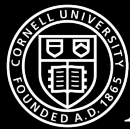


ECE 5725

Embedded Operating Systems

Lecture 15

Prof. Joseph F. Skovira



A few items

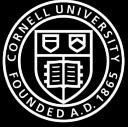
Lab 2 Week 2

Homework 3 Part 1

Lab 3 Next Week

Lab 2 Report Next Week

Break Schedule Next 2 weeks



Yet More Lab 2 items....

Typos

Bash Scripts

Two Button

Control Two Collide

Server

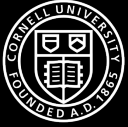
PyGame Doc

```
import pygame
from pygame.locals import * # for event MOUSE variables
import os

os.putenv('SDL_VIDEODRIVER', 'fbcon') # Display on piTFT
os.putenv('SDL_FBDEV', '/dev/fb1')
os.putenv('SDL_MOUSEDRV', 'TSLIB') # Track mouse clicks on piTFT
os.putenv('SDL_MOUSEDEV', '/dev/input/touchscreen')
```

Environment Variables

Lab2 Wheezy Downgrade Pygame Segmentation Fault



Handle Objects Stuck together

```
code_run = True  
collided = False  
Object Movement = Standard
```

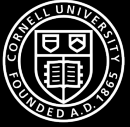
```
While code_run:  
    move objects
```

```
    if collision: # If objects have collided....
```

```
        if collided: # If already in collided state....  
            # Ignore Collision  
            # Continue moving to escape collision
```

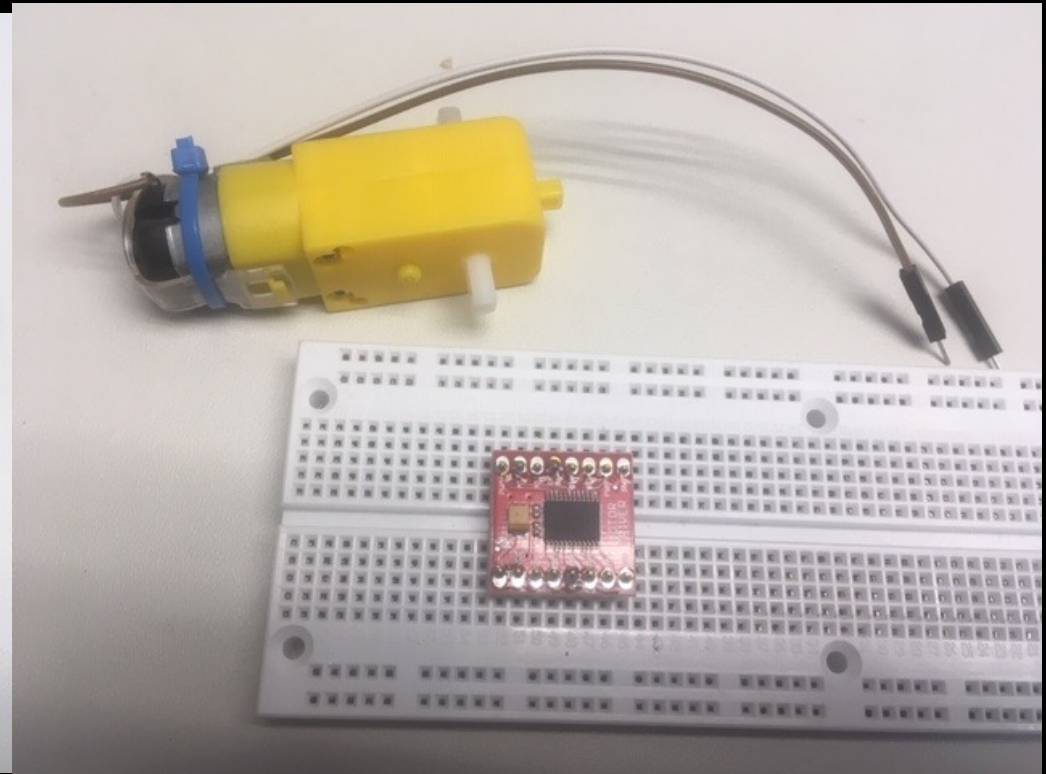
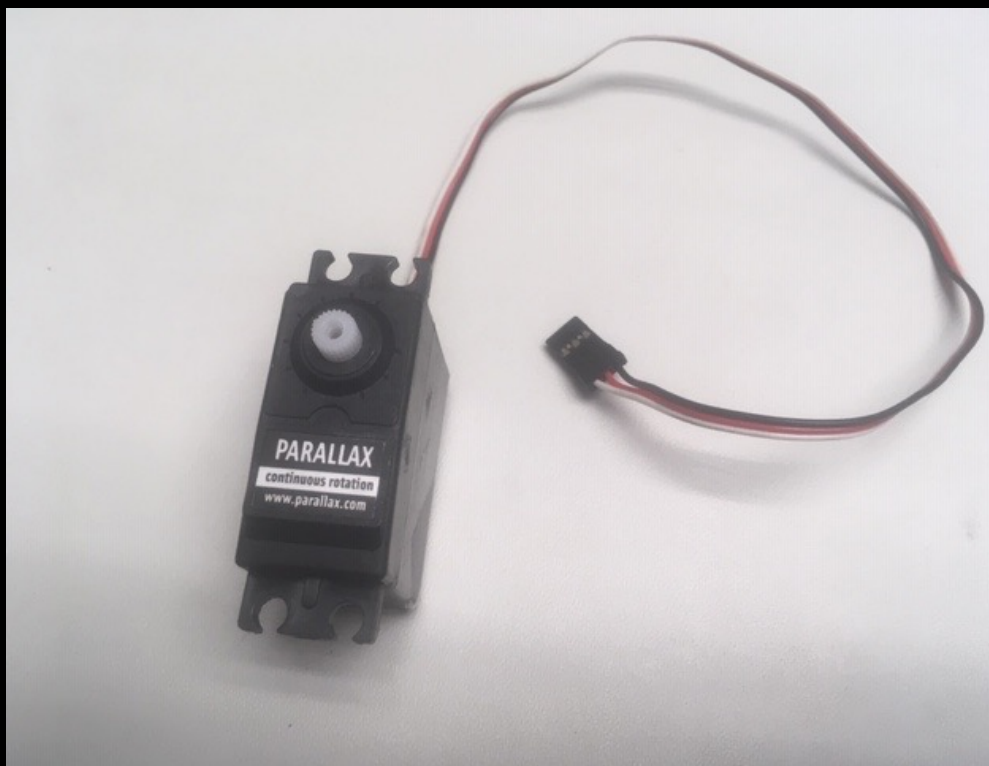
```
        else: # this is a new collided event so...  
            collided = True  
            Adjust object movement to escape collision
```

