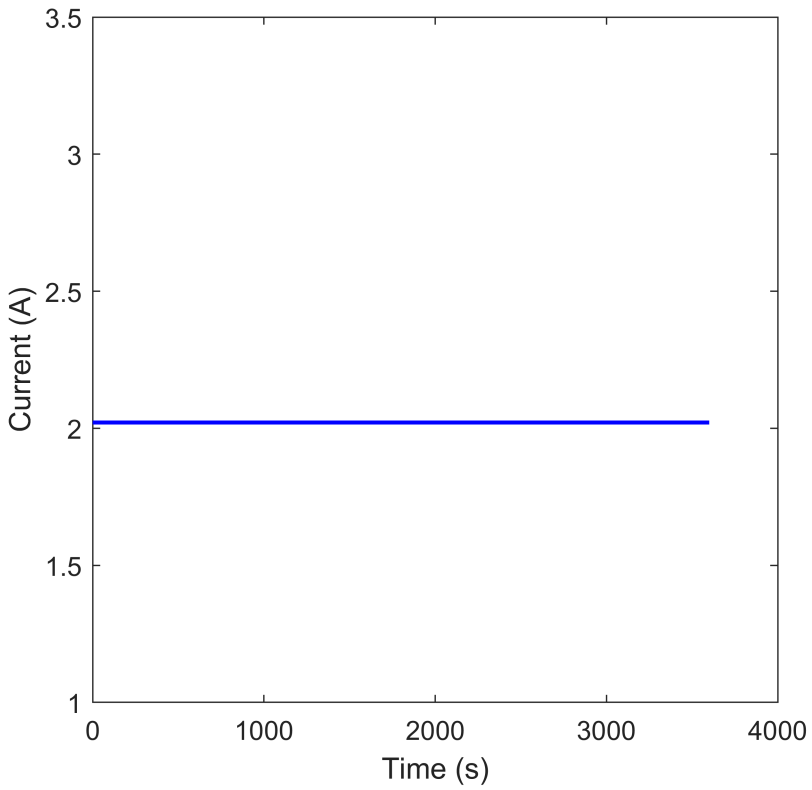
Add Model and Algorithm Libraries to Matlab's Path

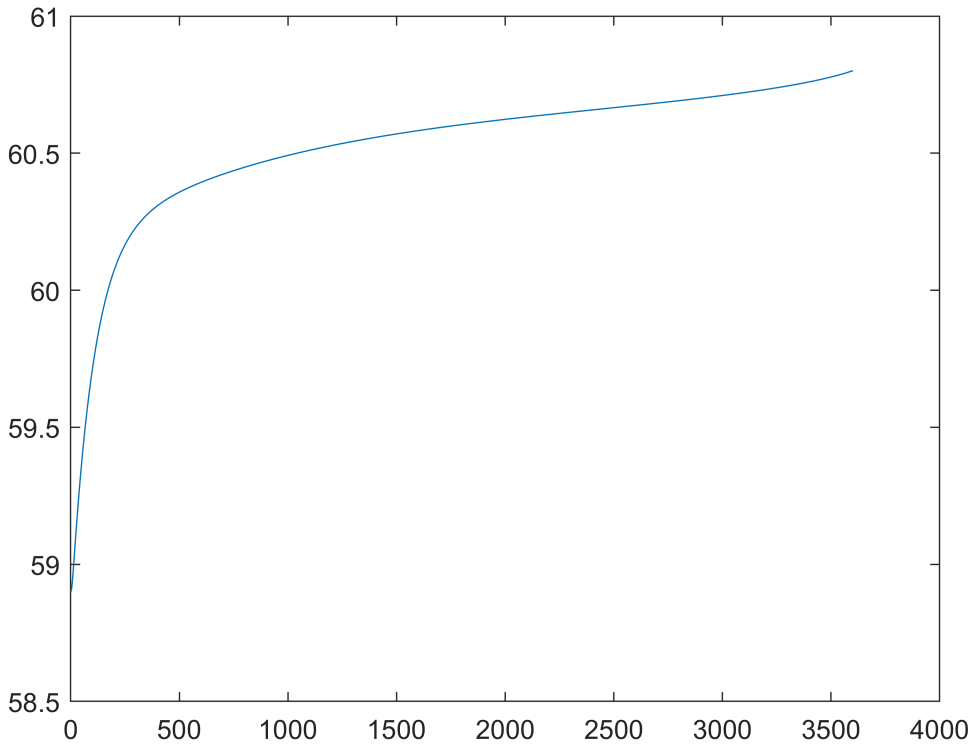
```
addpath('C:\Users\mrmehta\Documents\GitHub\PrognosticsModelLibrary\MATLAB')
addpath('C:\Users\mrmehta\Documents\GitHub\PrognosticsAlgorithmLibrary\MATLAB')
```

