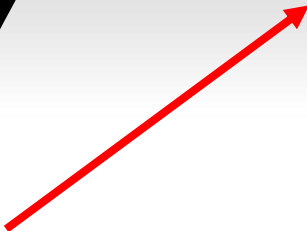




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ARDUINO STEAM ACADEMY



Art without Engineering is dreaming. Engineering without Art is calculating.

- Steven K. Roberts



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SERVO MOTORS

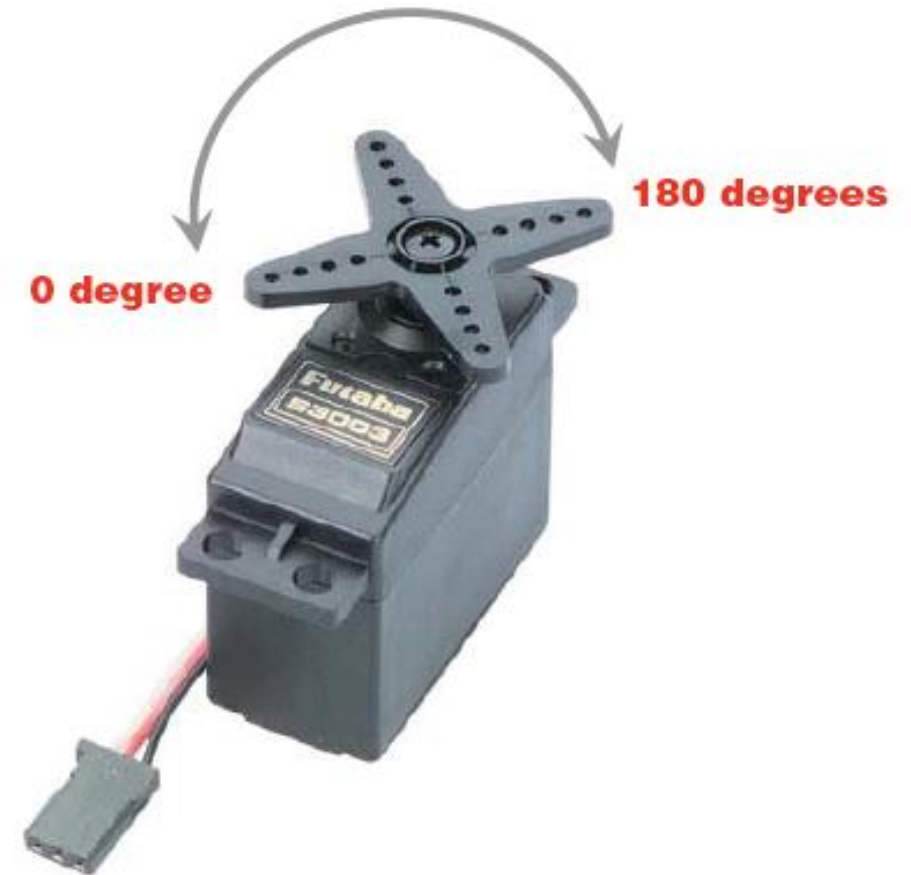


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SERVO MOTOR INTRO

- A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position
- This means, it is a motor that we can precisely control the position



SERVO MOTOR INTRO

- A **servomotor** is a closed-loop servomechanism that uses position feedback to control its motion and final position
- This means, it compares it's current position to the target position and then have the motor turn to go there



