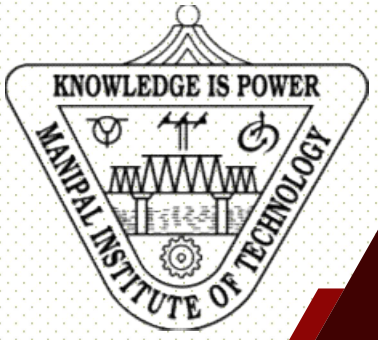
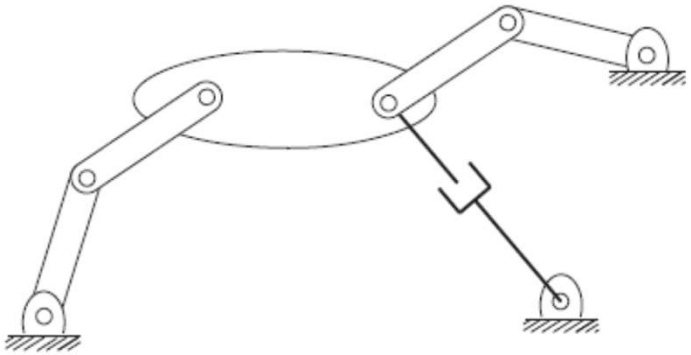


Introduction to Robotics

Soumya S



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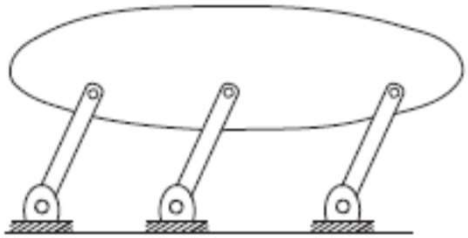
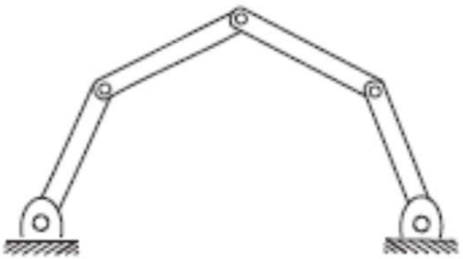
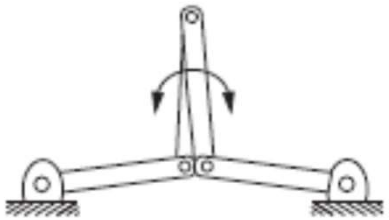
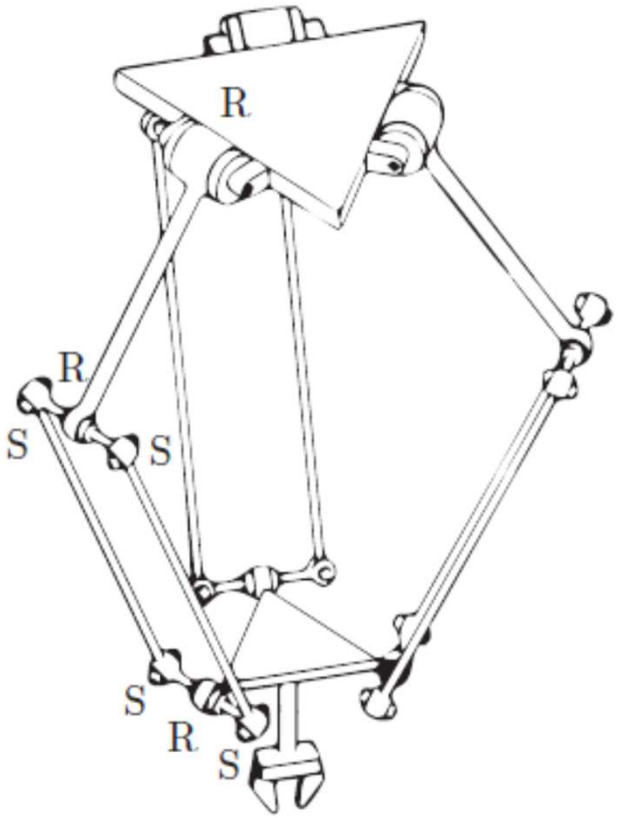