1C simulation

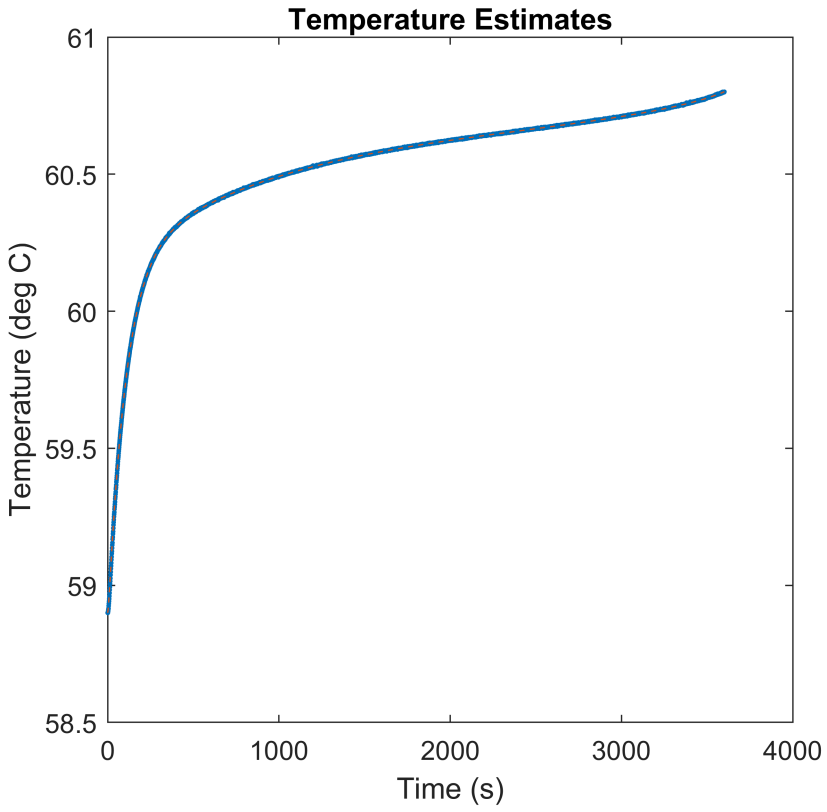
```
clf;
oneC = 2.021; %Default value
crate = 1;
loadval = oneC.*crate;
loads = [loadval;3600];
% loads = [4.2; 100*36];
horizon = 5000;
numSamples = 50;
simresults = testPrognoser(loads,horizon,numSamples);
```

