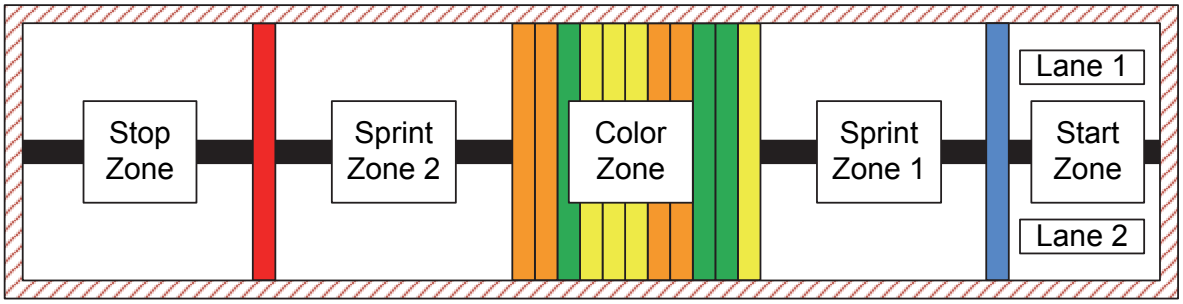
Project Region Detection

Project Objectives

This main objectives include the following

1. Introduction to data acquisition/logging and digital signal processing using C# and MATLAB
2. Introduction to feedback control
3. Introduction to sensors (gyroscopes, light sensors, ultrasonic and optical encoders)



Project Guidelines

This challenge is divided into the following phases

1. Two robots race across a wooden floor until the finish line, the robot crossing the finish line first wins. Robots start behind the start line in the start zone.
2. The competition will start with a signal by the instructor/TA. The motion of each robot should only when a team member presses the “space bar” on the computer.
3. Each robot should follow the side wall (right wall if the robot is in lane 1, left wall if lane 2) using the ultrasonic proximity sensor to maintain a straight line. Robots are not allowed to cross the middle black line set on the board nor the be in contact to the sidewalls or the opponent robot.
4. In the color zone, the robot should scan a sufficient amount of light sensor data, transmits them to the PC to be logged in a comma separated values “csv” file in the following format:

EncoderValue1, ColorSensorValue 1\r\n
EncoderValue2, ColorSensorValue 2\r\n
EncoderValue3, ColorSensorValue 3\r\n

After the race is complete, this file will later be analyzed in MATLAB to distinguish between the normalized width and color of each line. Example (1-yellow, 2-green, 2-orange,etc.)

5. After crossing the finish line, robots have to stop as close as possible to the front wall without contact and signal a sound indicating so.
6. The robots then turn 180 degrees relying only on gyroscope data in angular velocity mode (not angle mode). Hint: An integration of angular velocity can provide an estimate of angle.
7. Robots should race back to the start line without scanning the colored region, nor touching the walls or crossing the lane separator black line.

Demonstration Marking Rubric

Milestone	Percentage
2	5%
3	20%
4	40%
5	15%
6	10%
7	10%