1 Point: Returns to starting position



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# Tips

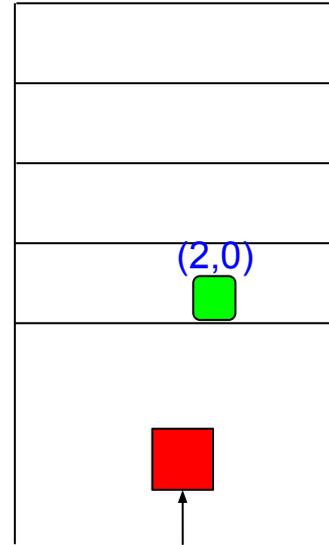
Plant grabbing



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# Crane 5: Plant Drop-Off

1. Starting in front of a plant, extend challenge 4 Write a function that uses the ones before to move the plant to the base
2. 1 Point: Picks up plant
3. 1 Point: Moves plant out of the shelf
4. 1 Point: Doesn't drop plant
5. 1 Point: Plant reaches base
6. 1 Point: Places plant on base

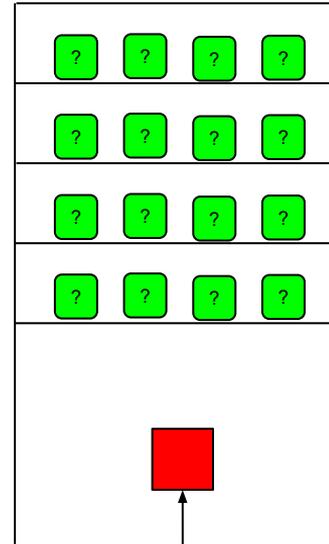


Goal location  
(in API)

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# Crane 6: Put it all together!

1. Not told where the plants will be located on the shelf, or how many.
2. Your robot must scan the shelves to determine the occupancy.
3. Your robot must then collect the plants from the shelf and deliver them to the goal location.
4. Bonus: Work out the quickest order to collect the plants!
  - 3 Points: Correct occupancy
  - 1 Point: Each successful plant picked up
  - 1 Point: Each plant successfully delivered to goal location
  - 10 Points: Collect all plants

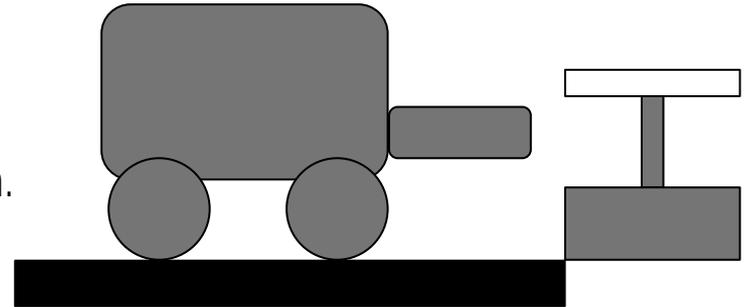


Goal location  
(in API)

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# PotBot 1: Plant pickup

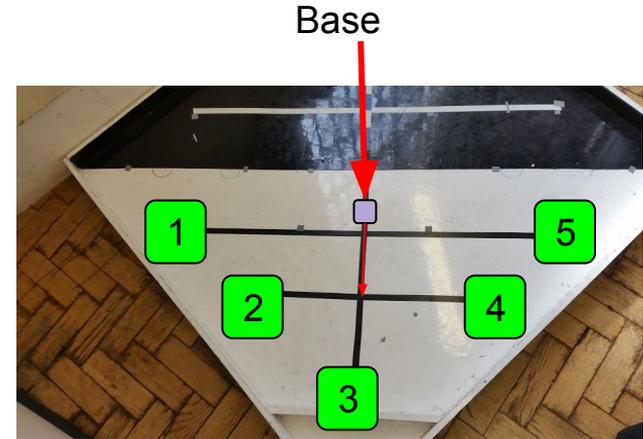
- Starting in front of the plant along a straight black line, stop at end of track and *wait* for plant to be present.
- Collect the plant from the delivery location.
- Bring the plant to the start position.
  - Follow line toward plant: 1 point
  - Stop / identify plant presence: 1 point
  - Collect plant: 3 point
  - Turn around and drive back along black line: 1 point



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# PotBot 2: Navigation

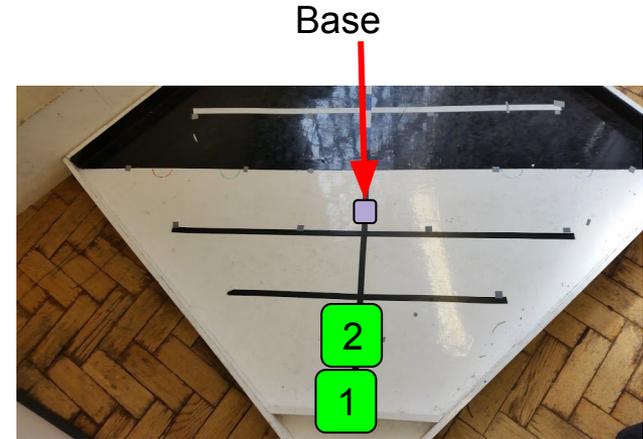
- Starting at the base, write a function that takes an map position index (see 5 points on image) and drives the robot to these branches.
  - Follow line toward plant: 1 point
  - Stop / identify plant presence: 1 point
  - Collect plant: 1 point
  - Turn around and drive back along black line: 1 point



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# PotBot 3: Pot placement

- Starting at the base, facing the plants, drive forward and collect a plant. Turn around and deposit the first plant at position 1. Return to base and collect a second plant, then place this plant in position 2
  - Follow line toward plant: 1 point
  - Stop / identify plant presence: 1 point
  - Collect plant: 1 point
  - Turn around and drive back along black line: 1 point



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# PotBot 4: Put it all together!

- Keep placing plants around the grid, in the order presented in the image.
- 1 Point: Each successful plant pick up
- 1 Point: Each successful line navigation
- 1 Point: Each successful plant drop-off

