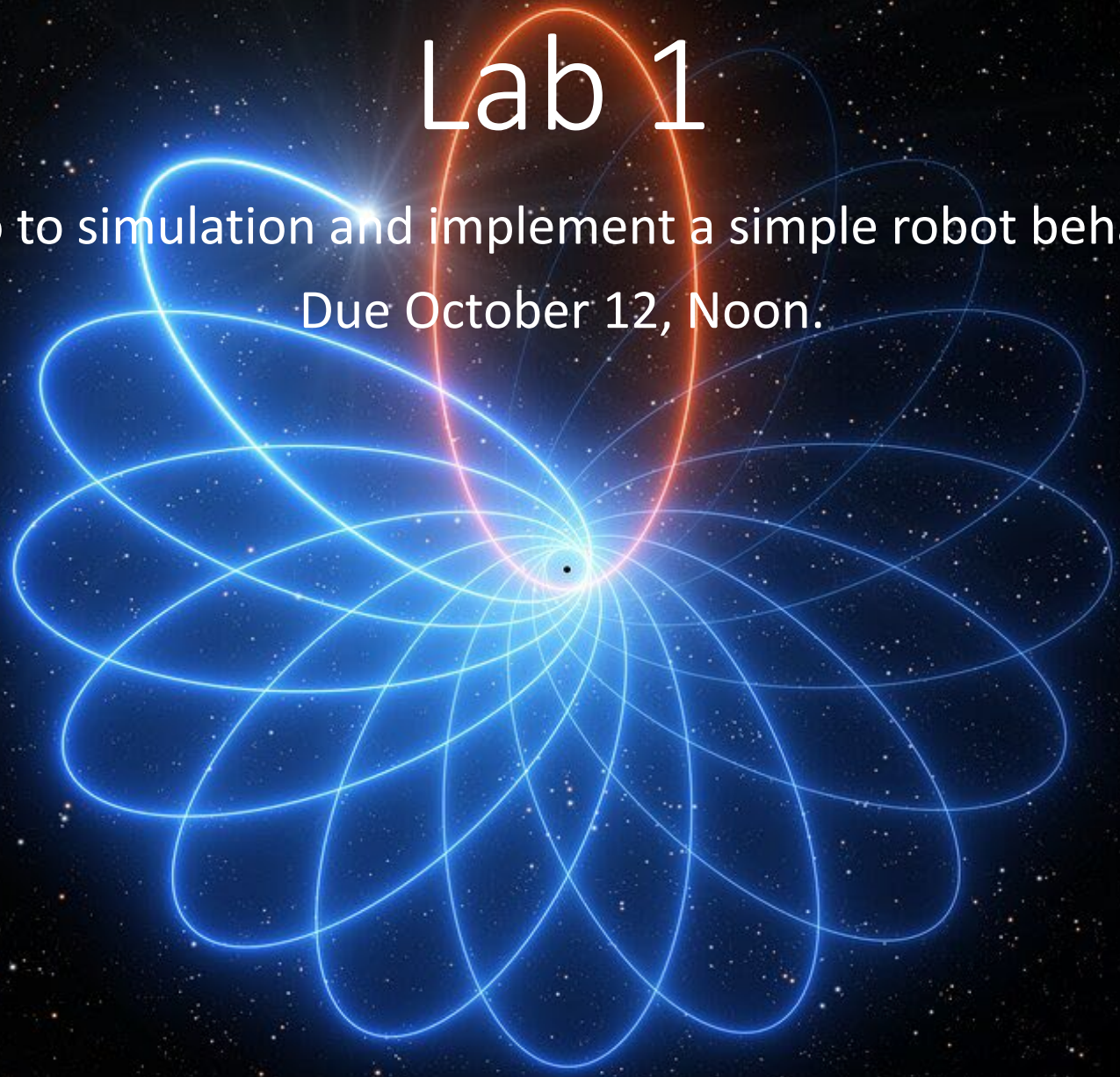
Lab 1

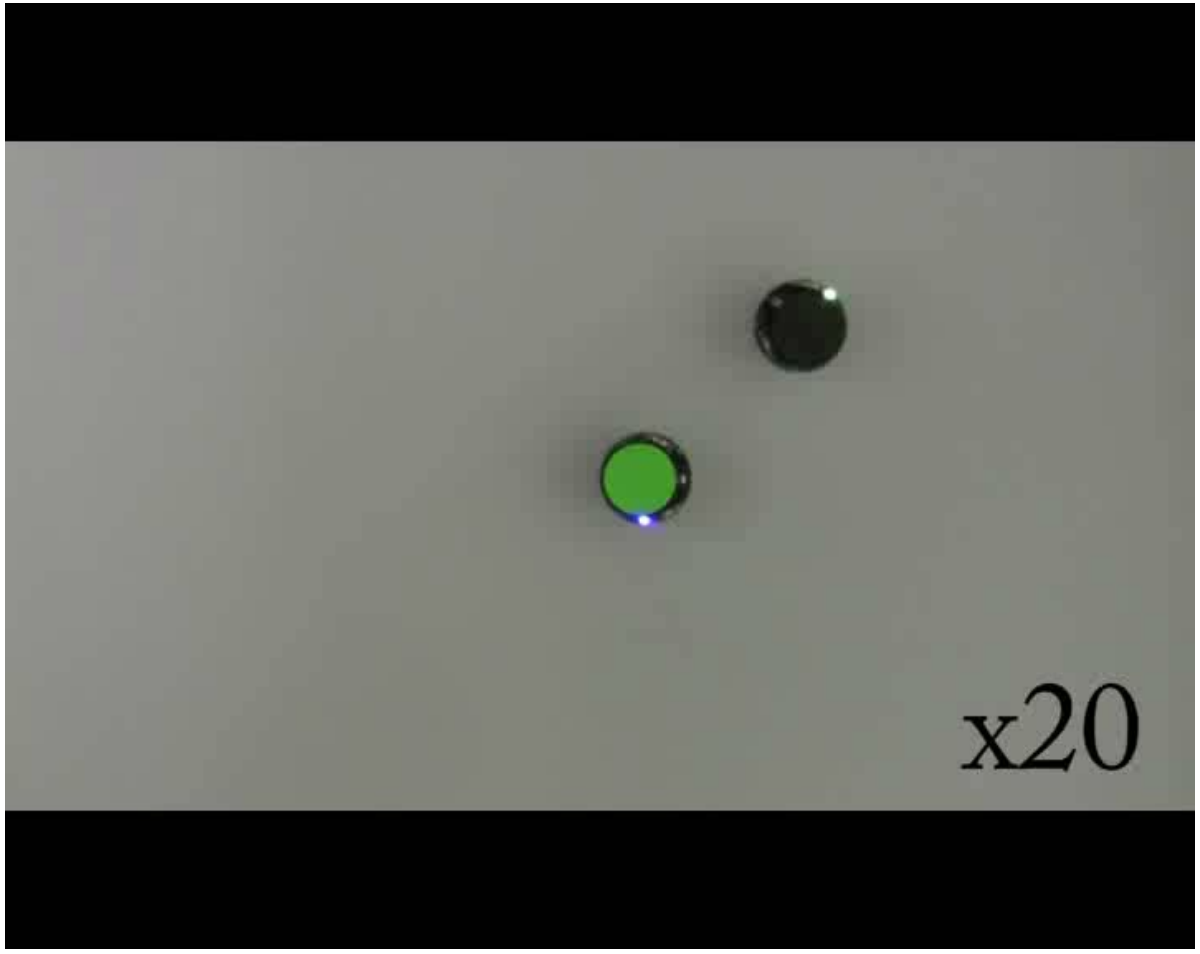
Intro to simulation and implement a simple robot behavior

Due October 12, Noon.



Orbit

- Move while maintain distance to stationary robot.



Orbit

- Move while maintain distance to stationary robot.

Orbit

- Move while maintain distance to stationary robot.

Lab 1 goal

- Create stable orbit at distance defined by global variable desired_distance
  - Value used for grading will be between 0.3 and 0.5
- Have robot with id==1 (robot.id ==1) orbit robot with id==0
  - Robot 0 should not move (but don’t assume it is stationary, I may have it move slowly for grading)
  - Robot 1 should orbit in clockwise direction
- Color of both robots should show distance error
  - Red if greater than desired_distance
  - Green if less than or equal to desired_distance
- Robot with id ==0 should only print out distance value, no other print statements from any other robot please

Installation

- https://github.com/michelleezhang/swarm_simulation

- You will need to have python installed as well as:
  - numpy
  - matplotlib
  - pygame

Running simulation

1. Use command found in readme file
2. Print statements will be displayed in command window
3. Update config.json
    1. Longer run time
    2. 2 robots
4. Use init_pose.py I provide in files/lab1

Api

- robot.get_clock() # gets time
- robot.id #gets robot id
- msgs = robot.recv_msg() #puts messages in msgs
- robot.get_pose() # gets robot position and orientation.
  - Check that it is a valid pose
- robot.send_msg(data) # sends data in a message to other robots
- robot.set_led(R,G,B) # sets robot color in R,G,B with int values 0-100
- robot.set_vel(wheel1,wheel2) # sets wheel speeds values -100 to 100

Behavior hints

- Compute distance by looking at robot's positions.
- Only update motion when new message arrives
- Look at how the distance changes between two readings to determine how to move
  - If too far
    - Distance is getting closer to desired distance, keep moving in wide circle
    - Distance is getting farther from desired distance, turn in tighter circle
  - If too close
    - Distance is getting closer to desired distance, keep moving in wide circle
    - Distance is getting farther from desired distance, go straight

Submission

- Only code to submit is usr_code.py
  - Well commented for easy understanding
  - Submit file on canvas before Oct 12 Noon.
  - 14.2% penalty per day late (Prorated)
- No other files should be changed from original state
- Work on this project alone.
  - Ok to ask questions about sim install or usage, just not about algorithm in usr_code.py