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Lab 3 – Sensor Input with Periodic Interrupts

To integrate the motor functions into the project I just wrote, I would still use interrupts to periodically check the IR and bump switch data inputs (inputs from the μ C perspective). Given this input, a state machine would need to be implemented to traverse to different states. If I wanted a very boring and inefficient robot, I could use the “simple” motor functions written for lab 1 where a hard valued time and duty cycle is passed to control the wheel motors. The simple motor functions can control either one wheel at a time or both at the same duty cycle. Instead, we could make use of the hardware timer modules to provide a wide range of PWM waves with varying duty cycles to control both wheels individually. This would be considered an output for the complex finite state machine. The timing aspect is now taken care from the interrupts where the state changes dependent on the inputs. However, I would think that the timing of the interrupt handler calls is very important as you need to find a balance between motor speed (duty cycle), program efficiency, and course effectiveness. For example, calling the ISR too slow might lead to the robot falling off course. On the other hand, calling the ISR too quickly will be high in power consumption (low efficiency) although allowing us to drive the motors harder.

P.S. I also have no idea what a semaphore and after researching it's a very simple concept but could not get it to work. There were no examples in class / lectures about it either. I just used global variables.

Videos:

1. <https://youtu.be/qxKrMFuec3o?si=k1hxcw39e9fqMseU>
2. <https://youtube.com/shorts/4jWQQ4nYU-Y?si=Z0DjkZMCyStpF3Di>