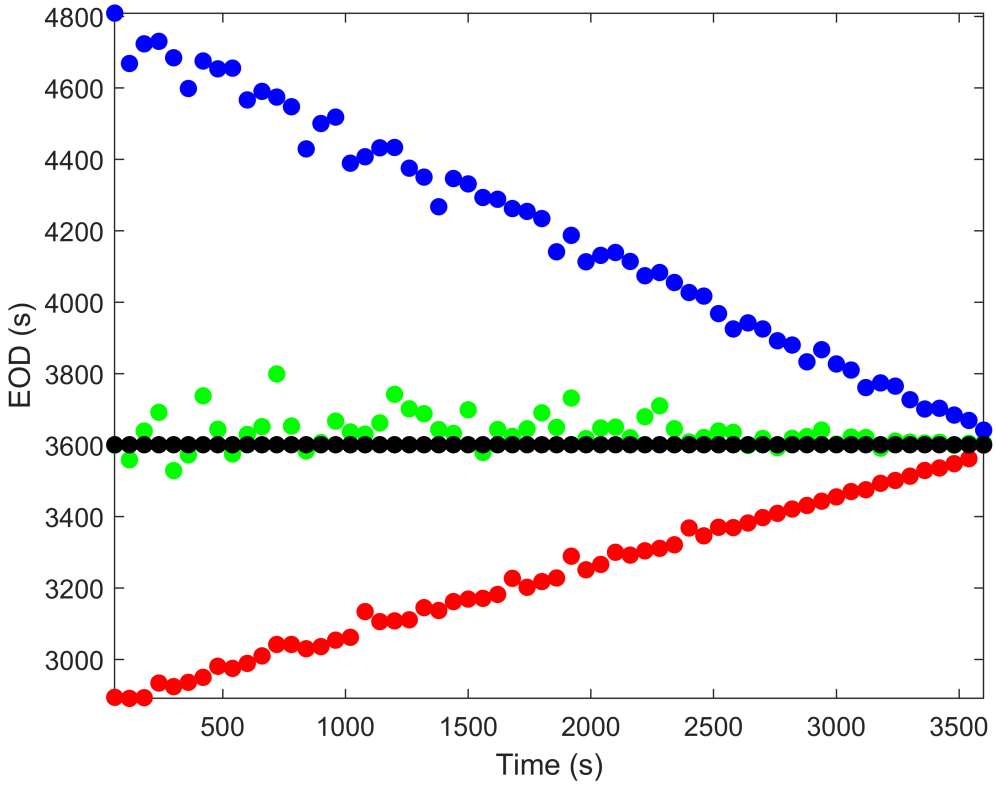
```
Maximum current: 2.021
```





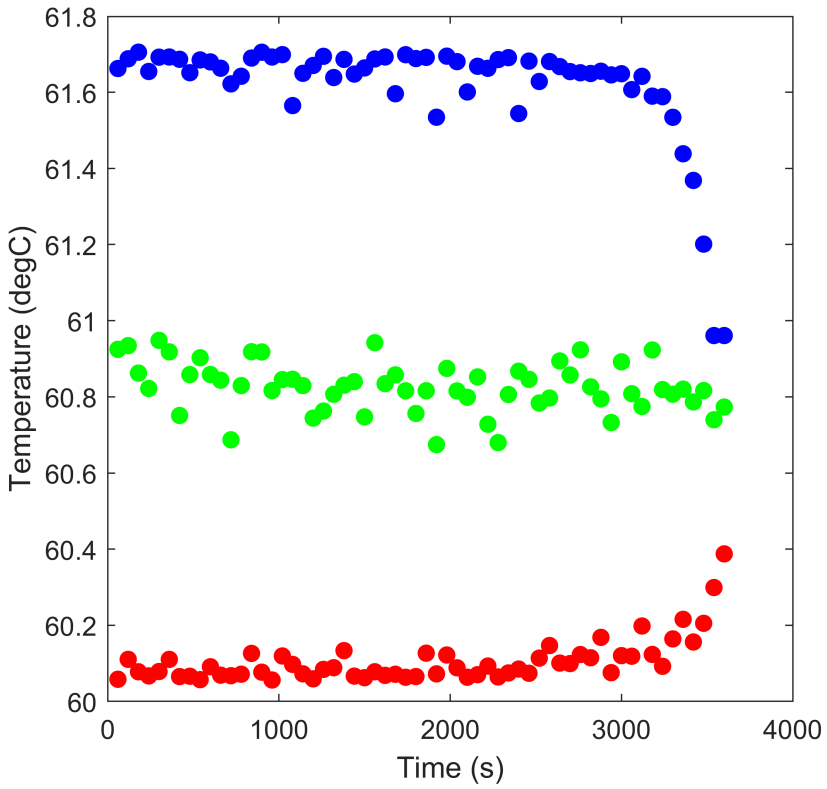

```
-------- Final Results --------

Discharge time: 3601 s
Discharge temperature: 60.801 degC
Ambient temperature: 58.9 degC

-------- End of final results --------
```



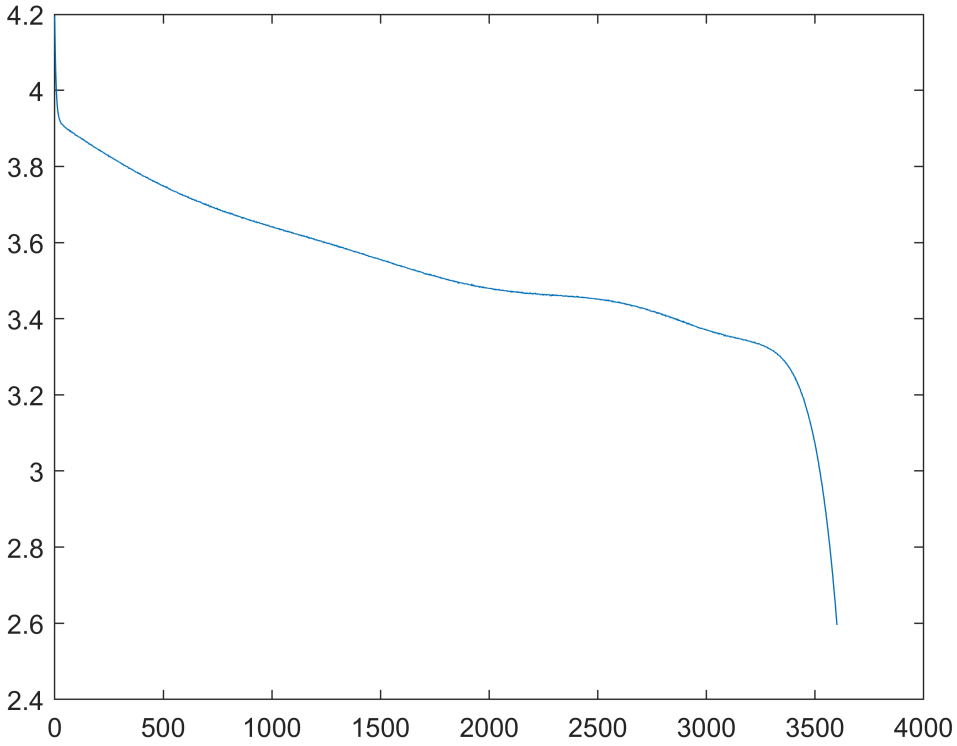



```
figure
plot(simresults.time,simresults.minTemp,'o','Color','red','DisplayName','Predicted T Min','Mark
hold on
```

```
plot(simresults.time,simresults.maxTemp,'o','Color','blue','DisplayName','Predicted EOD Max','M
plot(simresults.time,simresults.meanTemp,'o','Color','green','DisplayName','Predicted EOD Mean'
hold off
xlabel('Time (s)');
ylabel('Temperature (degC)');
axis square
box on
ax = gca;
ax.Color = 'None';
```