https://upload.wikimedia.org/wikipedia/commons/e/ec/Exploded_Servo.jpg

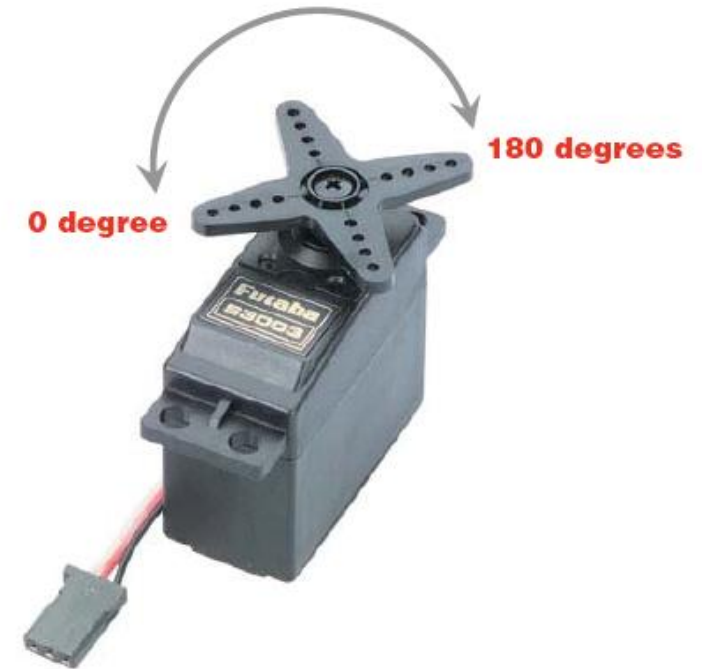
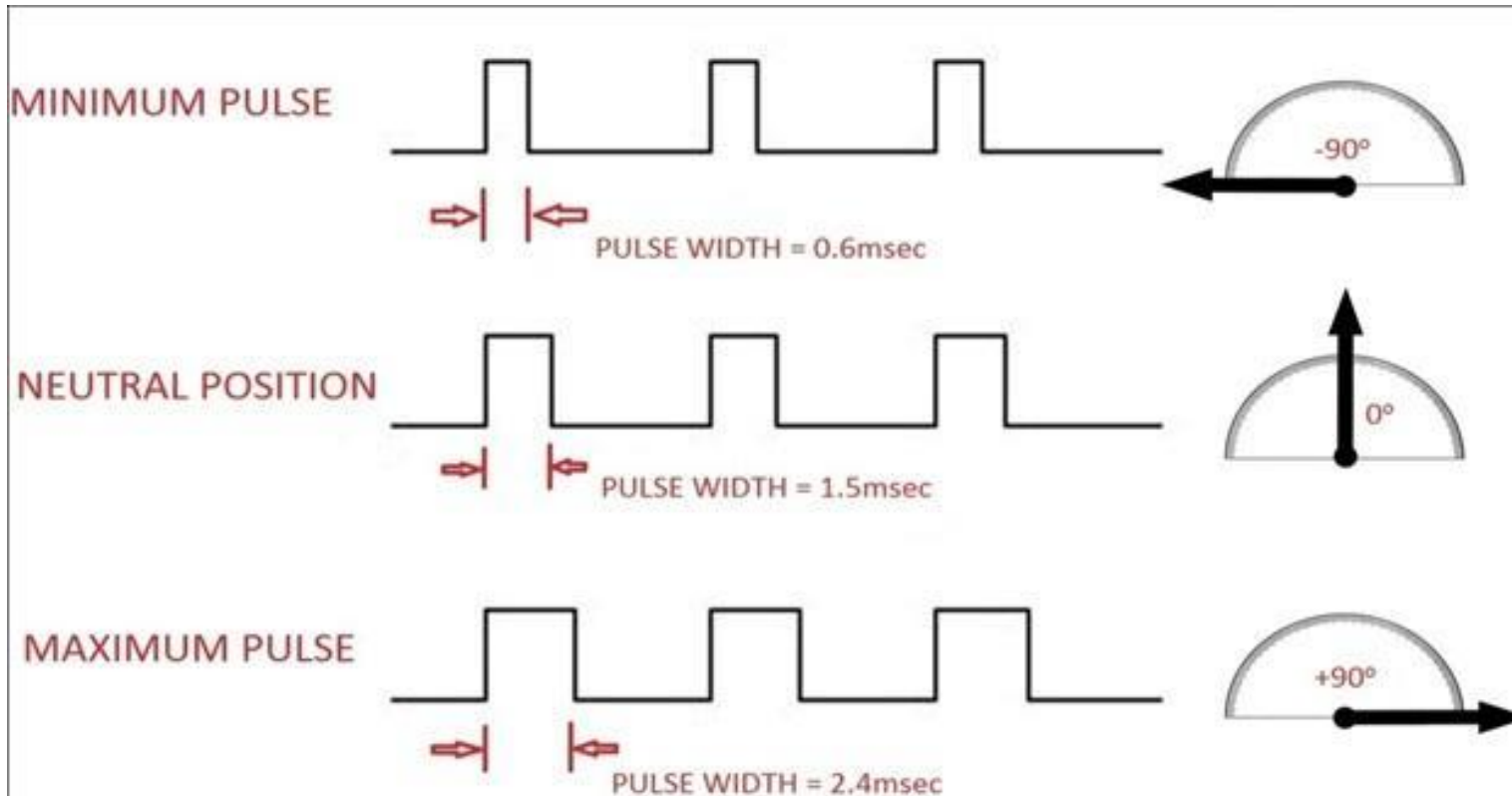


