



Electronics with Arduino

CS4HS Unitec 2015



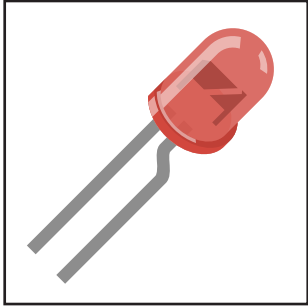
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Binary Blink

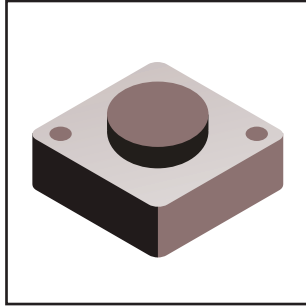
Digital in, digital out

Use a button to turn a light on and off.

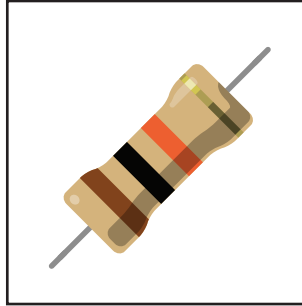
Bits we need



Red LED

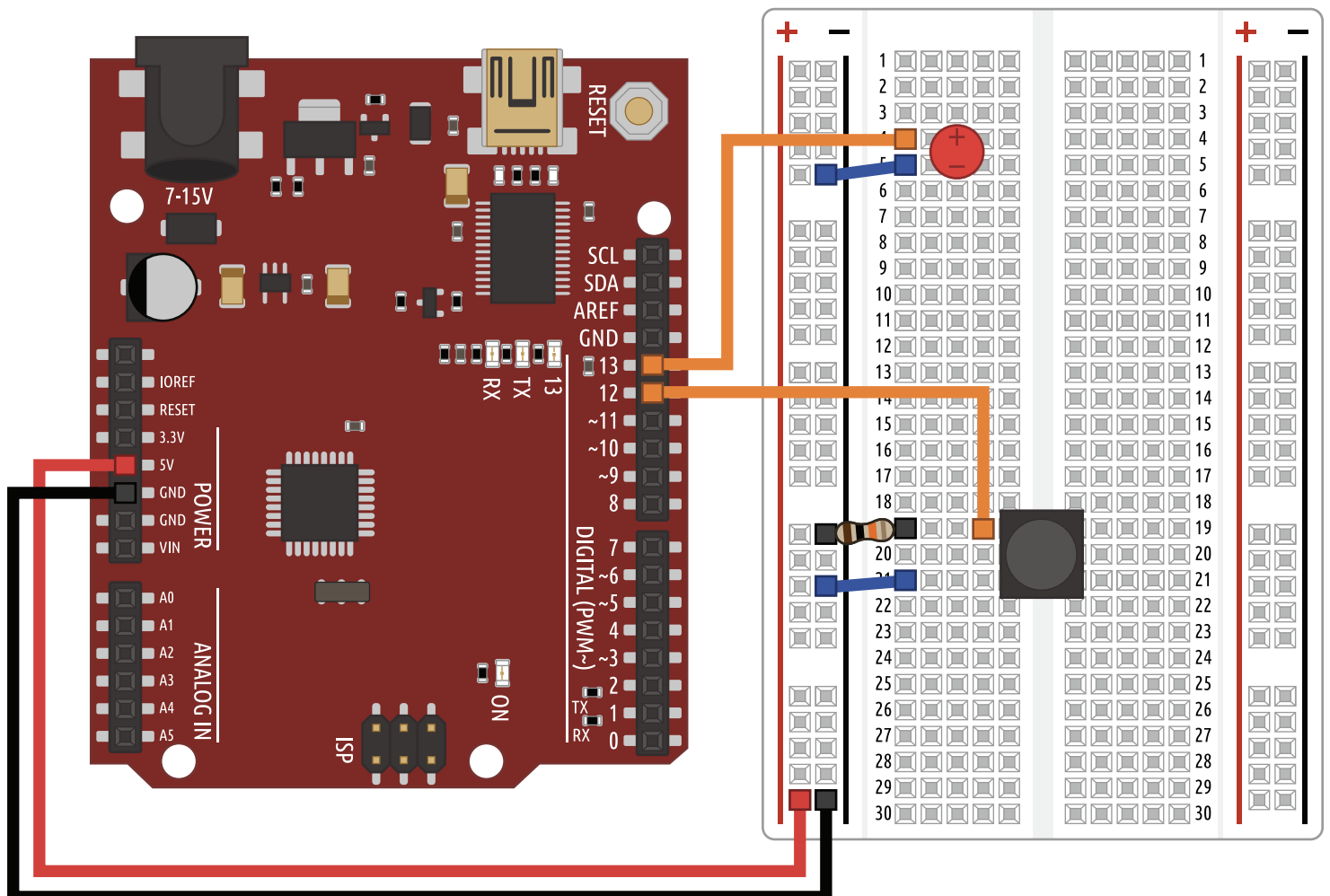


Button



10k Resistor

Full circuit wiring diagram

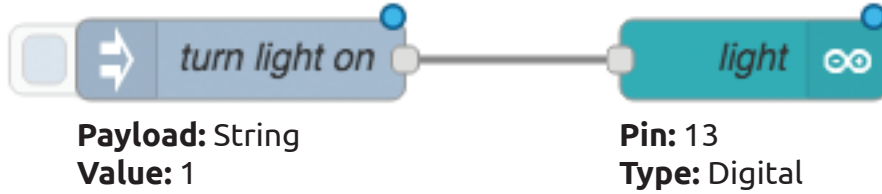


Binary Blink

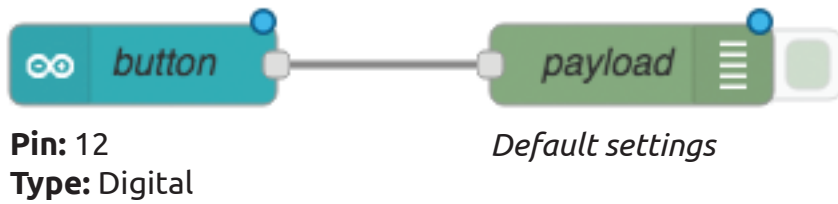
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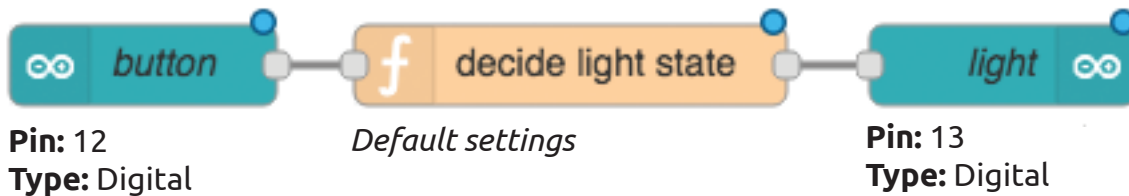
LED test flow



Button test flow



Full circuit flow



Step-by-step function

```
// get the physical button state
var buttonPressed = msg.payload;
// get the stored light state
var lightOn = context.lightOn;

// first time we set the global lightOn, assume it should be false
if(lightOn === undefined) {
  lightOn = false;
}

// if the button state is down/pressed invert the lightOn state
if(buttonPressed === true) {
  if(lightOn === true) {
    lightOn = false;
  } else {
    lightOn = true;
  }
}

// save the state of the light for the next function run
context.lightOn = lightOn;
// set the message payload to be our decided lightOn state
msg.payload = lightOn;

return msg;
```

Alternative shortened function

```
var buttonPressed = msg.payload;
var lightOn = context.lightOn || false;

if(buttonPressed) {
  lightOn = !lightOn;
}

context.lightOn = lightOn;
msg.payload = lightOn;

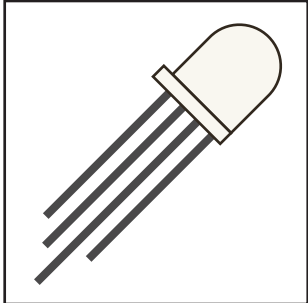
return msg;
```

