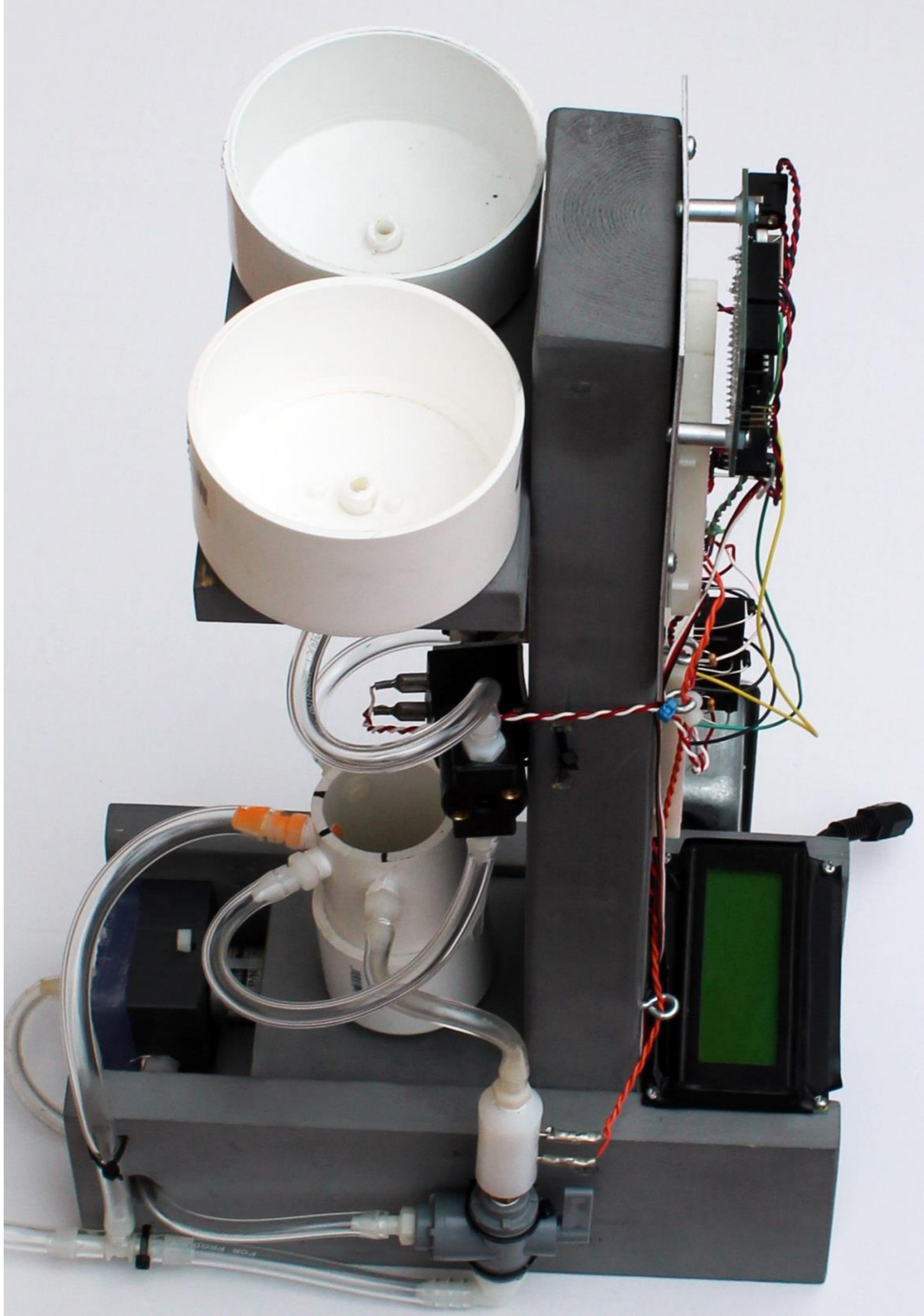
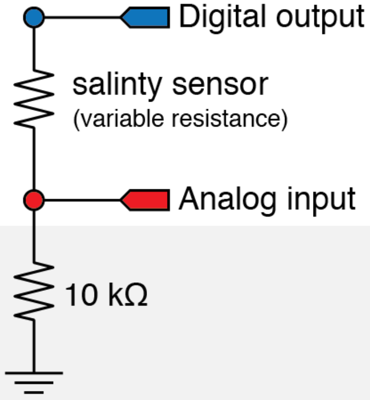
Salinity Sensor Calibration Review