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MOVE A SERVO MOTOR

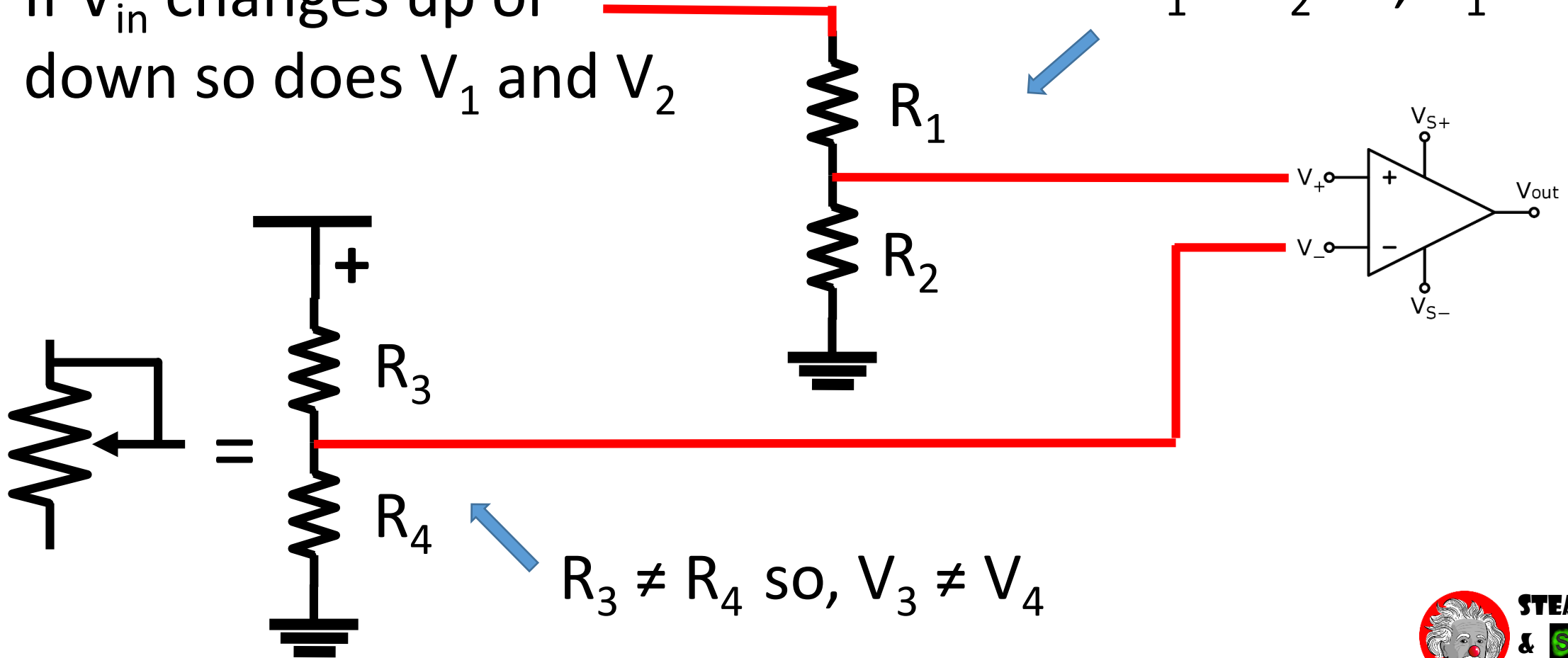
- PWM?
- Pulse Width Modulation



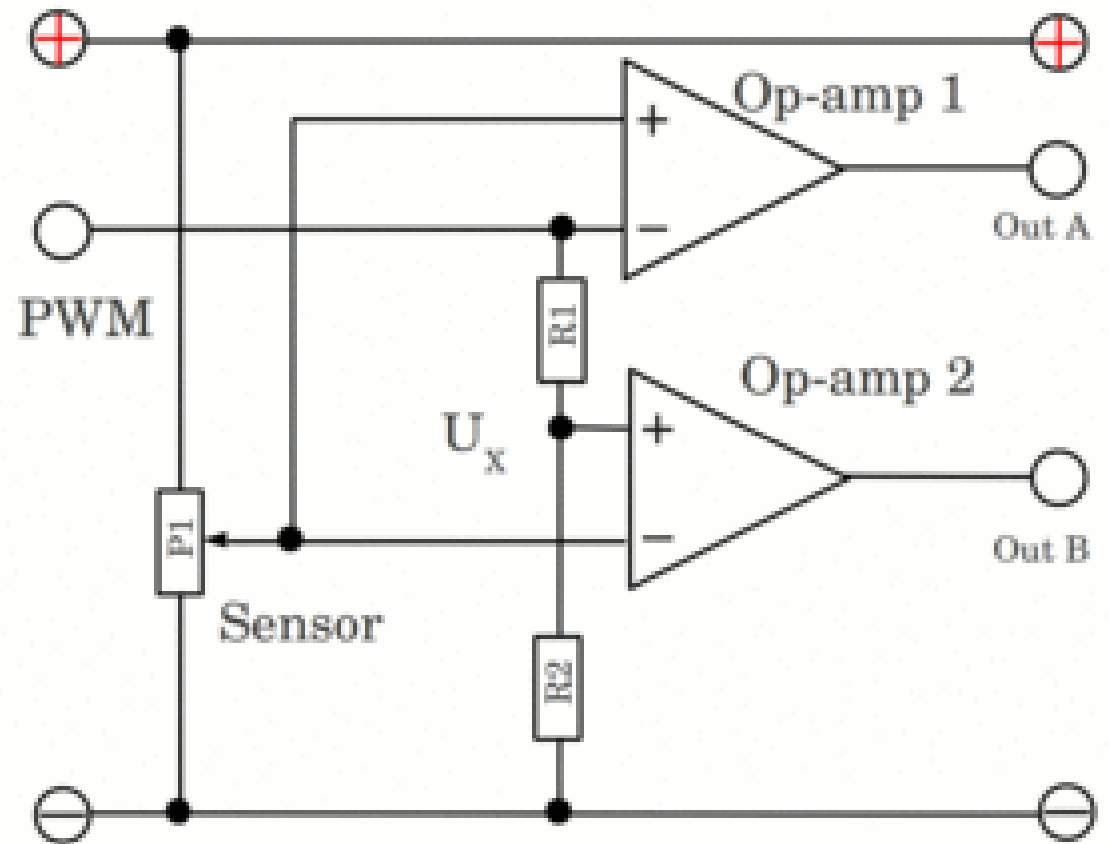
HOW A DIFFERENTIAL COMPARATOR WORKS

If V_{in} changes up or down so does V_1 and V_2

$R_1 = R_2$ so, $V_1 = V_2$



- A **servomotor** is a closed-loop servomechanism that uses position feedback to control its motion and final position
- This means, it compares it's current position to the target position and then have the motor turn to go there



http://homofaciens.de/bilder/technik/servos_007_400x225.gif



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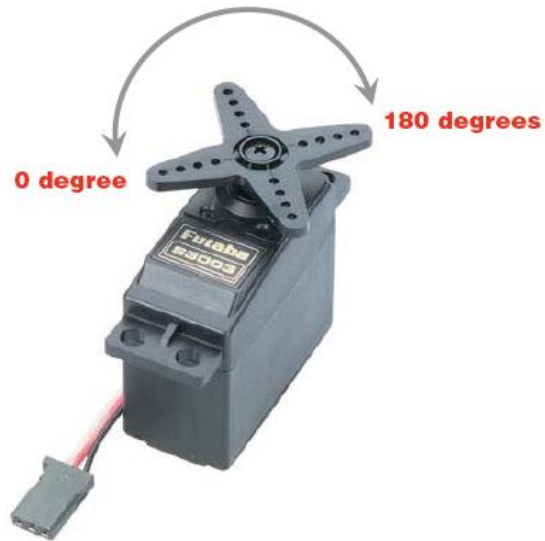
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VIDEOS ABOUT SERVO MOTORS

- [Electronic Basics #25: Servos and how to use them](#)
- [How servo motors work by Phidgets](#)
-



WRITING TO A SERVO MOTOR



```
#include <Servo.h>
Servo myservo; // create servo object to control a servo
                // twelve servo objects can be created on most boards
int pos = 0; // variable to store the servo position
void setup()
{
  myservo.attach(9); // attaches the servo on pin 9 to the servo object
  // myservo.write(pos);
}
void loop()
{
  for(pos = 0; pos <= 92; pos += 1) // can goes from 0 degrees to 180 degrees
  {
    // in steps of 1 degree
    myservo.write(pos); // tell servo to go to position in variable 'pos'
    delay(5); // waits 15ms for the servo to reach the position
  }
  for(pos = 92; pos >= 0; pos -= 1) // can goes from 180 degrees to 0 degrees
  {
    myservo.write(pos); // tell servo to go to position in variable 'pos'
    delay(5); // waits 15ms for the servo to reach the position
  }
}
}
```