Spectrum Spinner

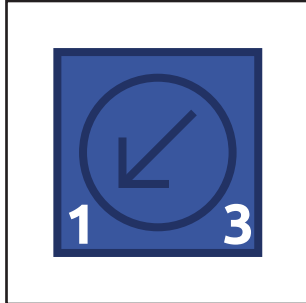
Analog in, digital out

Use a potentiometer to change the colour of an RGB LED

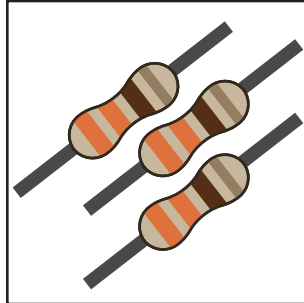
Bits we need



RGB LED

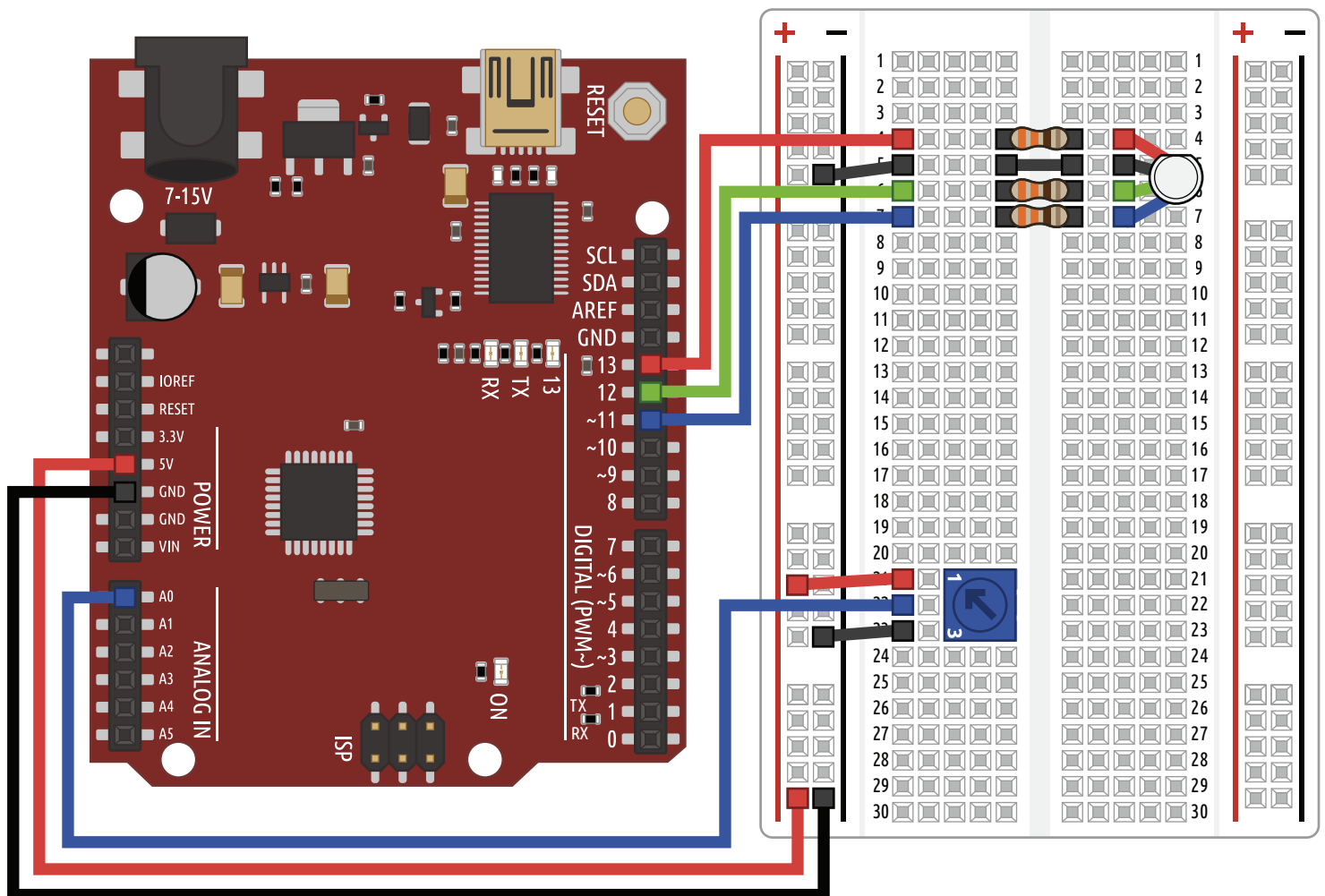


Potentiometer



3x 330 Ohm Resistor

Full circuit wiring diagram

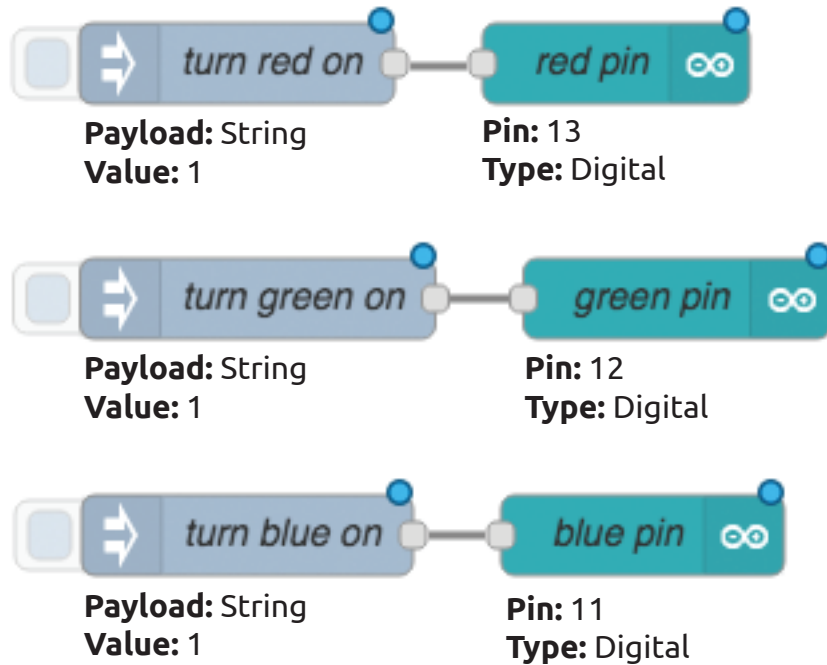


Spectrum Spinner

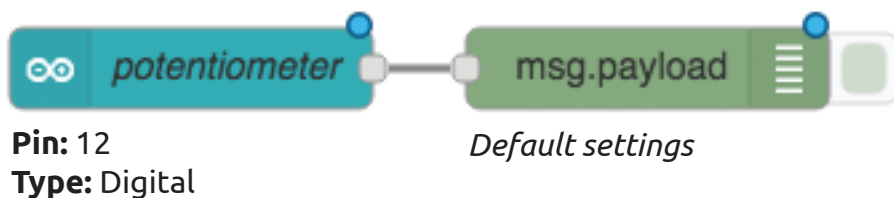
Analog in, digital out

Use a potentiometer to change the colour of an RGB LED

LED test flow



Potentiometer test flow



Full circuit flow



Step-by-step function

```
// get the dial's current value
var dialValue = msg.payload;

// set all LEDs to "off" by default
var redOn = false;
var greenOn = false;
var blueOn = false;

// turn on the correct LED based on the dial value
if(dialValue < 300){
  redOn = true;
} else if(dialValue > 900) {
  blueOn = true;
} else {
  greenOn = true;
}

// create a message for each LED
var redMessage = { payload: redOn };
var greenMessage = { payload: greenOn };
var blueMessage = { payload: blueOn };

// pass along an array containing all three messages
return [redMessage, greenMessage, blueMessage];
```

Alternative shortened function

```
var dialPosition = msg.payload;

var messages = [
  {payload: (dialPosition <= 300)}, // red
  {payload: (dialPosition > 300 && dialPosition < 900)}, // green
  {payload: (dialPosition >= 900)} //blue
]

return messages;
```


