

ESE112

Boe-Bot: Servos

Servos

- Boe-Bots use Continuous Rotation Servo
 - Use analog signal to encode *rotation rate*
 - Protocol: Pulse Width Modulation (PWM)
- PWM
 - Controlling analog circuits with a processor's digital outputs
 - Voltage source is supplied to the analog load (e.g. motors) by means of a repeating series of on and off pulses
 - The *on-time* is the time during which the DC supply is applied to the load, and the *off-time* is the period during which that supply is switched off

Servo Internals

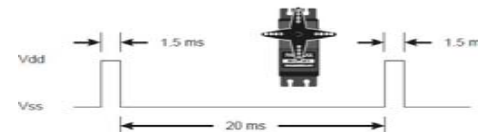
- Control circuitry and potentiometer that is connected to the output shaft
- Potentiometer allows control circuitry to monitor the current angle of the shaft
- Angle is correct
 - Then motor shuts off
- Angle is not correct
 - Then motor is turned to the correct direction until the angle is correct



Source: <http://www.seattlerobotics.org/guide/servos.html>

Pulse Width and Angle

- The angle is controlled by duration of pulse



- Pulse width of 1.5
 - Neutral Position
- < 1.5 – clockwise movement
- > 1.5 – counter clockwise movement

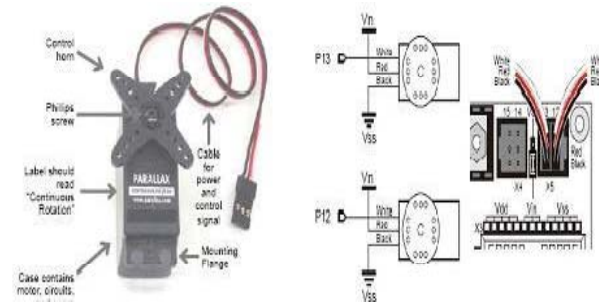
void pulseOut(int length, int portPin)

- Generate a pulse of a specific duration
 - If the pin is an input then it will be changed to be an output and remain as an output when complete
- The time is measured in 8.68us units
 - With a maximum value of 32767 giving a maximum pulse time of 284.4ms.
 - A time of 0 will not cause a pulse
- pulseOut can be used to generate the control pulses for a servo motor

ESE112

4

Connections on Boe-Bot



ESE112

5

Calibrating a servo



- Send a pulse with a pulse width of 1.5ms (i.e. centering pulse width) continuously
- On the back of each servo by the battery pack there is a small hole giving access to a yellow and blue potentiometer
- While running your calibration program, use a Philips screwdriver to the potentiometer until the servo stops turning
 - Make sure you do not turn them too fast

ESE112

6