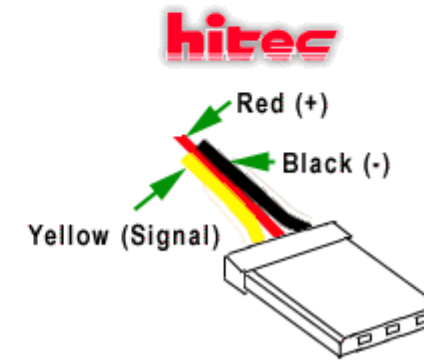
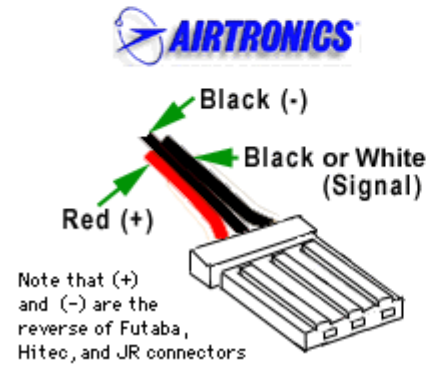
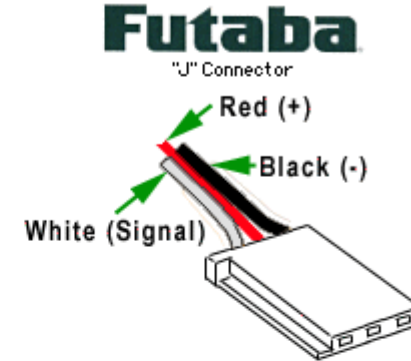
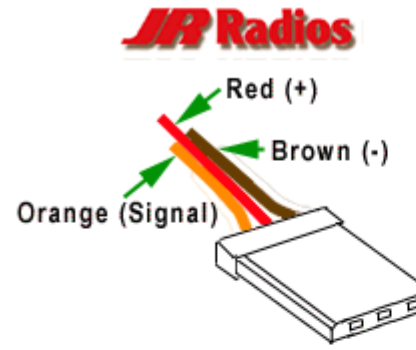
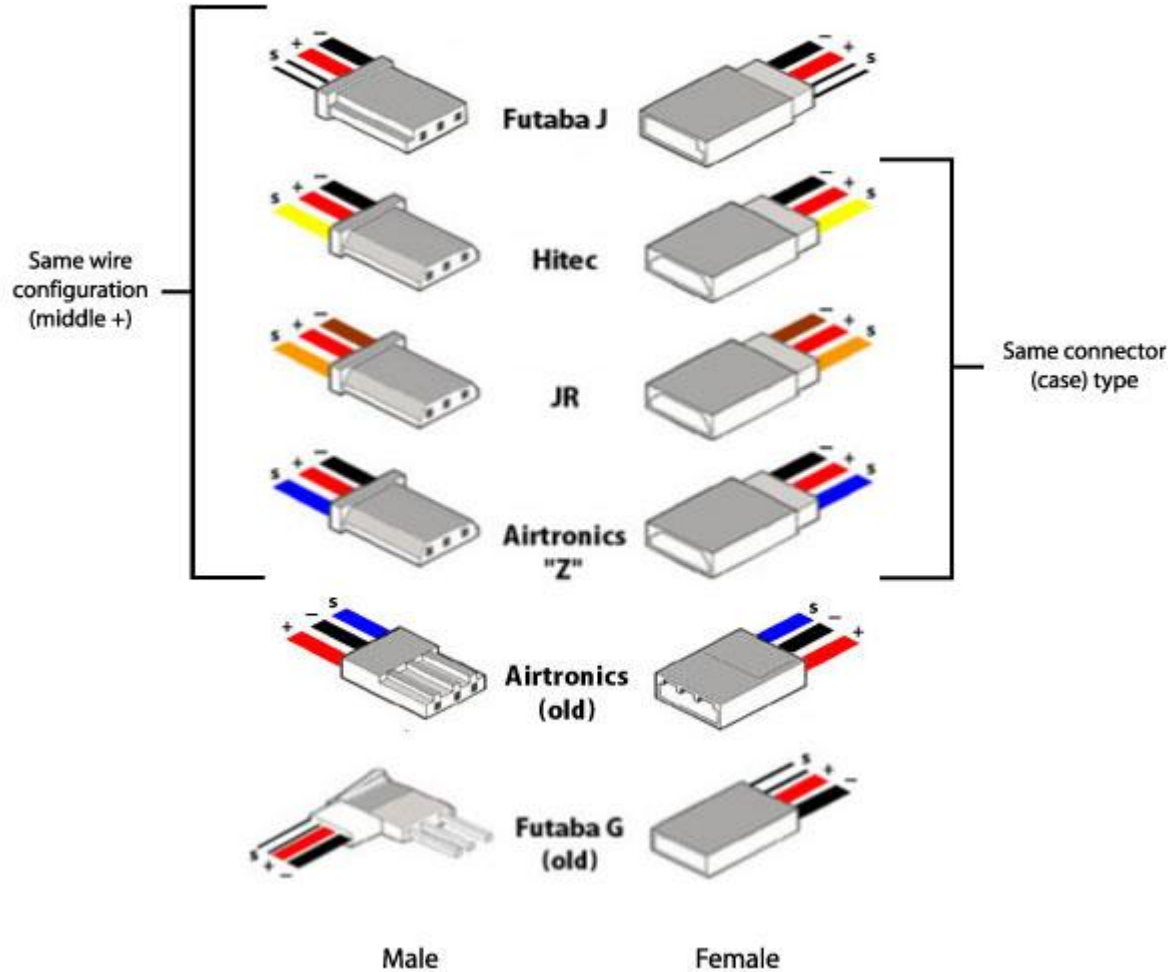


