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Robotics Homework 1

Task One:
We found that calibrating the robot by having the user change the motor speed while the robot was running made it rather hard to tell if we had correctly calibrated the robot. Instead, we

How close to straight can you get it?
We believe that by manually calibrating the scribbler we can get it to drive very straight for short distances and within a few degrees of straight for longer distances.

How long does it take to calibrate the motor speeds to drive straight.
After we decided to manually calibrate and moved the scribbler to a flat piece of paper with a marker, it took 4 or 5 runs to correctly calibrate the motor speeds.

What effect does a change in battery power have on the robot's performance?
When the batteries are fully charged, we find that the robot moves much more reliably. We see this less with movement in a straight line, though it is still a factor. In the later tasks we find that turning is significantly more reliable with fresh batteries.

Can it drive just as straight backwards as forwards?
Theoretically, yes. In practice we had to calibrate the robot slightly differently to get it to go straight backwards.

Does the robot you use make a big difference in how well you can calibrate the motors?
While we only attempted to calibrate our scribbler, Bradbury, we believe the process would be the same on all the scribblers. Though the Scribblers' motor values would vary from each other, it would be possible to get them all to run acceptably straight.

Task Two:
A trial video of bradbury taking a panorama photo:
https://drive.google.com/a/macalester.edu/file/d/0B0KcWF4nkS2xZWJsdzFzSWRjcjQ/view?usp=sharing

A video of Bradbury successfully taking a panorama photo:
https://drive.google.com/a/macalester.edu/file/d/0B0KcWF4nkS2xLWNkdFp3b2hFeXM/view?usp=sharing

As mentioned above, the most difficult part of this task was keeping Bradbury's turns constant. More than once we had to recalibrate the turn function to make a full 360 degree turn. We believe this is largely due to inconsistencies in motor commands, battery levels, and testing on multiple surfaces.

Task Three:
A trial run for task 3:
https://drive.google.com/a/macalester.edu/file/d/0B0KcWF4nkS2xdVJicFdnck5uSUU/view?usp=sharing

A successful run of task three:
https://drive.google.com/a/macalester.edu/file/d/0B0KcWF4nkS2xUG9SRmcwLVdpZUU/view?usp=sharing

Notice that in the second trial we have extended the wait time to make Matt Damon's reading of the encoded message easier.

Our implementation:
We decomposed this task into a few discrete functions. First there are two color detection functions that take in a threshold value and return True if there are more color matching pixels than the threshold value, and False otherwise. Then we implemented a function for precisely as possible turning to face a sign. Finally we wrote a function that slowly turned, scanning for the original yellow sign.

Challenges:
One of the biggest challenges with this task was the fact that Bradbury doesn't turn a consistent amount. In some cases, despite making the exact same call, our scribbler would turn either a little less or a little more than it had before. Additionally the robots tendency to slip made getting consistant turn amounts difficult.