Sri Sai Ram Engineering College
Department of Instrumentation & Control Engineering

Report

Webinar On MATLAB Programming for Robotics Applications

19th August, 2021
Thursday
10:30AM - 12:30PM

Resource Person : **Mr. S. Kaushik**
Senior Grade Assistant Professor,
Department of Control and Instrumentation,
Sri Ramakrishna Engineering College,
Coimbatore

Webinar Coordinator
Assistant Prof. Mohan Raj K
(Department of instrumentation and control engineeringSri SaiRam Engineering College)
(**IEEE RAS Student branch advisor**)

Conveners
Sahana S
Priya A
Srilekha A
(**Members of IEEE RAS**)

Written By:
Sai Dasaradharam G
(Chair of RAS SBC)

Preamble :

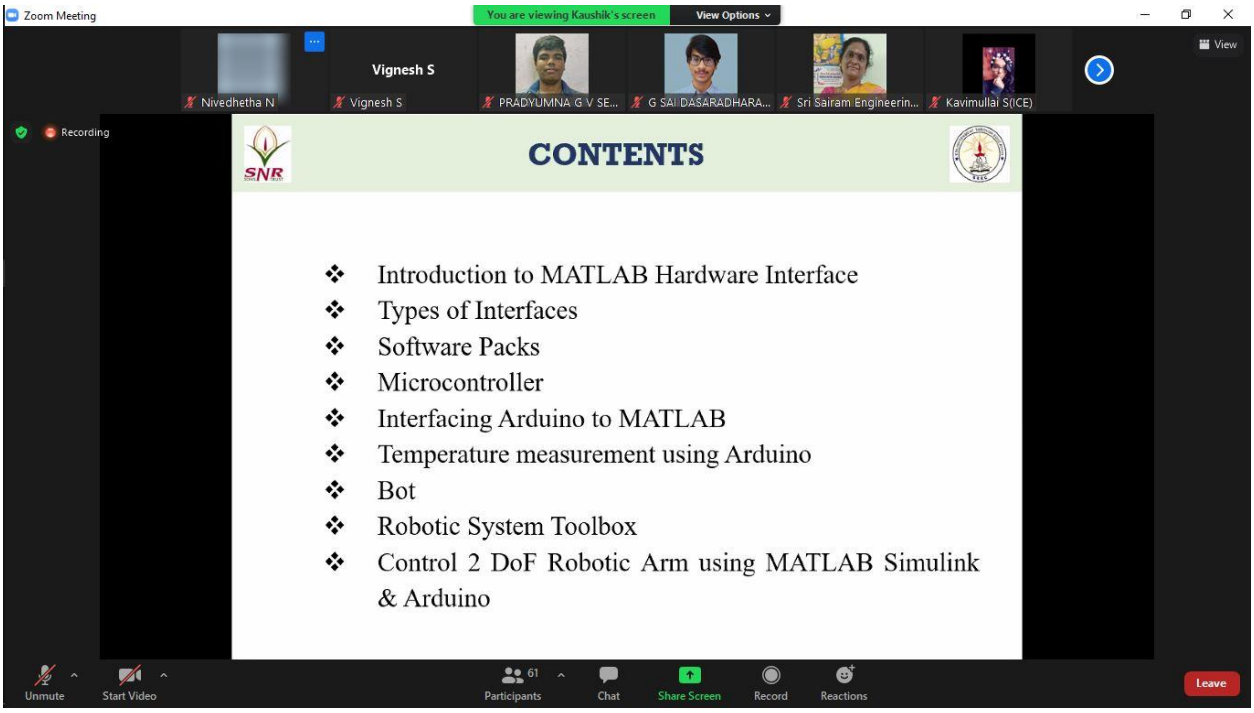
The IEEE's Robotic Automation Society at Sri Sai Ram Engineering College conducted the webinar on the topic "MATLAB Programming for Robotics Applications" on 19th August, 2021 from 10:30AM to 12:30PM. The Speaker was Mr. S. Kaushik, Assistant Professor, Department of Control and Instrumentation, Sri Ramakrishna Engineering College, Coimbatore.