CODE PROJECTS

- Servo Control
 - Haunted Box
 - Read a Switch
 - Write to 1 servo
 - 2 LEDs
 - Wave Hello
 - Read a Switch
 - Write to 2 Servo
- Think about how
 - What to do when a switch is pushed. Delay?
 - What is the pattern you want?
 - What to do after the “Event” has happened? Reset?
- Triggering a Pneumatic
 - Read Switch
 - Write to LED
 - Write to Sound board
 - Write to Pneumatic



SERVO WIRING DIAGRAMS





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APPENDIX



APPENDIX A: LICENSE & ATTRIBUTION

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REFERENCE SLIDES



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IS IT POSSIBLE TO GET HELP?

- Git Hub – See [Steam Clown's Files](#)
- <http://www.arduino.cc/> ← Official Arduino Site
- <http://www.arduinobook.com/>
- Google Is Your Friend...
 - Google [Arduino Getting Started](#)
 - Google [Arduino Tutorials](#)
 - Google [Arduino Sketches](#)
- PDF books
 - [Arduino Programmers Notebook](#)
 - [Arduino in a Nutshell](#)
 - [Introduction to Arduino - A piece of cake!](#)
- YouTube
 - [Arduino: Your First Arduino Sketch](#)
 - [Tutorial 01 for Arduino: Getting Acquainted with Arduino](#)

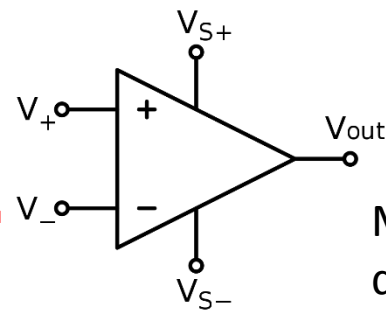




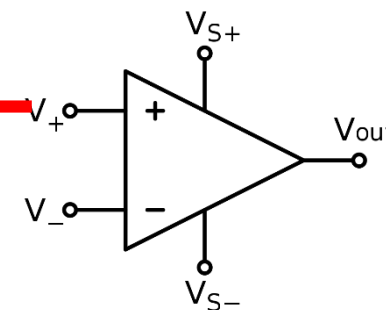
Represents the new **Target** position



Represents the **Current** position



Motor turns to make the Current position differential voltage equal to the new Target position differential voltage



https://upload.wikimedia.org/wikipedia/commons/thumb/9/97/Op-amp_symbol.svg/1000px-Op-amp_symbol.svg.png

<https://upload.wikimedia.org/wikipedia/commons/b/b5/Potentiometer.jpg>

https://pixabay.com/p-950527/?no_redirect