b

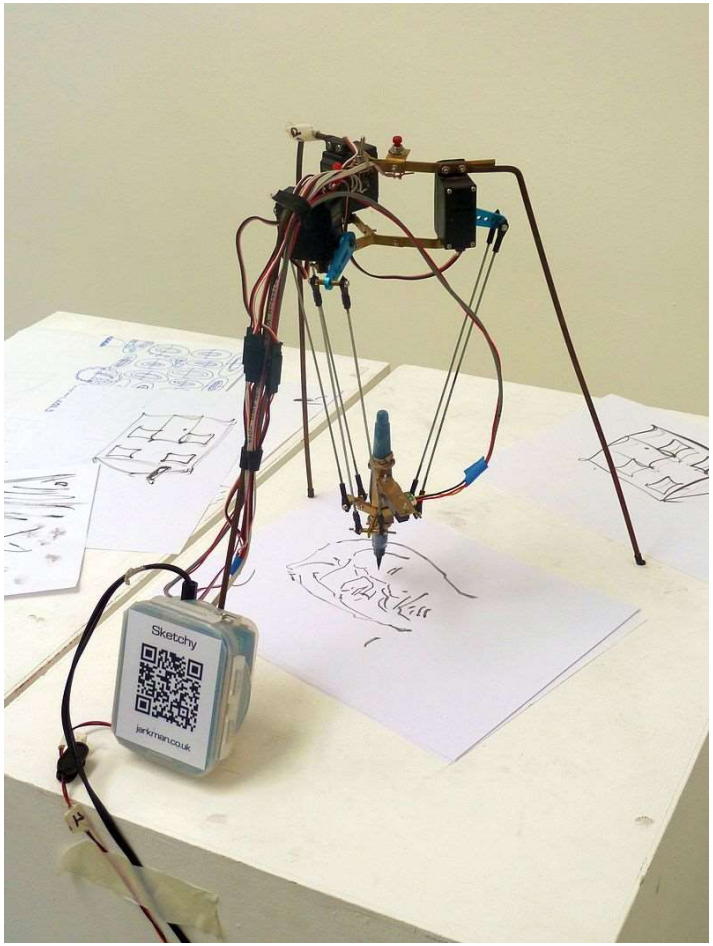


c



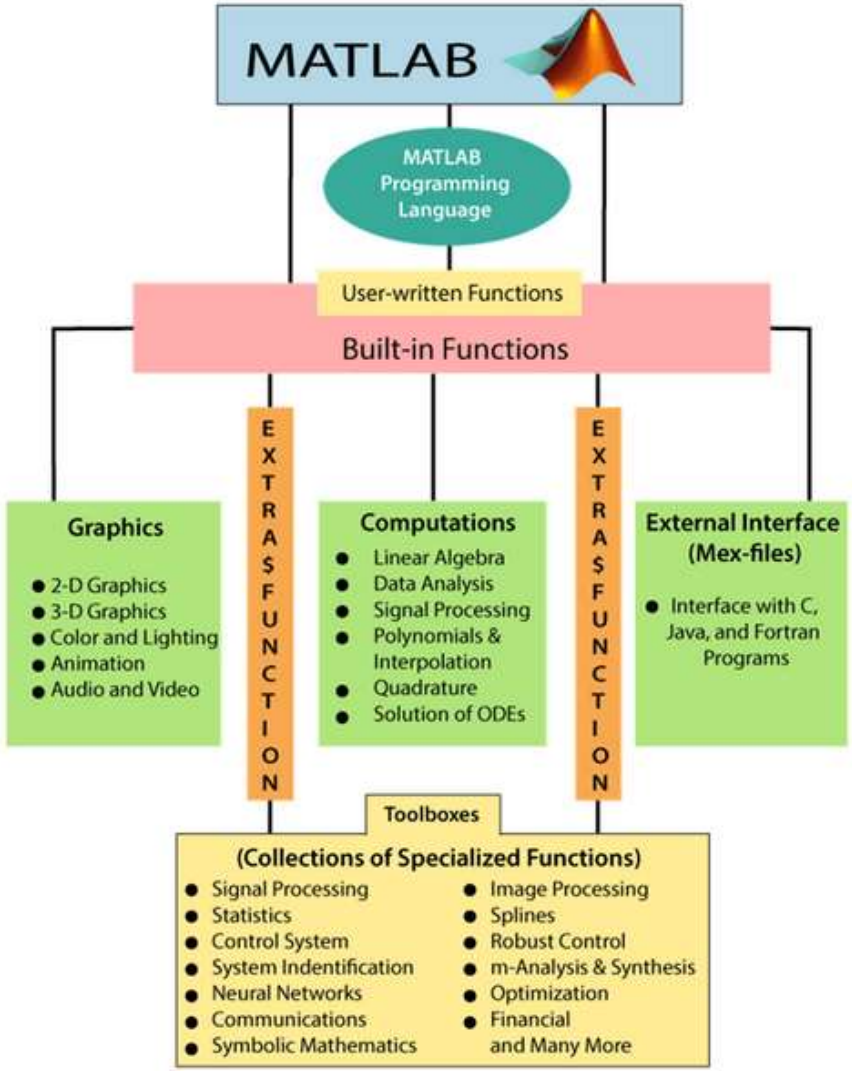


