

EXP.4.Sensor Data Acquisition

Open port to Pico

```
clear s % closes ports already open
s = serialport('COM4',9600) % Check COM#
```

```
s =
  Serialport with properties:

    Port: "COM4"
  BaudRate: 9600
 NumBytesAvailable: 0

Show all properties, functions
```

```
configureTerminator(s,'CR') % end lines with \r
```

Prompt the user for sample rate and number of samples and send to the Pico.

```
sample_rate = input("Please enter the sample rate: ") % prompt user for sample rate
```

```
sample_rate = 2
```

```
N = input("Please enter the number of samples: ") % prompt user for number of
samples
```

```
N = 60
```

```
s.writeline(string(sample_rate)) % write sample rate to Pico
s.writeline(string(N)) % write number of samples to Pico
```

Receive results and store them in two arrays sensor1 and sensor2.

```
sensor1 = zeros(1,N); % initialize sensor1 array
sensor2 = zeros(1,N); % initialize sensor2 array
for k = 1:N % loop through all samples
    sensor1(1,k) = s.readline(); % read value from Pico and update sensor1 array
    sensor2(1,k) = s.readline(); % read value from Pico and update sensor2 array
end
sensor1
```

```
sensor1 = 1×60
    61438    61519    61455    61422    61471    61438 ...
```

```
sensor2
```

```
sensor2 = 1×60
    61278    61262    61278    61294    61406    61326 ...
```

Convert sensor1 and sensor2 to degrees Fahrenheit and store in temp1 and temp2.

```
temp1 = convert_to_temp(sensor1) % convert sensor1 ADC values to temperature
```

```
temp1 = 1×60  
    97.1954    97.9295    97.3495    97.0503    97.4945    97.1954    97.3495    97.1954 ...
```

```
temp2 = convert_to_temp(sensor2) % convert sensor2 ADC values to temperature
```

```
temp2 = 1×60  
    95.7452    95.6001    95.7452    95.8902    96.9053    96.1802    95.6001    94.8750 ...
```

```
save 'sensor_data.mat' sensor1 sensor2 % save sensor data
```

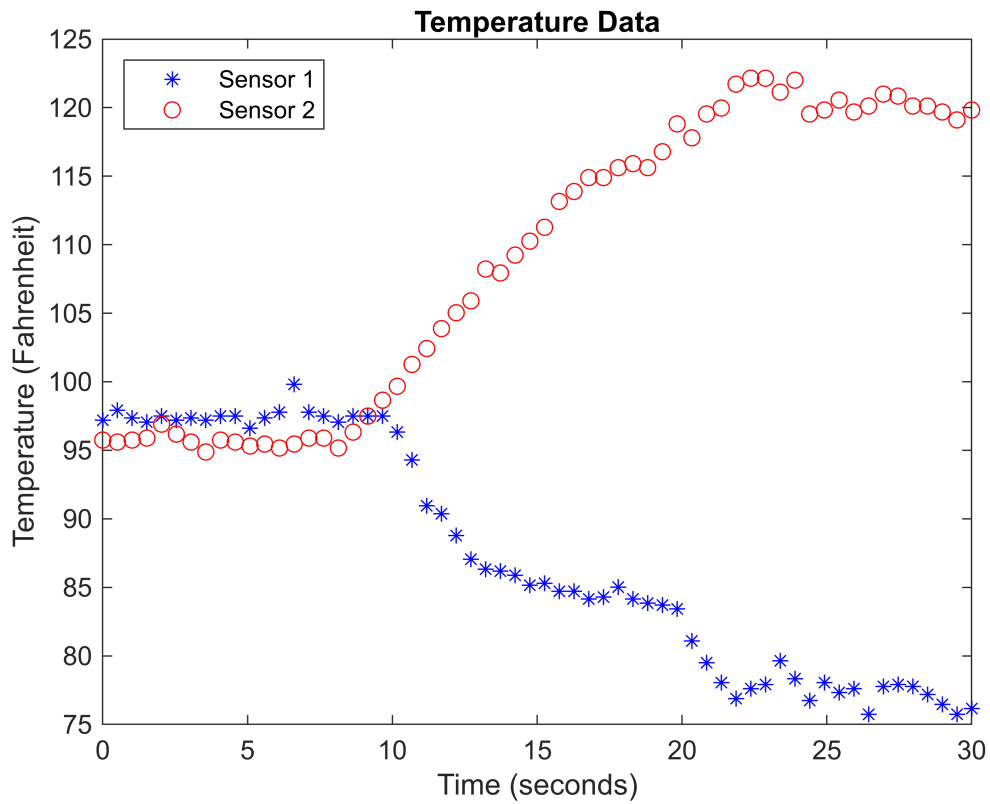
Create a time series using linspace based on the number of samples and sample rate. All three arrays should have the same number of elements.

```
time = linspace(0,N/sample_rate,N) % create x axis --> time (s)
```

```
time = 1×60  
    0    0.5085    1.0169    1.5254    2.0339    2.5424    3.0508    3.5593 ...
```

Plot both temperatures vs. time. Make sure to include axis labels, legend, and title.

```
plot(time,temp1,'b*') % plot temp1 data  
hold on  
plot(time,temp2,'ro') % plot temp2 data  
hold off  
title("Temperature Data")  
legend(["Sensor 1", "Sensor 2"], 'Location', 'northwest')  
xlabel("Time (seconds)")  
ylabel("Temperature (Fahrenheit)")
```



```
function temp = convert_to_temp(n) % convertes ADC value into temperature in
Fahrenheit

    temp = (((1/0.01)*((3.3/65535).*n) - 273.15)*(9/5)) + 32;

end
```