Review of conductivity sensor wiring & programming



```
int salinity_power_pin = 4;   // Digital I/O pin, Global variable
void setup()
{ Serial.begin(9600);
  pinMode (salinity_power_pin, OUTPUT);
}
void loop()
{ int salinity_input_pin = 2;           // Analog input pin
  int nave=20;                          // Number of readings to average
  float salinity;                       // Float stores fractional reading from computed average

  salinity = sensor_reading_average (salinity_power_pin, salinity_input_pin, nave);
  Serial.println (salinity);
}
// ----------------------------------------------------------------
float sensor_reading_average (int power_pin, int input_pin, int n){
  int i;
  float reading;
  float sum;                            // Use floats for more precision and to prevent overflow
of sum
  sum = 0.0;
  for (i=1 ; i<=n ; i++){
    digitalWrite (power_pin, HIGH);               // Turn on the sensor
    delay (100);                                            // Wait to settle
    sum += analogRead (input_pin);                // Add reading to the running sum
    digitalWrite (power_pin, LOW);                // Turn off the sensor
    delay(10);                                               // Wait between readings
  }
  reading = sum/float(n);
  return reading;
}
```

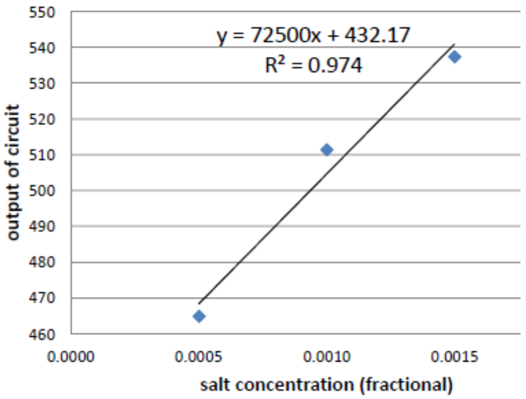
Review of conductivity sensor calibration

- Collect analog output of salinity circuit, with output numbers ranging from 0 to 1023 (the Arduino has a 10-bit ADC)

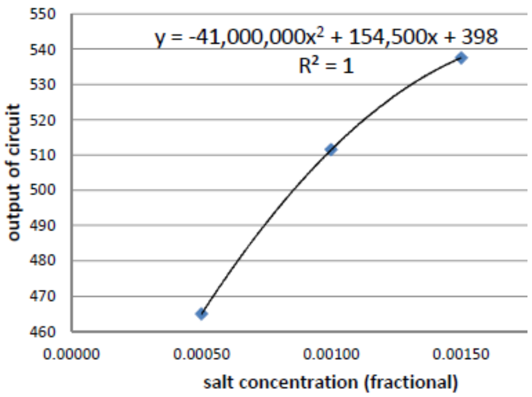
- Perform linear regression to determine the expected output of the conductivity circuit as a function of salinity

- Which fit is the best?

