

name _____
date _____
period _____

reverse engineering post test

software

1. what is a list in python? how can you get data from it? how can you put data into it? How does the robot use them?

2. what does import do? How can it be used to make a program easier to debug? What does the robot import?

3. what is a function? Why might you use one? What did genPath do on the robot?

4. what is does pin.value() do? Is there anything that needs to happen before it is called? How did the robot use this?

5. what does a while loop do? What does an if statement do? What does a for loop do? How did the robot use each of these?

Hardware

6. what is a stepper motor? Why is it used in applications where accuracy is required? How does the robot use them?

7. how are stepper motor drivers controlled? What do the step, direction, and enable pins do? How does the robot control the motors?

8. why would someone use a caster bearing instead of a caster wheel? How did your group use them effectively

9. why would hard plastic not make for a good wheel? What material should be used? Why? What material did your group use?

10. how would you ensure that all 4 wheels of a car are in contact with the ground at all times? Why do cars have 4 wheels? Is there a benefit to only having 3 wheels? How did your group ensure that all of the wheels were on the ground?

Answers

1.

a python list is a list of values stored in a single variable, multiple data types can exist in the same list, list length is not pre defined,
data can be extracted from the list by using the lists name and specifying an index list[0] would return, the first item in a list,
data can be added to the list by either appending to the list or editing values in a list,
the robot uses lists to store the list of points and instructions for how to get to those points.

2.

import will run all of the code in the specified python script as if it were run in the program that is importing,
importing allows for the use of multiple files, each file can be debugged on its own instead of needing to debug the entire project as a whole,
the robot imports navTest, time, ssd1306, buzzer, and stepperDriver.

3.

a function contains code that is commonly used in the program, it can be called from any point in the program after it is declared,
functions are most commonly used to make debugging easier and to make the code more legible,
genPath() takes a list of xy coordinates and converts them into heading distance commands.

4.

pin.value() can be used to get the current state of a pin or be used to set a pin high or low,
before pin.value() is called, a pin object must be defined with a pin number and modeling,
the robot uses pin.value() to drive the stepper motors.

5.

a while loop will execute the code it contains until its condition is no longer met,
an if statement will run once if its condition is met,
a for loop will execute the code it contains for each item in the specified list,
the robot used a while loop in the calibration script to prompt the user multiple times,
the robot used an if statement to change the turn direction if turn angle is less than 0 degrees,
the robot used a for loop to iterate through the path generated by genPath and move accordingly.

6.

a stepper motor is a type of motor that moves in discrete steps,
it is used when high accuracy is required because stepper motors can be driven in a way that ensures, that the motor will reach its target position without using sensors,
the robot used stepper motors as its main source of movement because of the accuracy advantages.

7.

stepper motor drivers are controlled by pulsing the step pin, it will move one step each time the step pin is pulled high in the direction specified by the direction pin,
the step pin will advance the motor by 1 step,
the direction pin will set the direction that the motor will step in,
the enable pin will turn the motor on when pulled high, anything sent before the motor is enabled will be ignored,

the robot controlled the motors by setting the direction using `setDir()` and then used `stepSteps()` to move the motors x number of steps

8.

the angle that the caster bearing makes contact with the ground does not effect its performance, it also does not need time to change direction, our group used caster bearings to ensure that the robot did not wobble on its main wheels.

9.

hard plastic does not have much friction on most materials, rubber has much more friction making it a better material for a wheel, which is why our group used rubber tiers.

10.

to keep all of the wheels of a car on the ground, suspension is used to allow the wheels to move up and down according to the terrain, cars use 4 wheels because it is significantly more stable, the only benefit that having 3 wheels offers is saving weight, our group ensured that all 4 wheels were on the ground by using a spring to push the fourth wheel into the ground.