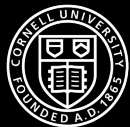
```
    else: # Objects have not collided...  
        collided = False  
        Adjust Object movement to standard
```



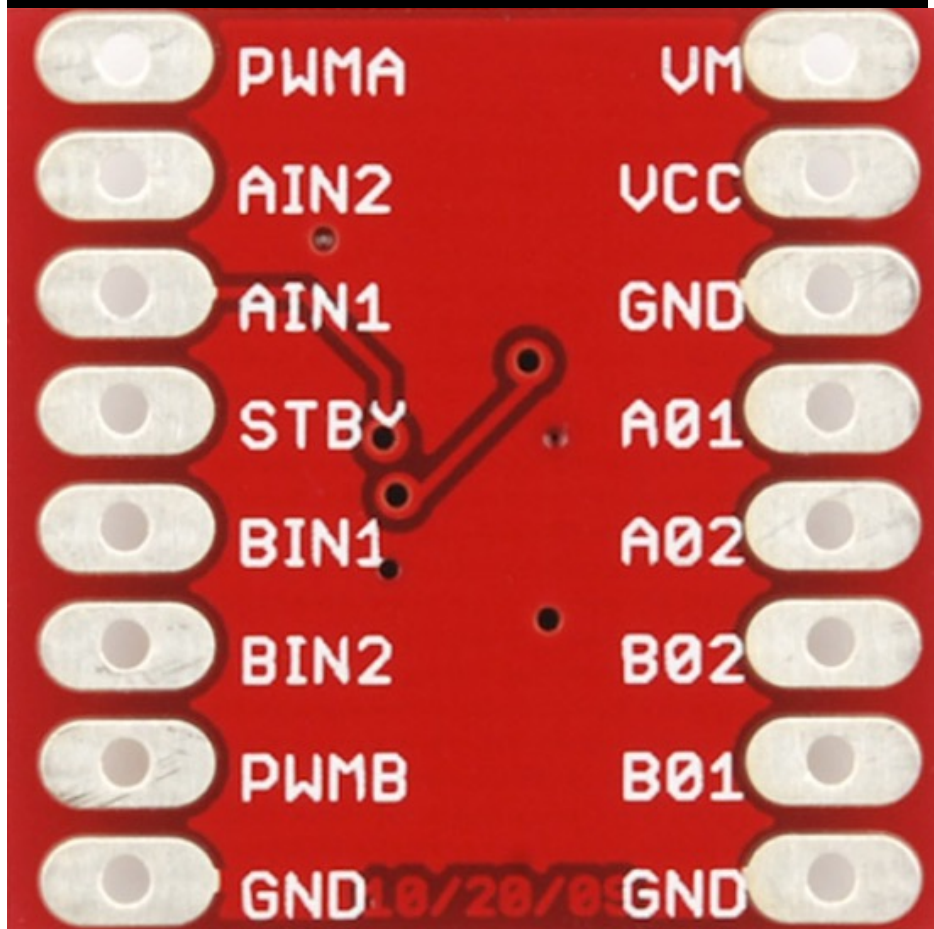
Lab 3 items

Adding GPIO Outputs





Lab 3 items



Parallax Continuous Rotation Servo (#900-00008)

The Parallax Standard Servo is ideal for adding bidirectional continuous rotation to your robotics projects.

Features

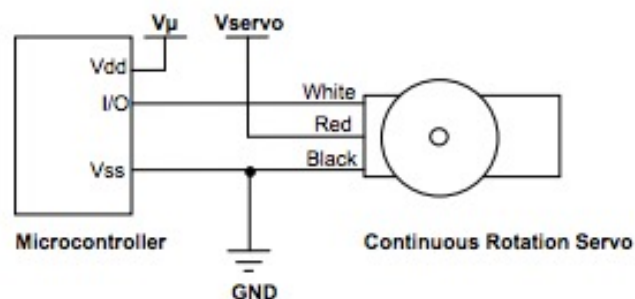
- Bidirectional continuous rotation
- 0 to 50 RPM, with a linear response to PWM for easy ramping
- Accepts four mounting screws
- Easy to interface with any Parallax microcontroller or PWM-capable device
- Very easy to control with the PULSOUT command in PBASIC or SX/B
- Weighs only 1.50 oz (42.5 g)
- 38 oz-in torque @ 6 V



Key Specifications

- Power requirements: 4 to 6 VDC; Maximum current draw 140 +/- 50 mA at 6 VDC when operating in no load conditions, 15 mA when in static state
- Communication: pulse-width modulation
- Dimensions: approx 2.2 x 0.8 x 1.6 in (5.58x 1.9 x 4.06 cm) excluding servo horn
- Operating temperature range: 14 to 122 °F (-10 to +50 °C)