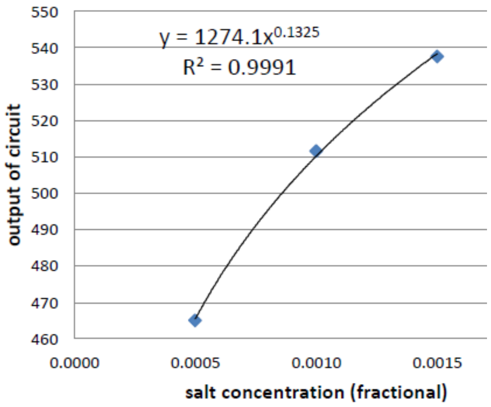
salt concentration (fractional)	Arduino output
0.0000	2.5
0.0005	465
0.0010	511.5
0.0015	537.5



linear



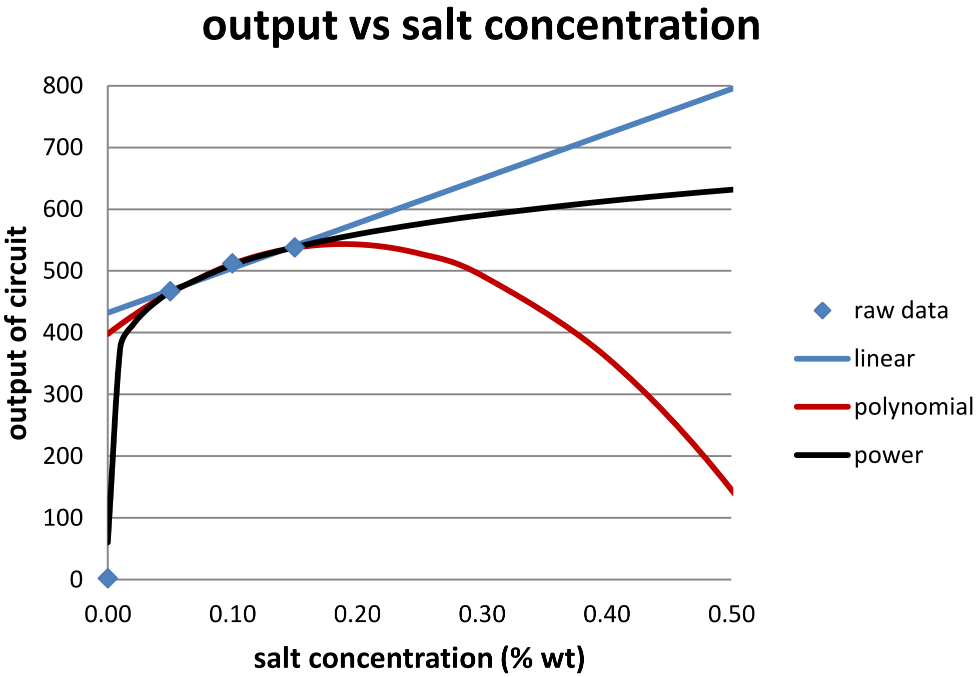
polynomial

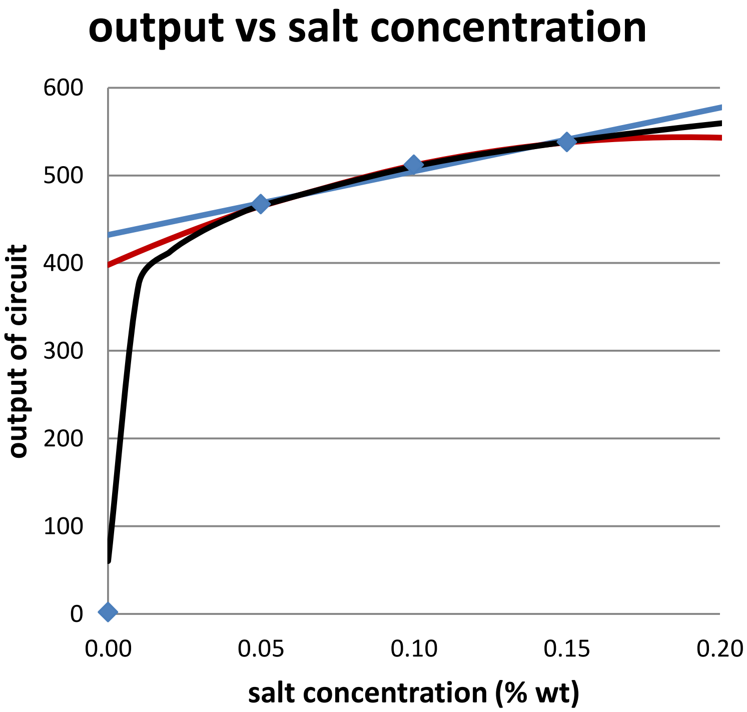


power

Examine fits over possible salinity range

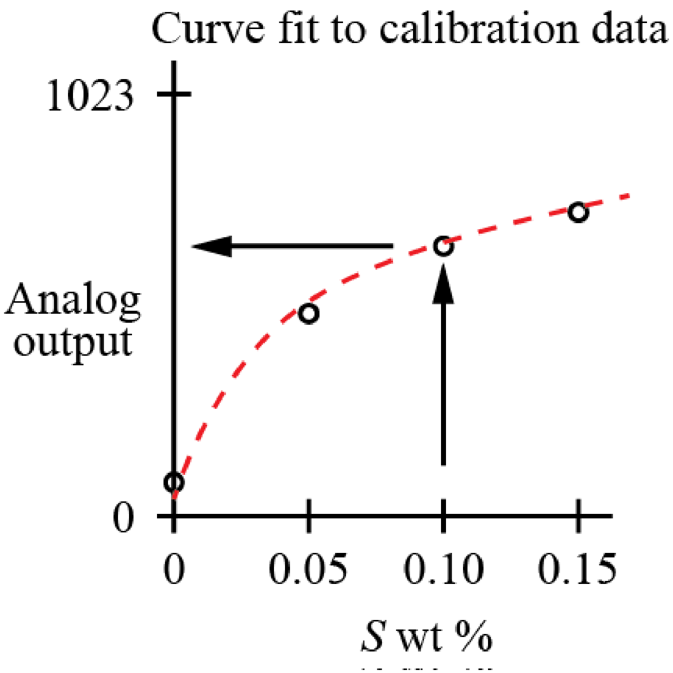
Consider how your fit behaves beyond 0.15 wt% salt since your salinity may increase well beyond 0.15% when salty water is added

