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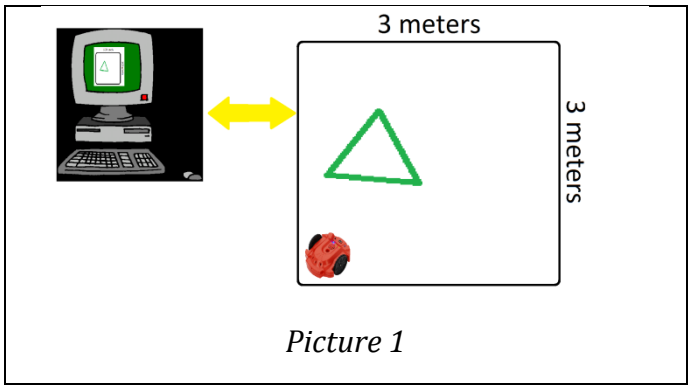
Date: October 2, 2014

Scribbler Bot Picture Drawer Proposal

Project Description

I propose to create a project where a user draws an image on the computer and the scribbler robot draws that picture with a pen on the surface that it is on (refer to picture 1 on the next page for a visual representation of this). Using the location of the image, python will analyse it. Through blob filtering, all pixels that are part of the background will be turned white. The program will then go through a loop storing in a list, the location of the x- and y-coordinates of all the non-white pixels.

The robot will be made to draw a 3 m by 3 m picture. It will also change the picture it is working with to 300 pixels by 300 pixels. This means that each pixel in the digital image will represent one centimeter on the physical picture. The robot will be assumed to begin at the top right corner of the physical picture to be drawn, facing the top left corner. For each pixel, the program will use the formula (x location of pixel)(3)/300 = (x location of pixel)/100 to identify how many centimeters from the beginning location, the robot should move to start drawing. A simple velocity kinematics equation will determine the amount of time the robot will take to get there. The robot will then move forward to that location. The same process will be done for the y-coordinate of the pixel. Once it has arrived at the pixel, the program will display a message asking the user to insert the pen. The program will then check if there are any pixels right next to it (same x-coordinate, y-coordinate shifted by one; same y-coordinate, x-coordinate shifted by one; or both x- and y-coordinates are shifted by one), if so it will check where this line ends. It will move in that direction, and ask the user the remove the pen when arriving at the end of the line. The above process is repeated for the whole picture, while the robot keeps track of its new locations, and subtracting it from the aforementioned formula.



Picture 1

Use of Robot Features and other Python Modules

First, the program will use the DC motors [1] in order to move around the picture and draw it. It will also use Scribbler's integrated pen port for the user to insert the pen. Finally, if we feel confident with the above procedure, and are able to finish early, we may use the camera to try and draw (without much detail) a picture taken by the robot.

The program will rely on myro [2] to show a pop-up message when the pen has to be inserted, and for working with the image.

Design Challenges

Some things to keep in mind are:

- Parts of the picture that have the same colour as the background colour
- Areas that are shaded in
- Two parts of the image that are merely a few centimeters apart but not touching each other
- Making every picture 300 pixels by 300 pixels without changing the picture itself
- The robot might not go in a straight line even when programmed to do so

Time Estimate

Table 1 illustrates the main tasks that we will need to do, and the estimated time that each will take:

Task	Estimated Time to Complete
Developing a good algorithm to maximize efficiency	10 hours
Taking the new algorithm and putting it into python and myro	5 hours
Testing and fixing minor details (there are many things that can go wrong in this specific program)	20 hours

Table 1

References

[1] D. Kumar, *Learning computing with robots*, Edition of book, : , 2009, p. 23.

[2] "Myro reference manual," http://wiki.roboteducation.org/Myro_Reference_Manual. Accessed October 2, 2014.