Accelerator

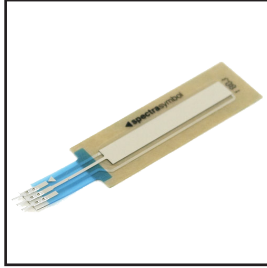
Analog in, analog out

Use a soft potentiometer to change the speed of a motor

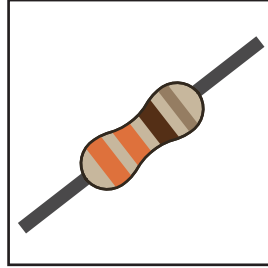
Bits we need



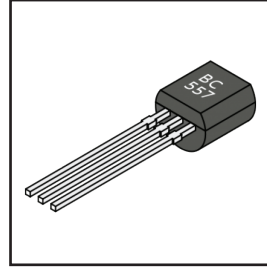
Motor



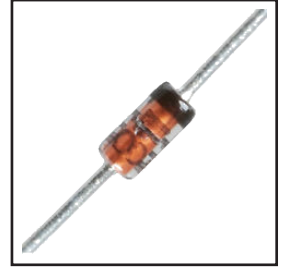
Soft Potentiometer



330 Ohm Resistor

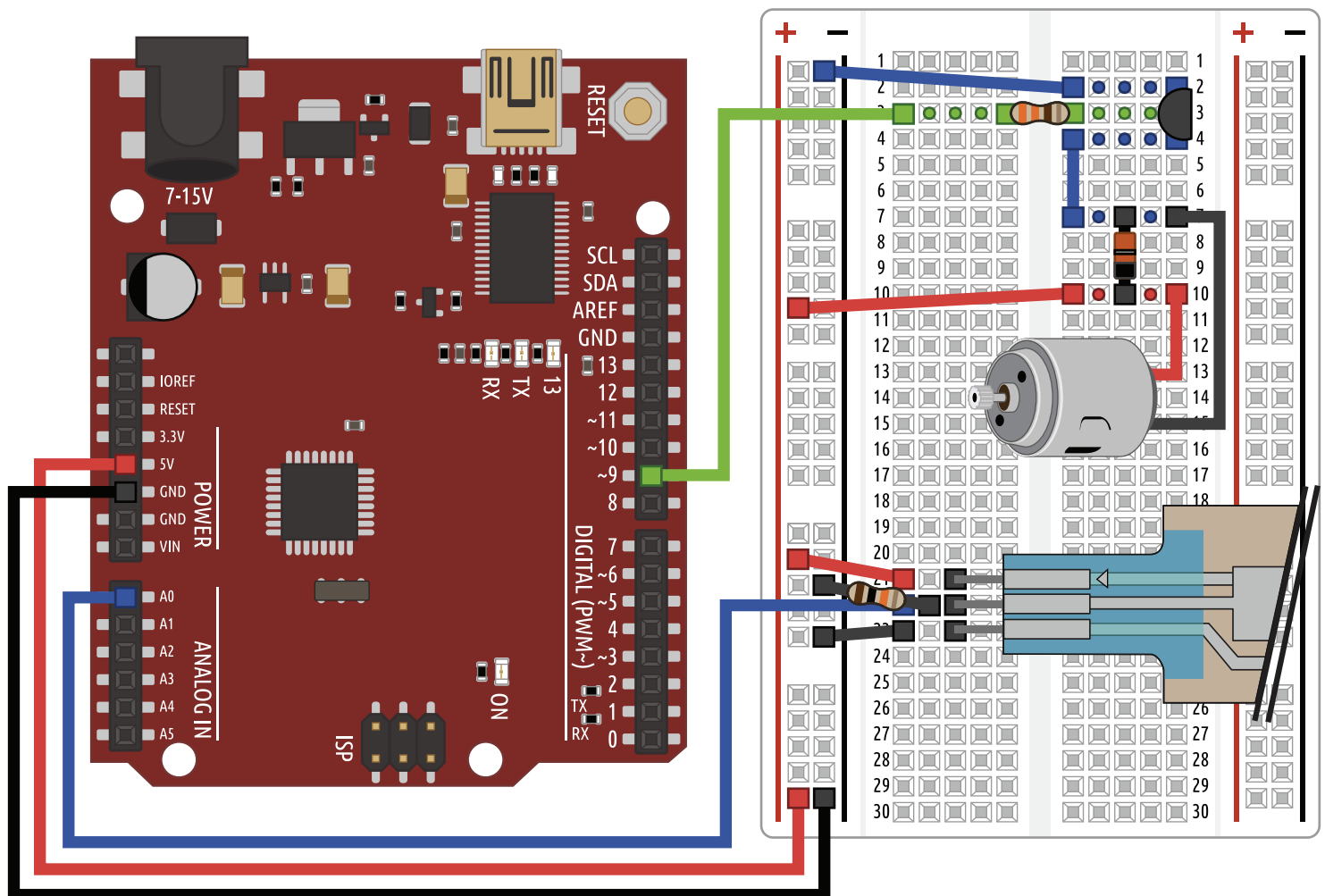


Transistor



Diode

Full circuit wiring diagram

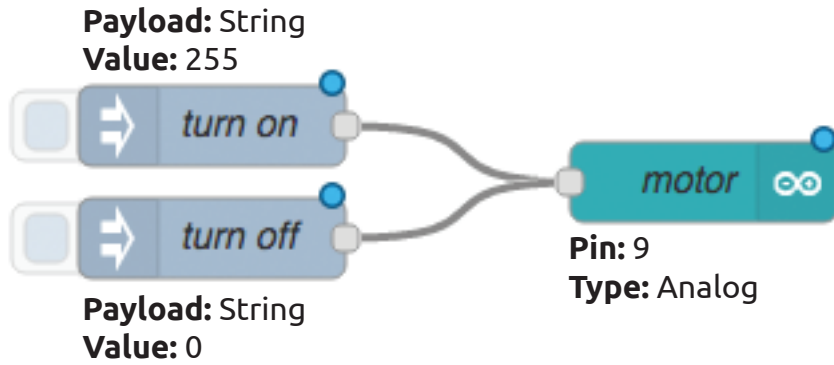


Accelerator

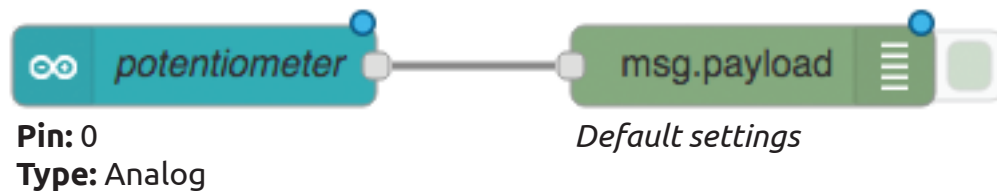
Analog in, analog out

Use a soft potentiometer to change the speed of a motor

