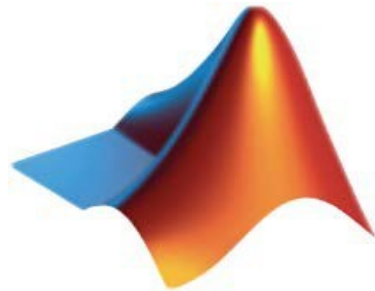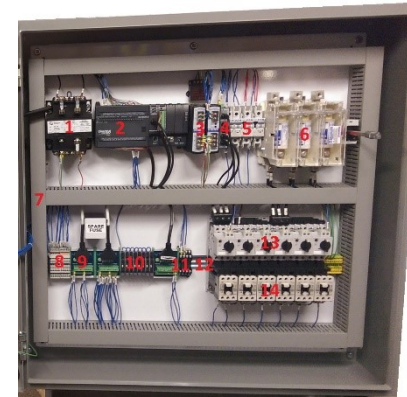# EEC380: Industrial Training (1)
Summer 2020

MATLAB   **Industrial Control**

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Outline

Functions in MATLAB.

Introduction to Functions in MATLAB

➢ Functions are M-files that can accept input arguments and return output arguments.

➢ The name of the M-file and function should be the same, <u>do not use existing names</u>, e.g., plot, sqrt, sin, etc.

➢ Functions operate on variables within their own workspace (local variables).

Syntax

```
function [y1,...,yN] = myfun(x1,...,xM)
```

output arguments   function name   input arguments

Functions in MATLAB

Example (1):

Write a **function** using MATLAB to find the sum of numbers between two numbers K and L.

```
mysum.m
1    function sum=mysum(a,b)
2
3      sum=0;
4      for i=a:b
5      sum=sum+i;
6      end
7
8      end
```

m file name   function name

```
Command Window
>> summation=mysum(3,5)

summation =

    12
```

Functions in MATLAB

Example (1):

Write a **function** using MATLAB to find the sum of numbers between two numbers K and L.

```
mysum.m    ×    +
1        function sum=mysum(a,b)
2
3  -      sum=0;
4  -      for i=a:b
5  -      sum=sum+i;
6  -      end
7
8  -      end
```

```
Command Window
>> summation=mysum(3,5)

summation =

    12

>>
>> a
Unrecognized function or variable 'a'.
```

local variable

Functions in MATLAB

Example (1):

Write a **function** using MATLAB to find the sum of numbers between two numbers K and L.

```matlab
function sum=mysum(a,b)

sum=0;
for i=a:b
sum=sum+i;
end

end
```

Command Window
```
>> last

last =

     5

>> a
Unrecognized function or variable 'a'.

>> global a
>> a

a =

     3
```

global variable

Functions in MATLAB

Example (2):

Write a **function** called **tri_area** that returns the area of a triangle with base **b** and height **h**, where **b** and **h** are input arguments.

```
tri_area.m    ✕    +
1    function area=tri_area(b,h)
2
3    area=0.5*b*h;
4
5    end
```

```
Command Window
>> area = tri_area(5,4)

area =

    10
```

Functions in MATLAB

Example (3):

Write a **function** called **matrix_corners** that takes a matrix as an input and returns four outputs which are the four corners of the matrix (**top_left, top_right, bottom_left,** and **bottom_right**).

```matlab
matrix_corners.m    +
1    function [top_left, top_right, bottom_left, bottom_right] = matrix_corners(A)
2
3      [n,m]=size(A);
4
5      top_left=A(1,1);
6      top_right=A(1,m);
7      bottom_left=A(n,1);
8      bottom_right=A(n,m);
9
10    end
```

```
Command Window
>> a=[2 4 ;  6 9];
>> [top_left, top_right, bottom_left, bottom_right] = matrix_corners(a)

top_left =          top_right =         bottom_left =          bottom_right =

     2                  4                  6                      9
```

Functions in MATLAB

Example (3):

Write a **function** called **matrix_corners** that takes a matrix as an input and returns four outputs which are the four corners of the matrix (**top_left, top_right, bottom_left,** and **bottom_right**).

```matlab
corners.m

1   function [top_left, top_right, bottom_left, bottom_right] = corners(A)
2
3       top_left=A(1,1);
4       top_right=A(1,end);
5       bottom_left=A(end,1);
6       bottom_right=A(end,end);
7
8   end
```

Functions in MATLAB

Activity(1):

Write a **function** called **taxi_fare** that computes the fare of a taxi ride. The function takes two inputs: distance in km (**d**) and the amount of wait time in minutes (**t**).
The fare is calculated like this:

- the first km is $5
- every additional km is $2
- and every minute of waiting is $0.25.

Functions in MATLAB

Activity(1):

- the first km is $5
- every additional km is $2
- and every minute of waiting is $0.25.

```matlab
taxi_fare.m  +
1   function fare=taxi_fare(d,t)
2     d=ceil(d);
3     t=ceil(t);
4     fare=5+(d-1)*2+t*0.25;
5   end
```

```
Command Window
>> fare = taxi_fare(3.5,2.25)

fare =

    11.7500
```

End of Lecture

Thank you for attention!
Any questions?

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