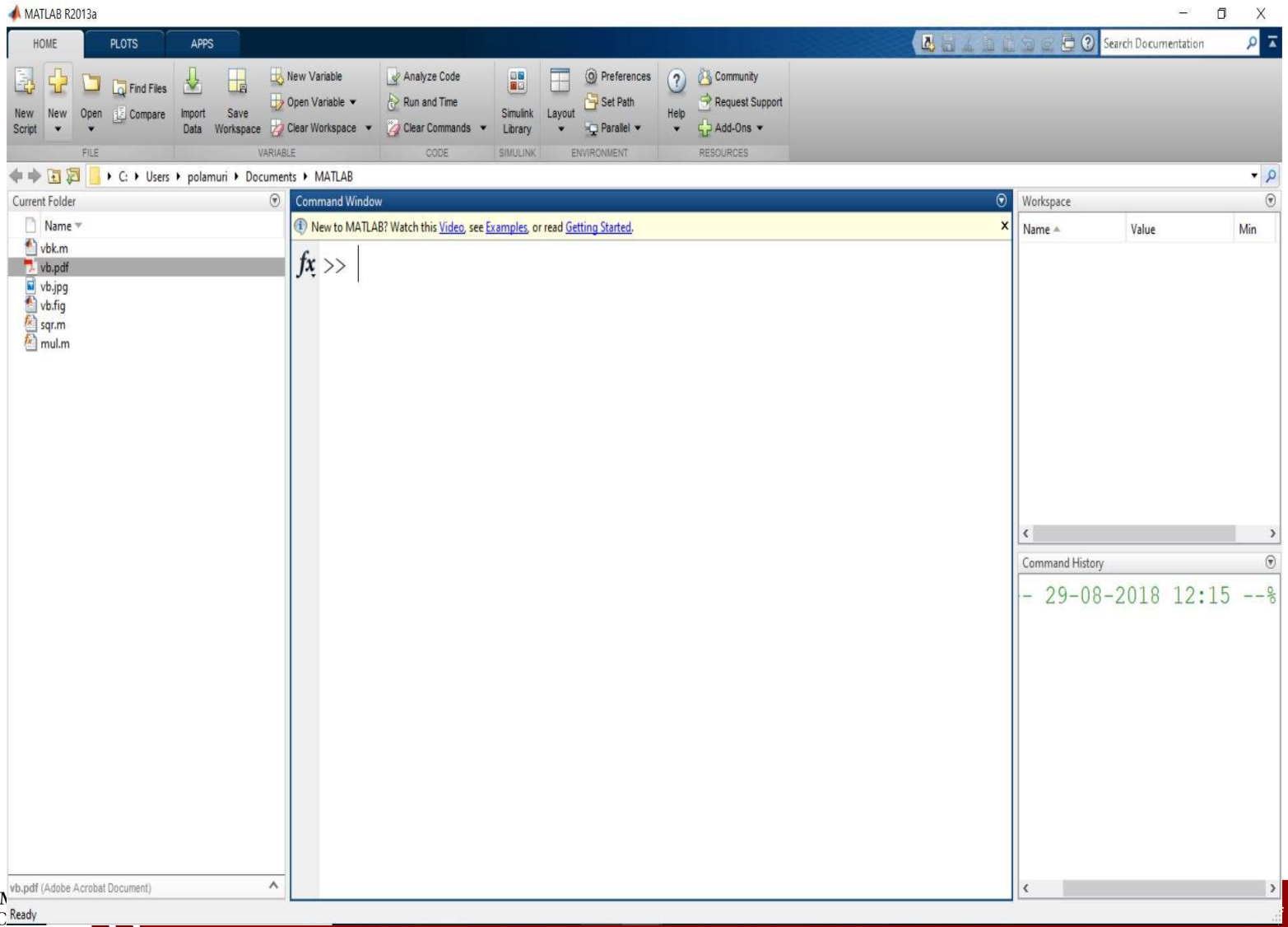
The Delta robot.



What is MATLAB

- MATLAB stands for MATrix LABoratory.
- It is a software package for high-performance numerical computation and visualization.
- It provides an interactive environment with hundreds of built-in functions for technical computation, graphical and animation.
- Basic data element >> MATRIX


MATLAB
MATLAB Programming Language
User-written Functions
Built-in Functions
EXTRA$FUNCTION
EXTRA$FUNCTION
Graphics
2-D Graphics
3-D Graphics
Color and Lighting
Animation
Audio and Video
Computations
Linear Algebra
Data Analysis
Signal Processing
Polynomials & Interpolation
Quadrature
Solution of ODEs
External Interface (Mex-files)
Interface with C, Java, and Fortran Programs
Toolboxes
(Collections of Specialized Functions)
Signal Processing
Statistics
Control System
System Indentification
Neural Networks
Communications
Symbolic Mathematics
Image Processing
Splines
Robust Control
m-Analysis & Synthesis
Optimization
Financial
and Many More


MATLAB R2013a
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PLOTS
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Search Documentation
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Import Data
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New Variable
Open Variable
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Analyze Code
Run and Time
Clear Commands
Simulink Library
Layout
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Parallel
Help
Community
Request Support
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vb.jpg
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Command Window
New to MATLAB? Watch this Video, see Examples, or read Getting Started.
fx >>
Workspace
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Command History
- 29-08-2018 12:15 --%
Ready

- Matrices can be easily created in matlab not only creation but operations are also easily performed.

  Row matrix a=[1 2 3 4 5]

  Column matrix a= [1;2;3;4;5]

- Operations like determinant, inversion etc.,
- Example: 3x3 matrix

  a=[1 2 3 ; 4 5 6 ;8 9 10]

  inv(a)

  det(a)

  rank(a)

  size(a)

  a' transpose

- Matrix creating tools

  zeros(3,3)

  ones(2,1)

  twos(2,1) ** There is no twos only ones and zeros.

  eye(3,3) identity matrix

- Matrices can be complex form

  i= imaginary unit(complex number)

  eg: a= [1+i 2+3+i]

  b=[1+i 2+3+i; i 2*i]
- pi
- Sqrt(a)
- a^2 -----power
- Mathematical operations like

  addition a+b

  subtraction a-b

  multiplication a*b

- Matrices can also be strings form

  a= [‘btech’ ‘chem’]

  a= [‘btech’ ‘chem’; ‘hello’ ‘star’]

- Matrices can be logical also

```
a=[1 2 3; 4 5 6; 8 9 10]
a>5
a=
    0  0  0
    0  0  1
    1  1  1
```

- >5 means correct represented as 1
- < 5 represented as 0

```
a==5
a=
    0  0  0
    0  1  0
    0  0  0
```

Graphical Ability

- x= 0:0.01:2*pi

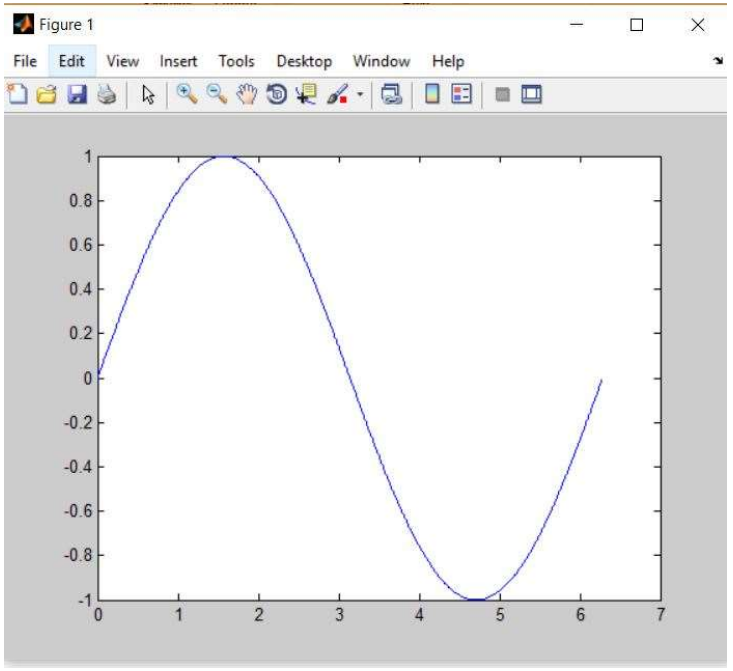
Initial value

Step size(no. of steps)

Final value

- plot(x,sin(x))
- plot(x,sin(x),'*')

- Editing plot



Function

- Functions are required for repeating calling of the operation.
- Use command window or editor to create a function.

Eg:

```
Function y=sqr(x)
y=x*x;
end
```

- Directly in command window we can call function

Eg:

```
function name=@(x,y) x*y;
fun=@(x,y) x*y;
fun(2,3)
ans=
      6
```

Roots of algebraic equations & solution to simultaneous equations

Solved Examples:

1. Solve $x^2-5x+4=0$; Find the roots.
2. Solve the set of equations to find x & y:

$$2x+y=8$$

$$x+4y=15$$

Exercise Problems:

1. Solve the system equations to find x, y & z:

$$x+2y+z=10$$

$$3x+y+2z=20$$

$$x-3y+4z=15$$

Introduction to RVC Toolkit