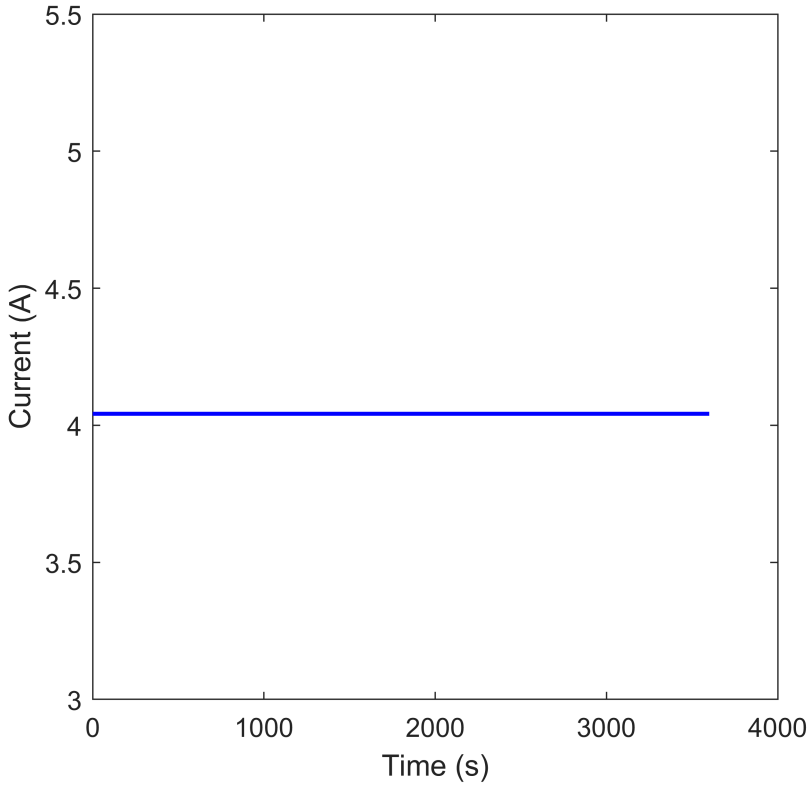

```
figure
plot(simresults.time,simresults.voltage)
```

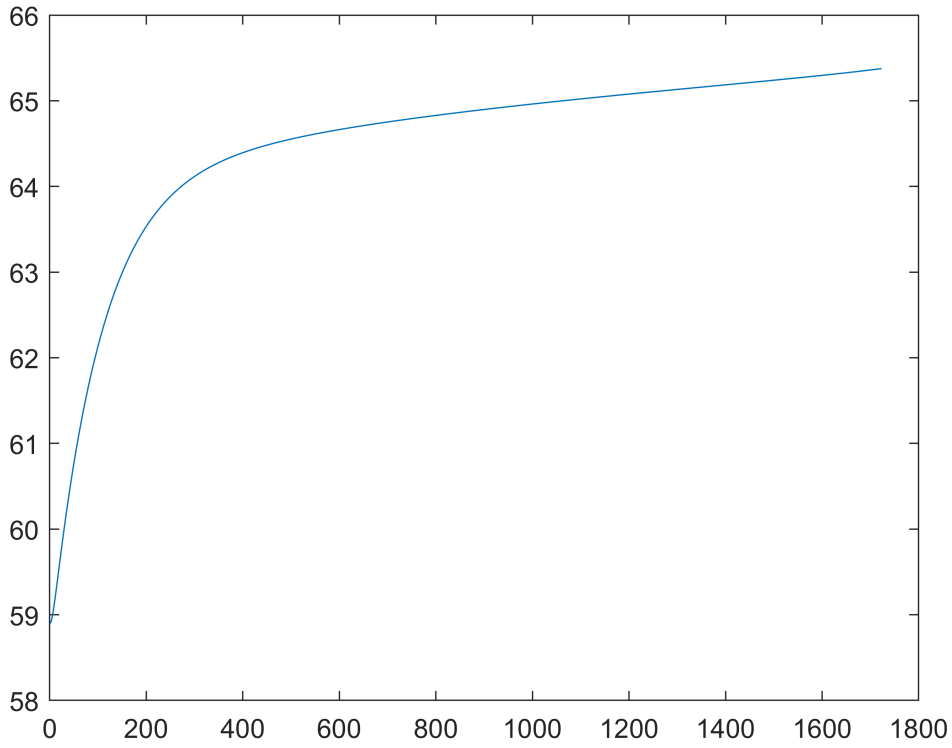


2C simulation

```
clear all
close all
clf;
oneC = 2.021; %Default value
crate = 2;
loadval = oneC.*crate;
loads = [loadval;3600];
% loads = [4.2; 100*36];
horizon = 3000;
numSamples = 100;
simresults = testPrognoser(loads,horizon,numSamples);
```