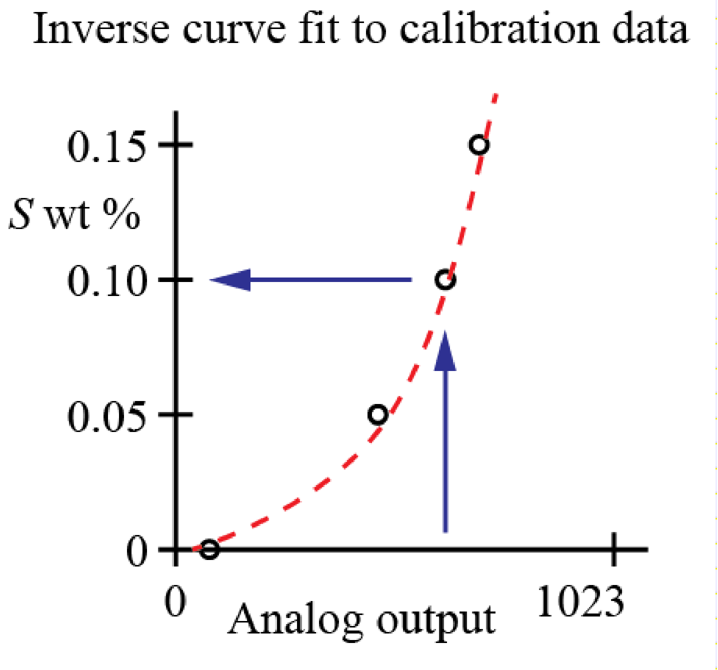




- Do you see any potential problems?
- Which fit seems to be the best? Why?

Equations needed for salinity control sketch





Inverse equation can be obtained by

- Algebraic rearrangement of the calibration curve fit, or
- Performing another fit with x and y values swapped.

In either case, retain four or five digits in the curve fit coefficients