Event Summary :

Sahana S, representing IEEE RAS, Sri Sai Ram Engineering College, gave a formal welcome address and started the webinar. Then, Mrs. T. Mangayarkarasi, Head of the Department, welcomed everyone to the webinar. Priya A, then introduced the speaker, Mr. S. Kaushik briefly. The agendas of the webinar were stated by Mr. S Kaushik. He made sure that we get a clear picture of what can be done using MATLAB, He then elaborated on the types of interfaces which are supported by MATLAB. He explained about utilizing a data sheet. He taught how to add an "add-on Package" and how to use the instrument control box after which he showed us how to interface an arduino board to MATLAB, also the output from the arduino board was shown. Using an Arduino he explained the working of two different projects, one of which was about how to measure temperature and another project was to play the chrome game when there is no internet connectivity. He explained the process of conversion from analog to digital. He also showed the simulation of an Odometer-which is used to calculate distance using encoders, the simulation was done using MATLAB-simulink. He then started clearing the doubts asked by the participants. Feedback form was provided to the students for the webinar. At the end of the webinar, Srilekha A proposed the vote of thanks to Mr. S. Kaushik, along with other IEEE heads. Also, participants were thanked for their solemn presence.

POSTER OF THE WEBINAR

MOMENTS FROM THE WEBINAR:



Zoom Meeting — You are viewing Kaushik's screen — View Options

Vignesh S | PRADYUMNA G V SE... | G SAI DASARADHARA... | Sri Sairam Engineerin... | Kavimullai S(ICE) | sec20ic027 Prasath

Recording

Interfacing Arduino to MATLAB

C:\Users\CIE\Documents\MATLAB\LED_BLINK_GUI.m

```
clear a;
global a;
a=arduino('COM4');
pinMode(a,13,'output');

% --- Outputs from this function are returned to the command line.
function varargout = LED_BLINK_GUI_OutputFcn(hObject, eventdata, handles)
% varargout  cell array for returning output args (see VARARGOUT);
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Get default command line output from handles structure
varargout{1} = handles.output;


% --- Executes on button press in pushbutton1.
function pushbutton1_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton1 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global a;
digitalWrite(a,13,1);
```

LED_BLINK_GUI / pushbutton1_Callback | Ln 81 | Col 1 | OVR

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Analog to Digital converter

- 10 bit ADC
- $2^{10} = 1024$
- To find the voltage for every sensed value
  - $V_{out} = \frac{ADC\ value}{2^n} * V_{in}$
  - Eg: V = 681 / 1024.0 * 5.0 = 3.325V

A → D

8, 12, 16

A0 = analog read(A0)

D — 1023

0 — 1024

0 — 5

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Recording

Temperature Measurement using Arduino

```
clear a;
a = arduino('COM6','Uno');
c1 = 1.009249522e-03;
c2 = 2.378405444e-04;
c3 = 2.019202697e-07;
Vo=readVoltage(a,'A0');
a0=Vo * (1023 / 5);
R1=100000;
R2 = R1 * (1023.0 / a0 - 1.0);
logR2 = log(R2);
T = (1.0 / (c1 + c2*logR2 + c3*logR2*logR2*logR2)); % Steinhart–Hart equation
T = T - 273.15;
TF = ((T * 9.0)/ 5.0) + 32.0;
TC = (TF - 32) * 5/9;
```

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Recording

Bot

Calculate Distance using Encoders – Odometer*

*Odometer - a device used for measuring distance traveled by a vehicle

$1\ rotation = 1\ circumference\ distance = 2 * \pi * R$

$Distance\ Traveled = Number\ of\ Wheel\ Rotations * 2 * \pi * R$

$$Distance\ Traveled = \frac{Total\ Encoder\ Ticks}{Tick\ count\ per\ rotation} * 2 * \pi * R$$

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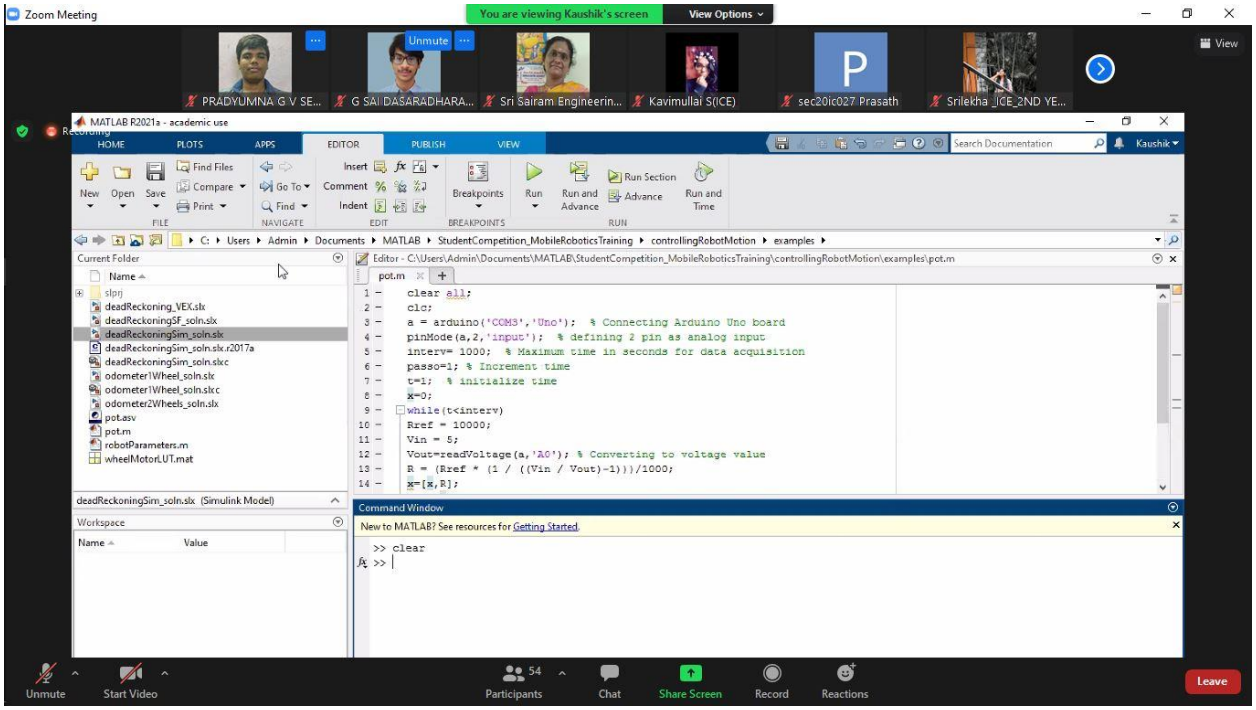
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Sri Sairam Engineerin...
Kavimullai S(ICE)
sec20ic027 Prasath
Srilekha _ICE_2ND YE...
MATLAB R2021a - academic use
clear all;
clc;
a = arduino('COM3','Uno'); % Connecting Arduino Uno board
pinMode(a,2,'input'); % defining 2 pin as analog input
interv= 1000; % Maximum time in seconds for data acquisition
passo=1; % Increment time
t=1; % initialize time
x=0;
while(t<interv)
Rref = 10000;
Vin = 5;
Vout=readVoltage(a,'A0'); % Converting to voltage value
R = (Rref * (1 / ((Vin / Vout)-1)))/1000;
x=[x,R];
>> clear
>> >>
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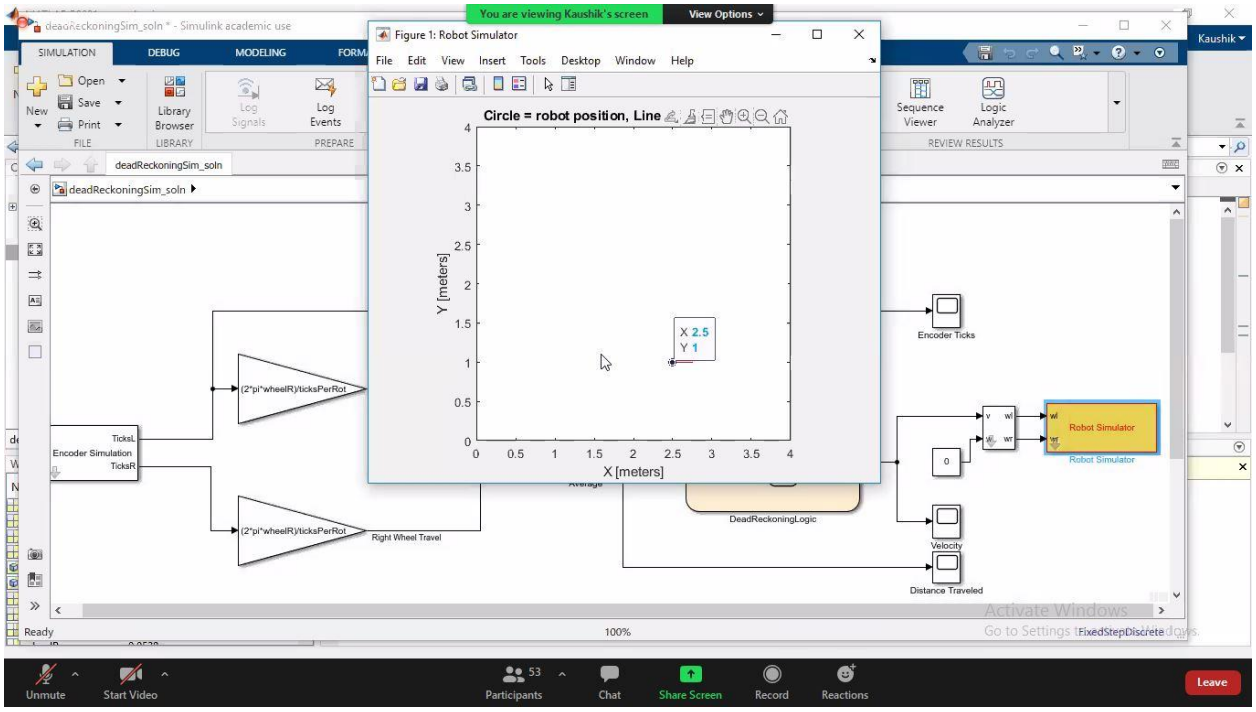
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Figure 1: Robot Simulator
File Edit View Insert Tools Desktop Window Help
Circle = robot position, Line
Y [meters]
X [meters]
X 2.5
Y 1
deadReckoningSim_soln
Encoder Ticks
Robot Simulator
DeadReckoningLogic
Velocity
Distance Traveled
Right Wheel Travel
Ready
100%
FixedStepDiscrete
Unmute
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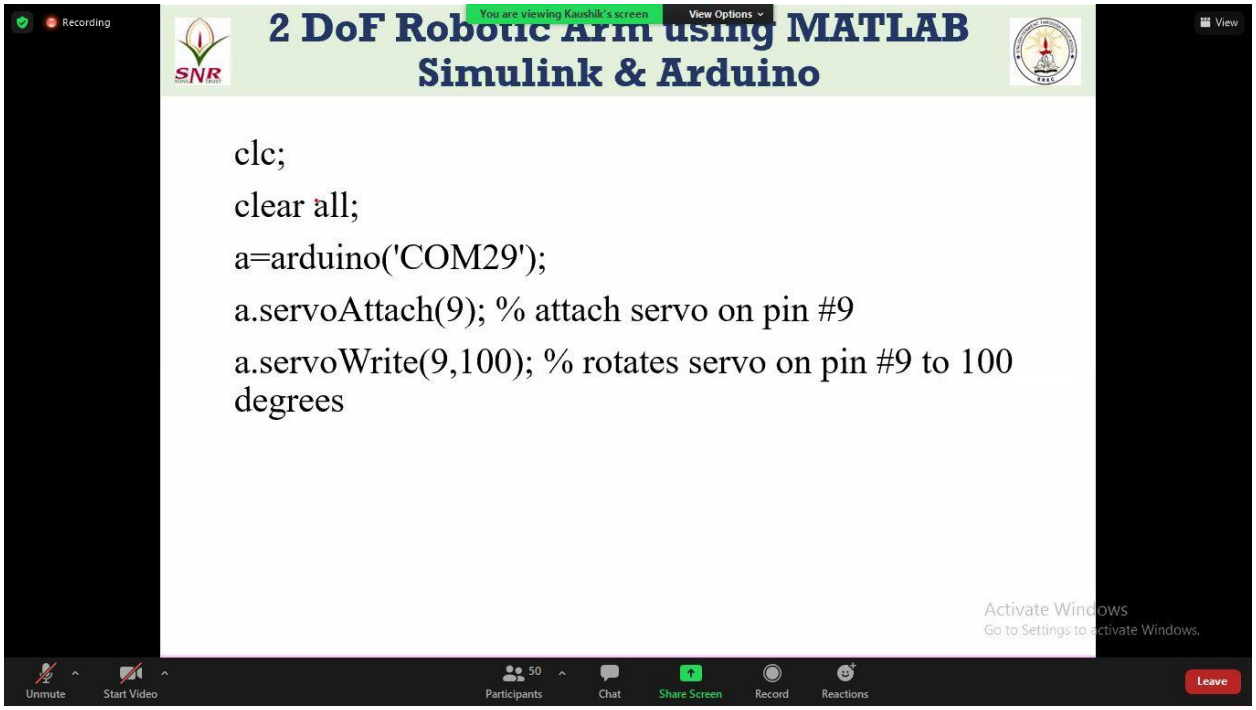
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2 DoF Robotic Arm using MATLAB Simulink & Arduino
clc;
clear all;
a=arduino('COM29');
a.servoAttach(9); % attach servo on pin #9
a.servoWrite(9,100); % rotates servo on pin #9 to 100 degrees
Activate Windows
Go to Settings to activate Windows.
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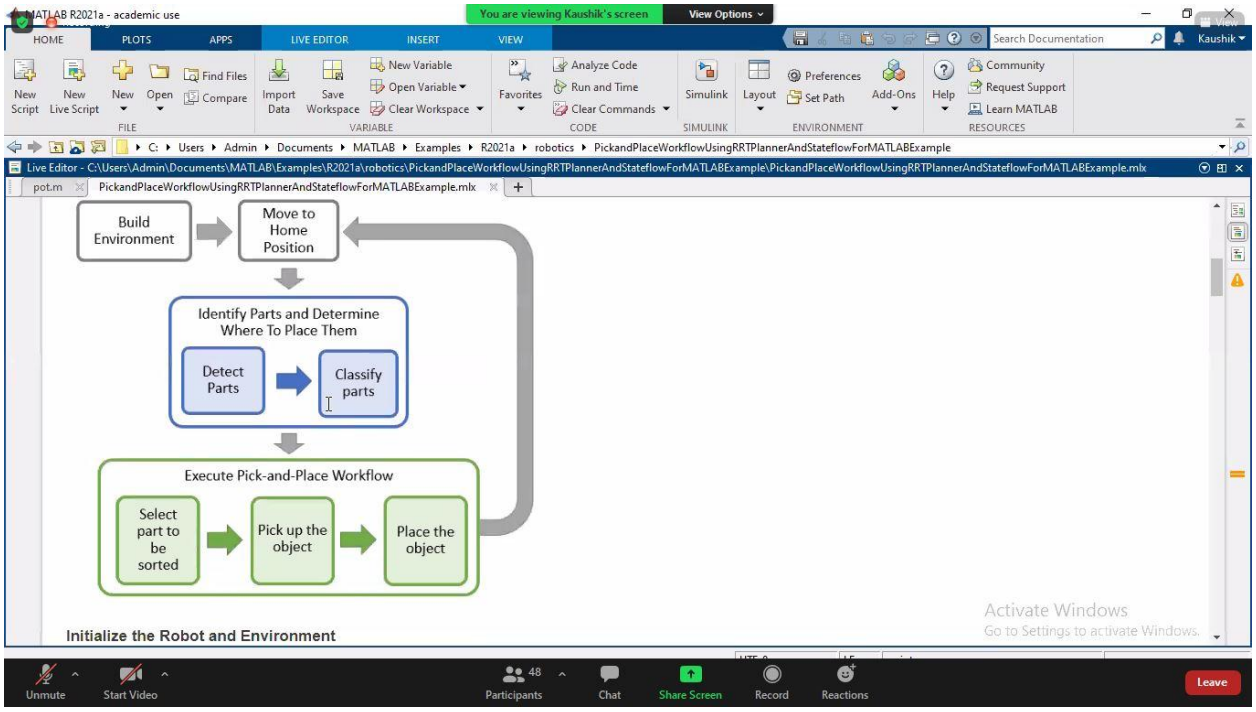
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View Options
HOME
PLOTS
APPS
LIVE EDITOR
INSERT
VIEW
Search Documentation
Kaushik
Build Environment
Move to Home Position
Identify Parts and Determine Where To Place Them
Detect Parts
Classify parts
Execute Pick-and-Place Workflow
Select part to be sorted
Pick up the object
Place the object
Initialize the Robot and Environment
Activate Windows
Go to Settings to activate Windows.
Unmute
Start Video
Participants
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Reactions
Leave

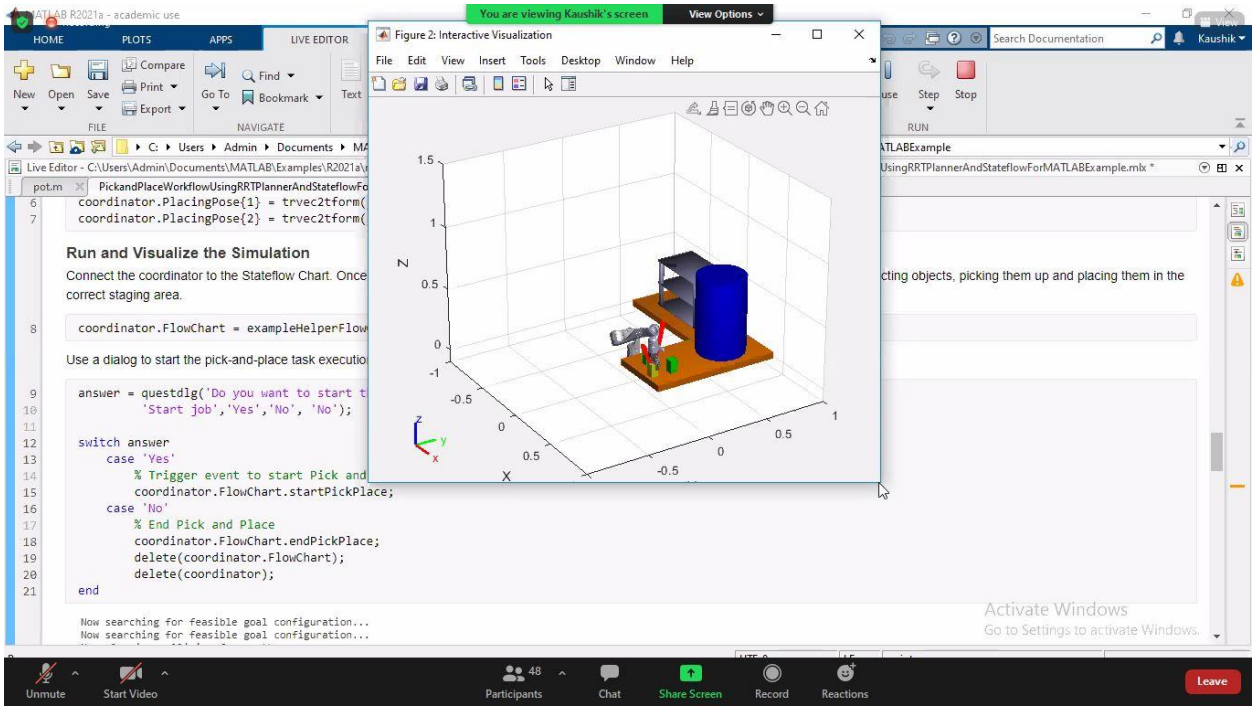
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Figure 2: Interactive Visualization
File Edit View Insert Tools Desktop Window Help
Run and Visualize the Simulation
Connect the coordinator to the Stateflow Chart. Once
correct staging area.
Use a dialog to start the pick-and-place task executio
answer = questdlg('Do you want to start t
'Start job','Yes','No', 'No');
switch answer
case 'Yes'
% Trigger event to start Pick and
coordinator.FlowChart.startPickPlace;
case 'No'
% End Pick and Place
coordinator.FlowChart.endPickPlace;
delete(coordinator.FlowChart);
delete(coordinator);
end
Now searching for feasible goal configuration...
Now searching for feasible goal configuration...
Activate Windows
Go to Settings to activate Windows.
Unmute
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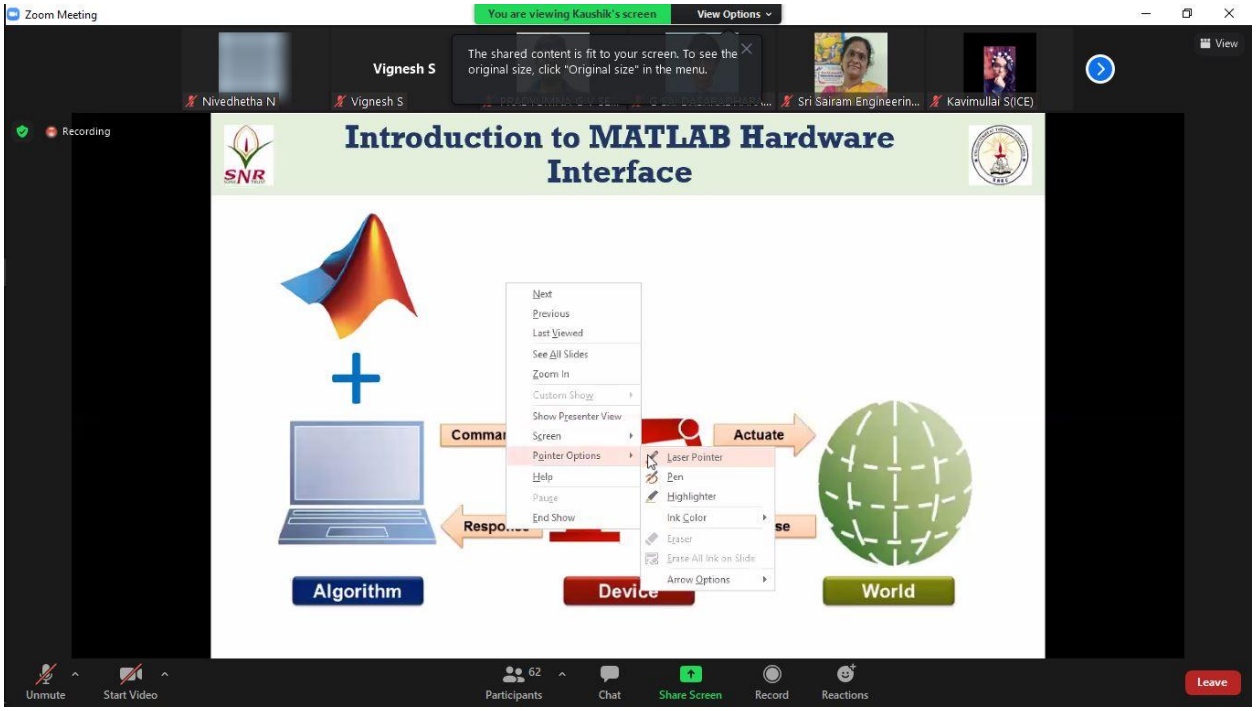
Reactions
Leave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Nivedhetha N
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Recording
Introduction to MATLAB Hardware Interface
Next
Previous
Last Viewed
See All Slides
Zoom In
Custom Show
Show Presenter View
Screen
Pointer Options
Help
Pause
End Show
Laser Pointer
Pen
Highlighter
Ink Color
Eraser
Erase All Ink on Slide
Arrow Options
Actuate
Algorithm
Device
World
Unmute
Start Video
Participants
Chat
Share Screen
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Reactions
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View
Recording
MATLAB Hardware Interface
Store the Data
Process and Plot the Data
Apply Technologies like
Data Science
Artificial Intelligence
Control Algorithm etc.,
Purpose
Unmute
Start Video
60
Participants
Chat
Share Screen
Record
Reactions
Leave


Meeting
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View
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Types of Interfaces
USB to RS232
RS232
Ethernet
USB
Bluetooth
GPIB
I2C
100%
ENG
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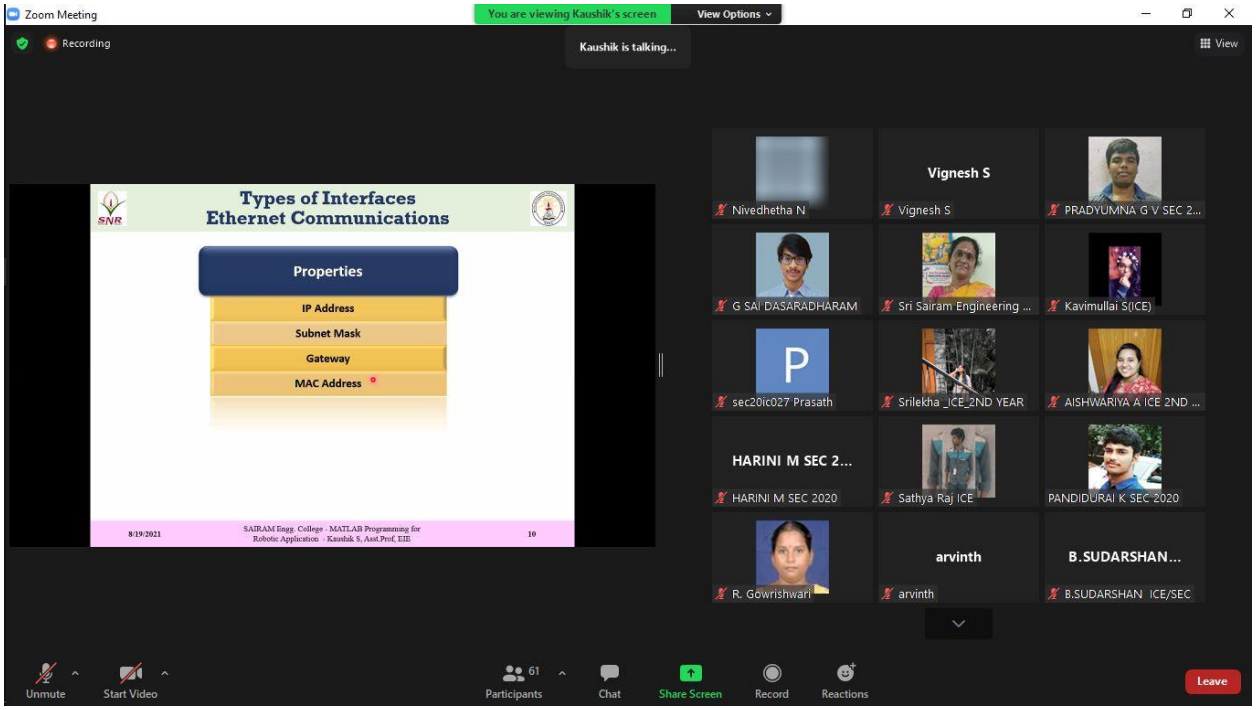
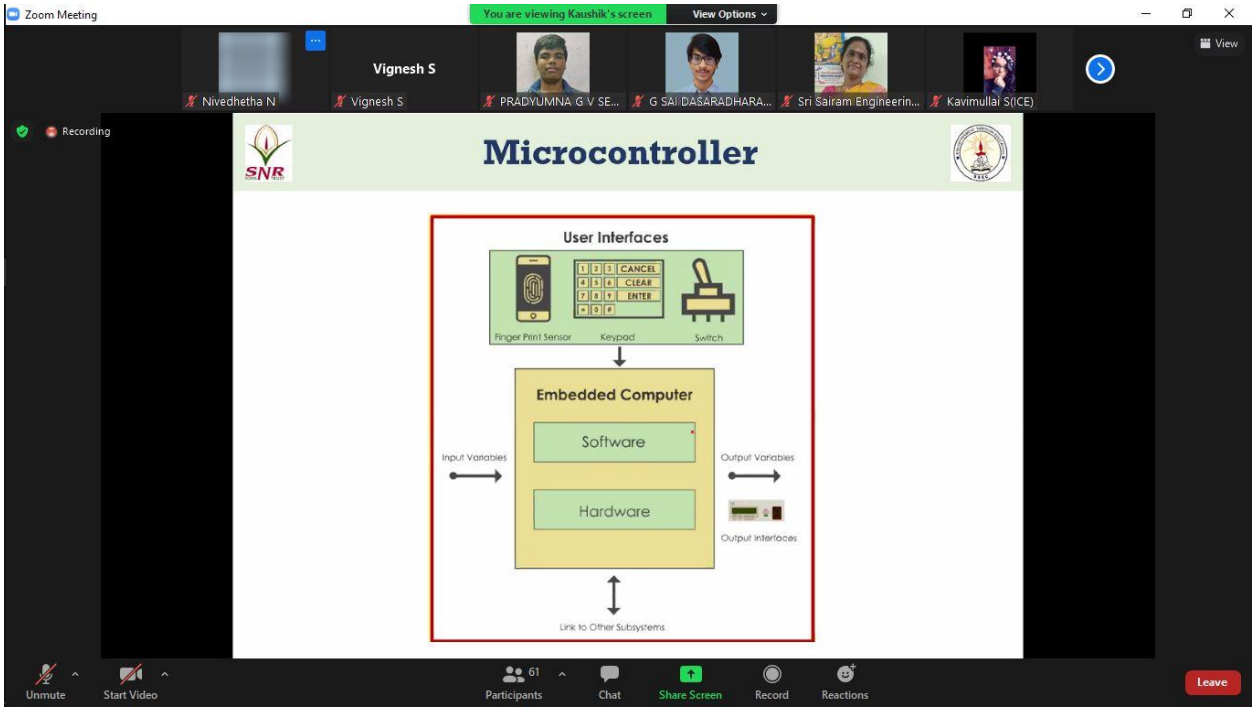
19-08-2021
Start Video
61
Participants
Chat
Share Screen
Record
Reactions
Leave





The objective of the webinar was achieved.

Feedback:

Name:	DEPT:	Year/Sem	1. Knowledge and inform	2. Rate the understandat	3. Did the webinar live up	4. Overall View of the ev	Would you like to have m
YASHWANTH.S	ICE	2/3	5	5	5	5	Yes
Rashith Ahamed S	ICE	III rd year/ V th sem	4	4	4	4	Yes
MADHUMITA.S	ICE	2ND YR/3RD SEM	4	3	4	4	Yes
lokesh kumar S	Instrumentation and Con	3/5	5	4	4	5	Yes
Priya A	ICE	2nd year/3rd sem	5	5	5	5	Yes
MANOPRADEEP R	Ice	3RD/5	1	1	1	1	Yes
G. V. PRADYUMNA	ICE	II/III	4	4	4	3	Yes
S KATHIRAVAN	ICE	2nd year/ 3 sem	4	4	4	4	Yes
HARINI.S	ICE	2/3rd Sem	5	5	5	5	Yes
DHARSHINI V	ICE	II year	2	3	2	2	Yes
Sundareswaran	ICE	2/3	4	4	4	4	Yes
SAHANA S	ICE	2nd year/ 3rd Semester	4	4	3	3	Yes
ASHRAF M	ICE	2nd-year /2nd-sem	3	3	3	3	Yes
A. Srilekha	ICE	2nd year 3rd sem	4	4	4	4	Yes
B. SUDARSHAN	ICE	20-24/3	4	4	4	4	Yes
SIVAKUMAR R	ICE	2 /3rd sem	4	4	4	3	Yes
Umeshnandhan	ICE	2/ 3rd sem	5	5	5	5	Yes
Edwin Adharsh D S	ICE	2nd/1	5	5	5	5	Yes
AISHWARIYA A	ICE	2020/3RD SEM	4	4	4	4	Yes
Thejashri V	ICE	II/I	5	5	5	5	Yes
Ekambareshwaran S	ICE	2 /3	5	4	4	5	Yes
sathya RAJ	Ice	2021/III	4	4	4	4	Yes

----------END OF REPORT----------