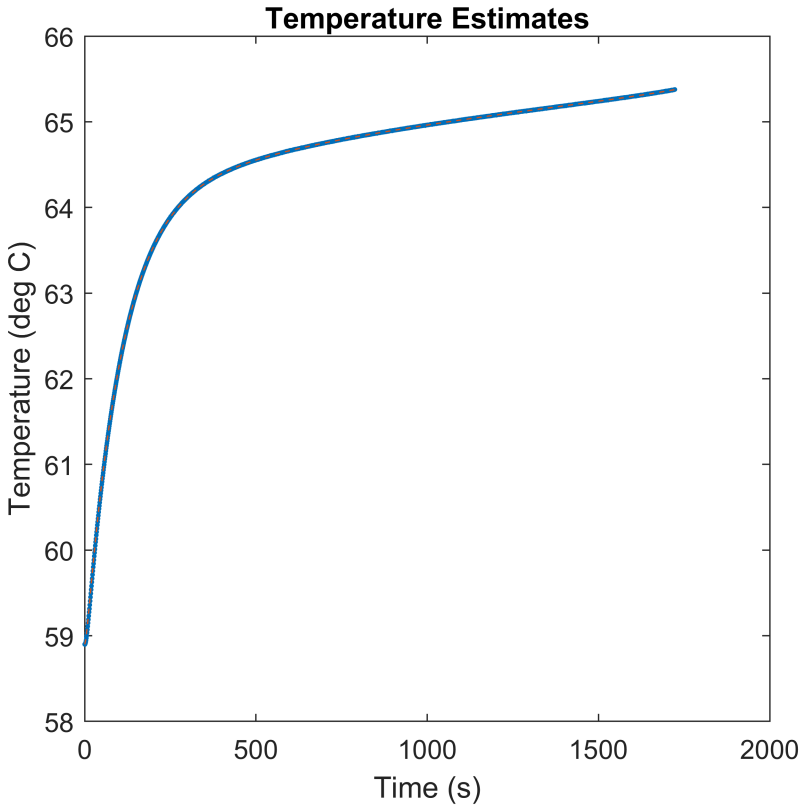
```
Maximum current: 4.042
```

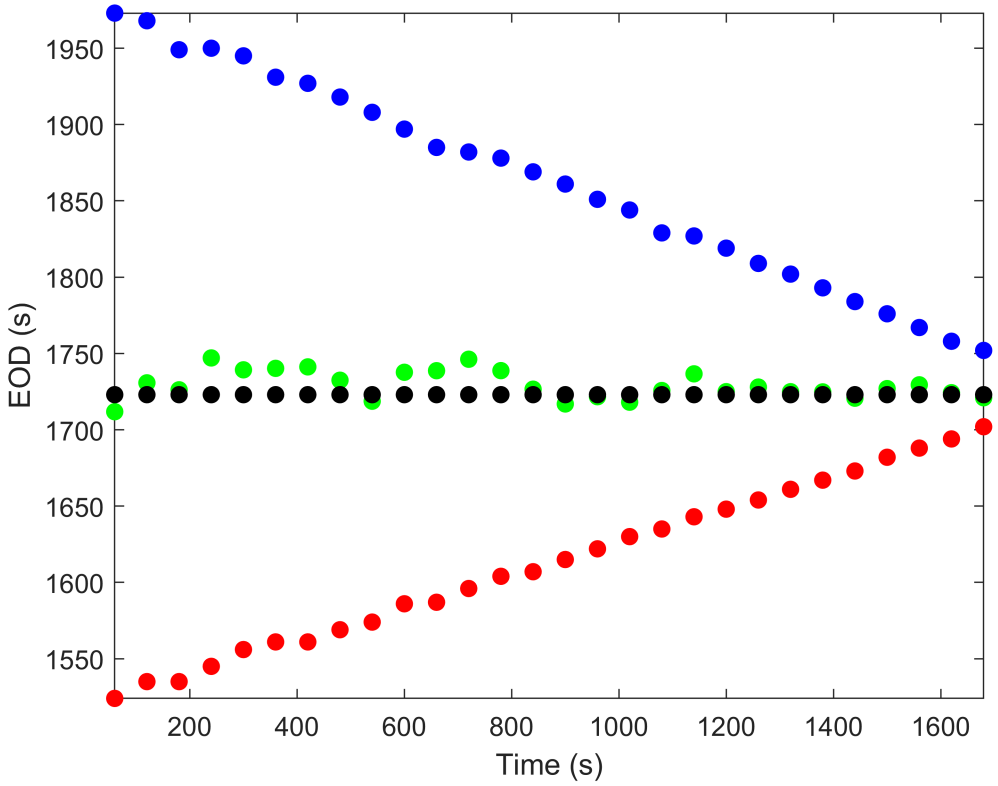





```
-------- Final Results --------

Discharge time: 1723 s
Discharge temperature: 65.3759 degC
Ambient temperature: 58.9 degC
```

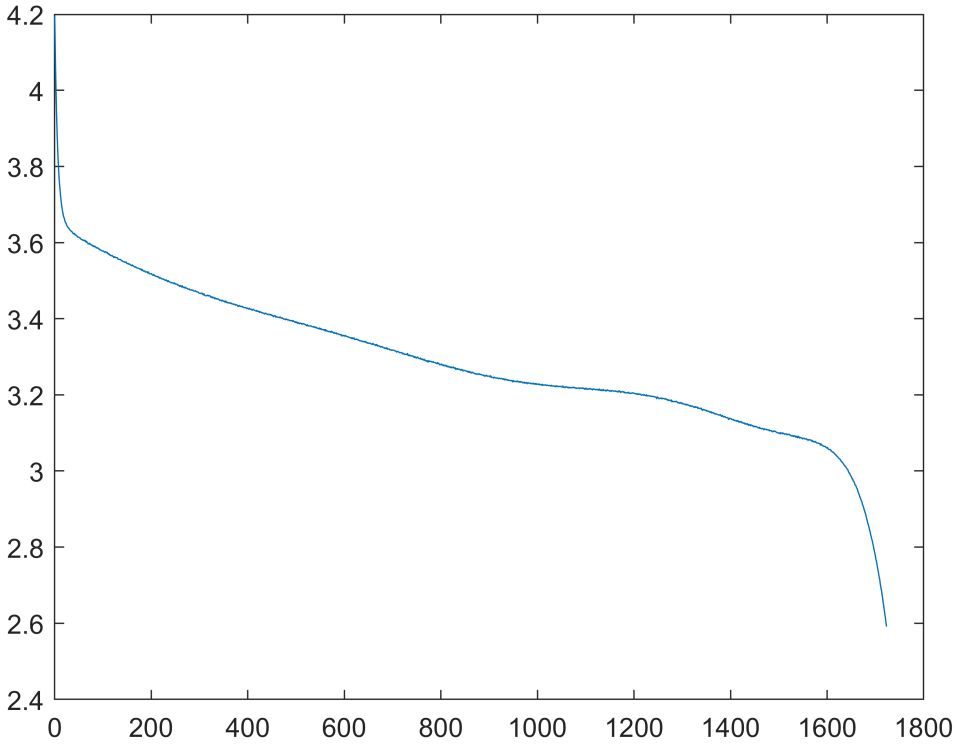
```
-------- End of final results --------
```



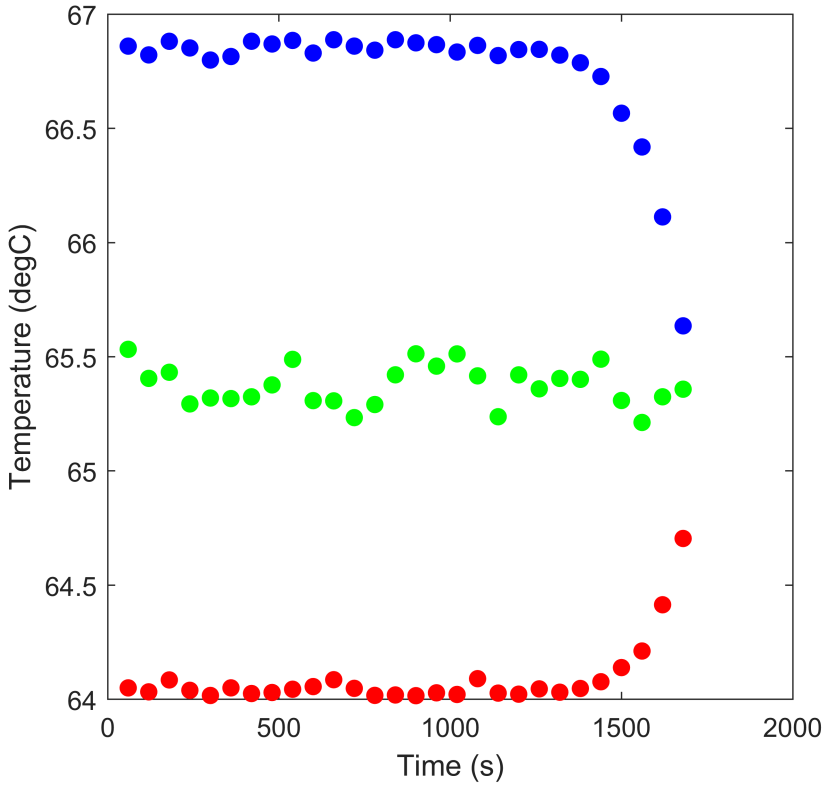



```
figure;
```

```
plot(simresults.time,simresults.voltage)
```



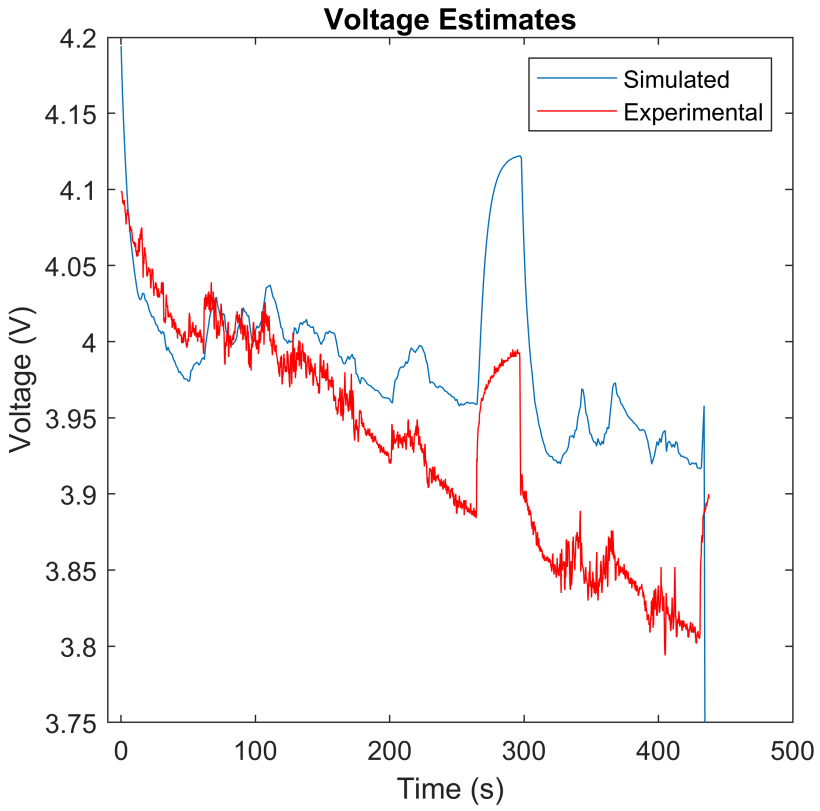

```
figure
plot(simresults.time,simresults.minTemp,'o','Color','red','DisplayName','Predicted T Min','Mark
hold on
plot(simresults.time,simresults.maxTemp,'o','Color','blue','DisplayName','Predicted EOD Max','M
plot(simresults.time,simresults.meanTemp,'o','Color','green','DisplayName','Predicted EOD Mean'
hold off
xlabel('Time (s)');
ylabel('Temperature (degC)');
axis square
box on
ax = gca;
ax.Color = 'None';
```



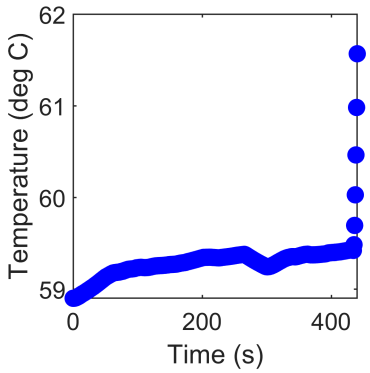
Trying to Match Chetan's Data

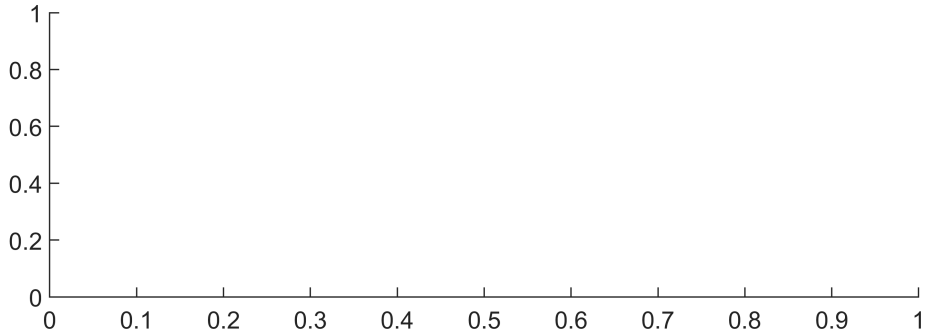
```
battery = Battery.Create;
oneC = 2.1; %Default value
trueEOD = 433.02;
trueEODinHr = trueEOD./3600;
loadval = oneC./trueEODinHr;
% loads = [1.0327;12.7800;0.8917;0.2400;0.8917;3.1800;1.0290;0.1800;1.0290;15.0000;1.2000;0.240
loads = [1.60;0.18;1.53;0.24;1.52;0.18;1.49;0.18;1.49;0.24;1.52;0.18;1.54;0.18;1.54;0.24;1.56;0
loads(1:2:end) = 0.9.*loads(1:2:end);
ref_voltage = [4.098;4.098;4.099;4.098;4.097;4.094;4.092;4.091;4.091;4.090;4.092;4.093;4.093;4.
ref_time = [0.00;0.18;0.42;0.60;0.78;1.02;1.20;1.38;1.62;1.80;1.98;2.22;2.40;2.58;2.82;3.00;3.1
loads_ref = [1.60;0.18;1.53;0.24;1.52;0.18;1.49;0.18;1.49;0.24;1.52;0.18;1.54;0.18;1.54;0.24;1.
loads = [loads;loadval];
% % figure(3);
% plot([0;cumsum(loads(2:2:end))],[loads(1);loads(1:2:end-1)],'-','LineWidth',1.5,'Color','blue
% xlabel('Time (s)');
% ylabel('Current (A)');
% axis square
% box on
% ax = gca;
% ax.Color = 'None';
battery.inputEqnHandle = @(P,t)Battery.InputEqn(P,t,loads);
[Ttosim,~,~,Z] = battery.simulateToThreshold();
% figure(8)
plot(Ttosim,Z(2,:))
```

```
hold on
plot(ref_time,ref_voltage,'-','Color','red');
hold off
title('Voltage Estimates');
xlabel('Time (s)');
ylabel('Voltage (V)');
legend('Simulated','Experimental');
xlim([-10 500])
ylim([3.75,4.2])
axis square
box on
ax = gca;
ax.Color = 'None';
```




```
figure(1);
subplot(2,1,1)
hold on
plot(Ttosim,Z(1,:),'o','Color','blue','MarkerFaceColor','blue');
xlabel('Time (s)')
ylabel('Temperature (deg C)');
axis square
box on
ax = gca;
ax.Color = 'None';
subplot(2,1,2)
hold on
```





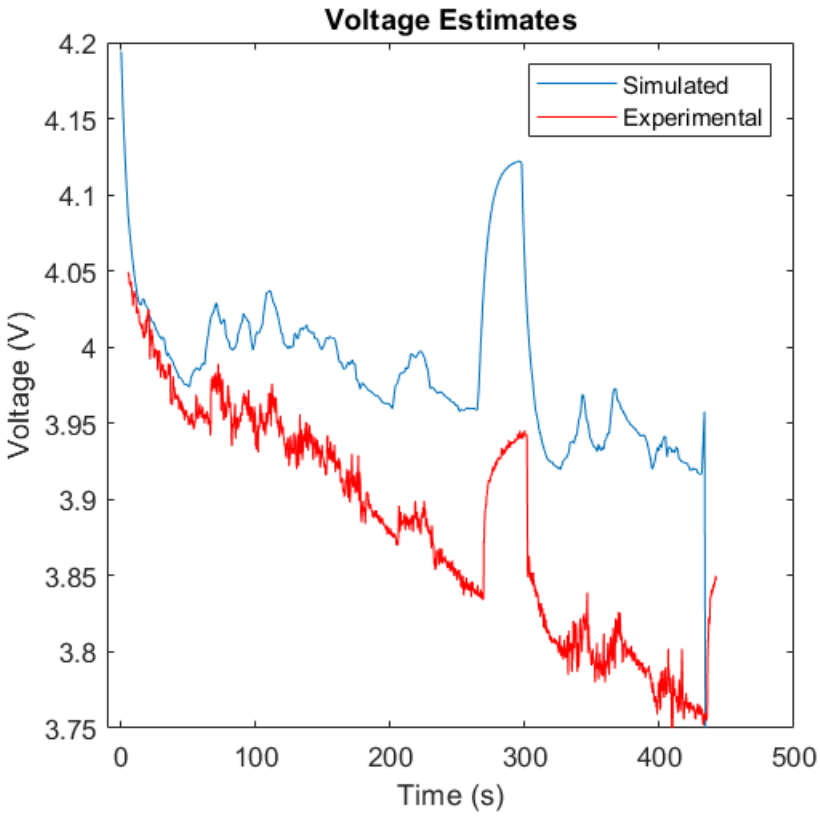

```
    plot(t,z(2,:),'o','Color','blue','MarkerFaceColor','blue');
```

```
Unrecognized function or variable 't'.
```

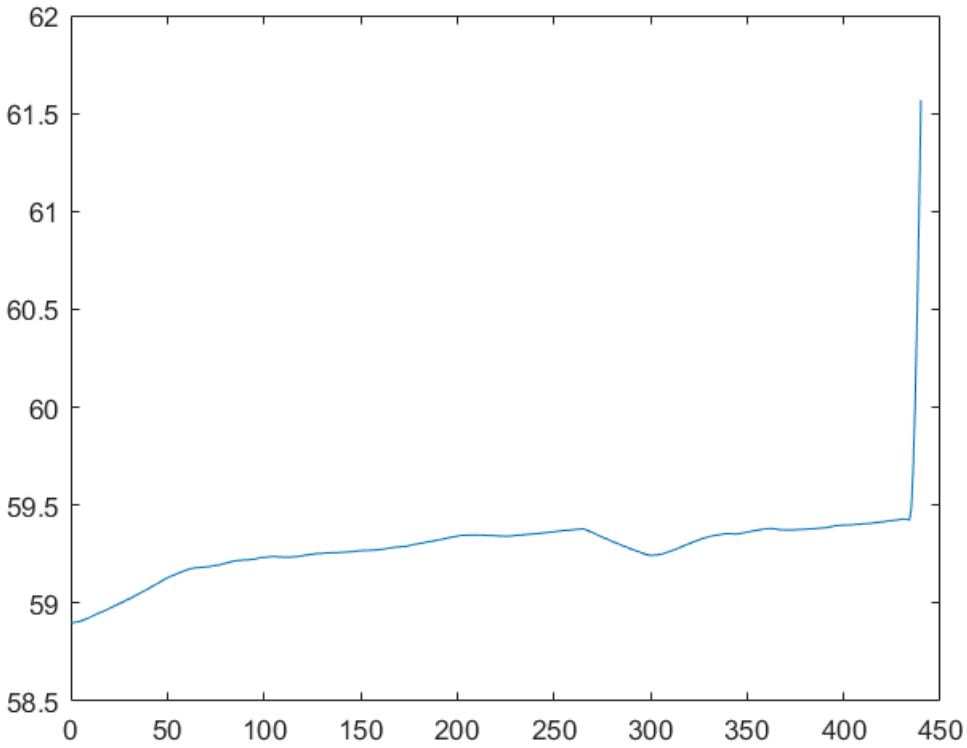
```
    xlabel('Time (s)')
    ylabel('Voltage (V)');
    axis square
    box on
    ax = gca;
    ax.Color = 'None';
    drawnow;
    xlim([-10,3700])
```

```
[Ttosim,~,~,Z] = battery.simulateToThreshold();
% figure(8)
plot(Ttosim,Z(2,:))
hold on
plot(5+ref_time,-0.05+ref_voltage,'-','Color','red');
hold off
title('Voltage Estimates');
xlabel('Time (s)');
ylabel('Voltage (V)');
legend('Simulated','Experimental');
xlim([-10 500])
ylim([3.75,4.2])
axis square
box on
```

```
ax = gca;
ax.Color = 'None';
```




```
% figure(7)
plot(Ttosim,Z(1,:))
```




```
% trueEOD = Ttosim(end);
endTemp = Z(1,end);
disp(' ')
```

```
disp('-------- Final Results --------')
```

```
-------- Final Results --------
```

```
disp(' ')
```

```
fprintf('Discharge time: %g s\nDischarge temperature: %g degC\n',Ttosim(end),endTemp);
```

```
Discharge time: 440 s
Discharge temperature: 61.5676 degC
```

```
fprintf('Ambient temperature: %g degC\n',battery.P.x0.Tb-273.15);
```

```
Ambient temperature: 58.9 degC
```

```
disp(' ')
```

```
disp('-------- End of final results --------')
```

```
-------- End of final results --------
```

```
disp(' ')
```

```
a = xlsread('C:\Users\mrmehta\OneDrive - NASA\linux_sync\NASA_John_SPARRCI\ARC_experiments\FORM

%%
plot(a(:,1),a(:,4)./6)
ylim([3.7,4.3])
```