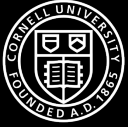
Quick-Start Circuit



V_μ = microcontroller voltage supply

V_{servo} = 4 to 6 VDC, regulated or battery

I/O = PWM TTL or CMOS output signal, 3.3 to 5 V; < V_{servo} + 0.2 V



From Data Sheet And Connection guide

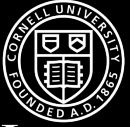
Motor Control Setup

Correctly power motor, controller,
and Pi

Maximum Speed

Direction Control

Frequency and Duty Cycle



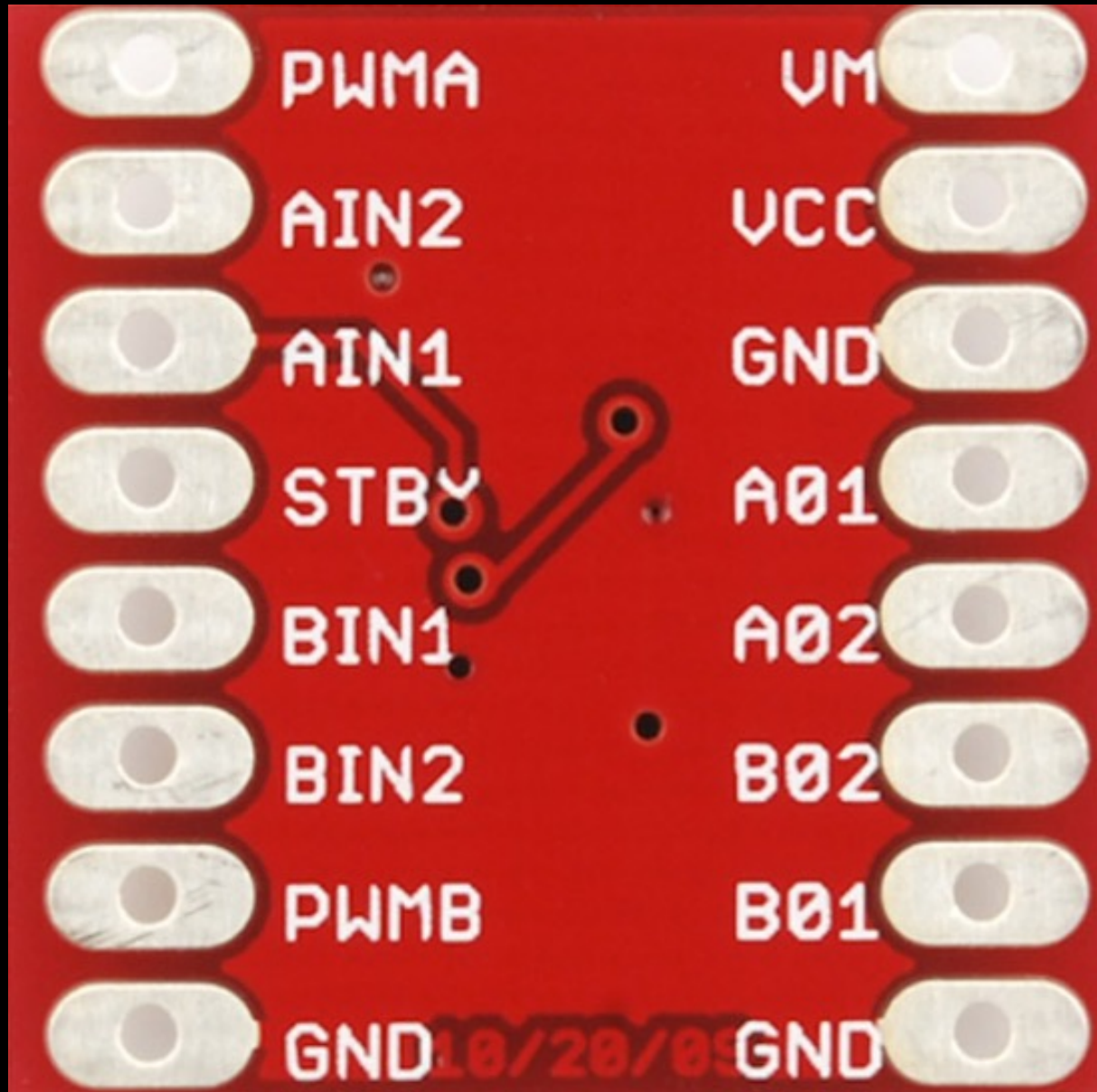
Connections

ECE 5725 Lecture 15

Input From Rpi:
PWM speed
control

Input From Rpi:
Motor A
direction

Standby!



Input: Motor
Power

Input:
Controller
Power

Ground!

Output: To
Motor A



Direction Control

In1	In2	PWM	Out1	Out2	Mode
H	H	H/L	L	L	Short brake
L	H	H	L	H	CCW
L	H	L	L	L	Short brake
H	L	H	H	L	CW
H	L	L	L	L	Short brake
L	L	H	OFF	OFF	Stop



Lab 3 items - PWM

Communication Protocol

The Parallax Continuous Rotation Servo is controlled through pulse width modulation. Rotational speed and direction are determined by the duration of a high pulse, in the 1.3--1.7 ms range. In order for smooth rotation, the servo needs a 20 ms pause between pulses. Below is a sample timing diagram for a centered servo:

