CSCE 274 Section 001 Fall 2019 -- Project 1 -- A. Staton, M. Ziemer, R. Carff

Description:

The program for Project 1 had a primary goal to "draw" (i.e--move) the iRobot Create2 in the shape of a polygon. The number of sides of this polygon could change, for all valid inputs of side numbers (e.g.--two is an invalid input number of sides). The program works in conjunction with two interfaces and a main function to produce this desired result.

One interface is responsible for transmitting and receiving data for the program to the iRobot via Serial communication. All information in this interface is read/written in the form of bits; it is a low-level form of data communication. The other interface handles operations for the iRobot Create2. These operations perform actions such as manipulating the state of the robot, reading the robot's sensors, reading the input from the robot's buttons, and moving the robot. These interfaces were designed in order for other classes and objects to be able to inherit these boilerplate functions. Any work done by the iRobot will need both of these interfaces, so the design decision was made to make these functions inheritable.

There is one function that calls all of our other functions in some way; it's the main function. A design decision was made to use a main function (although python does not require one) for organizational purposes. Also, this main function enhances readability for the program by allowing any future audience to be able to easily trace functions and their source. The authors of this code worked to ensure its proper documentation and organization.

The program works by first listening for the press of iRobot's "Clean" button. This initiates the program. Upon it's press, the robot will move forward to draw the first side of the intended polygon. Kinematics formulas were applied to calculate the proper side length (i.e.--drive time) and turning radius for the polygon. While the iRobot is driving in the shape of the desired polygon, it is also listening to the "Clean" button on the iRobot. If this button is pressed during movement, the iRobot will pause its movement at the next vertices, or the next turning point, of the polygon. It will resume its motion if the clean button is pressed once more.

This constant listening of the "Clean" button was implemented by Threading. By creating another process for this listening specifically, Group 4 was able to ensure that the main function was not inhibited. The two, separate processes will rejoin after the iRobot draws its polygon.

Evaluation:

Group 4's program works; and it works well. It has been tested for polygons with sides between Triangles and Octagons. Some of the parts of the projects that were initially challenging were: reading the buttons, packing/unpacking bytes before transmission, and threading. With sufficient critical thinking, as well as many trials and errors, the group was able to mend its shortcomings.

The group managed it's codebase with Git. Generating branches to test ideas and test functionality, while keeping a 'master' branch to maintain a working submission proved to be beneficial. It was a large factor in the group's efficacy.

Allocation of Effort:

This project's group (#4), has three members: Miles Ziemer, Robert Carff, and Austin Staton. Each member of the group made significant contributions to the development, advancement, and completion of this project. Ziemer provided many of the mathematical calculations and gave structural input to ensure the project's completion; Carff wrote many functions of the code and guaranteed their effective internal documentation; Staton also contributed to some of the programming functionality and wrote the technical documentation. This group proved to be both effective and successful in their completion of Project 1.