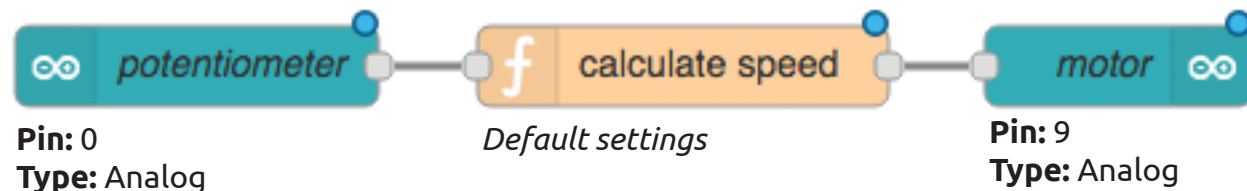
Motor test flow



Soft potentiometer test flow



Full circuit flow



Step-by-step function

```
var pressurePoint = msg.payload;
var lowestSpeed = 130;
var highestSpeed = 255;
var maxPoint = 1024;

if(pressurePoint < 100) {
  msg.payload = 0;
} else {
  var percentTotalSpeed = pressurePoint / maxPoint;
  var speedRange = highestSpeed - lowestSpeed;
  var speedAboveMin = percentTotalSpeed * speedRange;
  var finalSpeed = lowestSpeed + speedAboveMin;

  msg.payload = finalSpeed;
}

return msg;
```