



**LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

Accredited by NAAC & NBA ( CSE, IT, ECE, EEE & ME) under Tier - I

Approved by AICTE and Permanently Affiliated to JNTUK, Kakinada



## DEPARTMENT OF MECHANICAL ENGINEERING

In Association with **The Robotics Club** Organized

Three-day Online Student workshop on

**“Robotics and Automation - Industrial Applications”**



**Date / Duration: 28<sup>th</sup> June, 2021 to 30 June 2021**

### Resource Persons

1. **Dr. K.R.L. Prasad**, Professor, Dept. of EEE, LBRCE
2. **Mr. J. Subba Reddy**, Assoc. Professor, Dept. of ME, LBRCE
3. **Mr. B.V.N.R Siva Kumar**, Assoc. Professor, Dept. of ECE, LBRCE

### Faculty Coordinators:

1. Mr. J. Subba Reddy, Assoc. Professor, Dept. of ME, LBRCE
2. Mr. V. Sankararao, Asst. Professor, Dept. of ME, LBRCE
3. Mr. V. Venkatrami Reddy, Asst. Professor, Dept. of ME, LBRCE

### Student Coordinators:

1. Mr. P. Gunakar (17761A03F3), IV year, Dept. of ME, LBRCE
2. Mr. Sk. Akbar (17761A03F6), IV year, Dept. of ME, LBRCE

**Audience:** B.Tech I, II, III and IV year students and research scholars.

**Total Number of Participants:** 312

**Topics covered in the one day workshop:** Introduction to robotics, robot kinematics, path and trajectory planning, robot control and design, actuators, sensors, mechatronics, etc.

**Objective of the Event:** To impart the knowledge on the fundamentals of robotics and automation, types, characteristics, uses, applications, present, future scope and emerging areas in robotics.

**Outcome of the Event:** 312 participants who attended the workshop gave their feedback on the Resource person(s) sessions and gained knowledge on the robotics and automation.

## Workshop Brochure:

### About the Institute & Department

The Lakireddy Bali Reddy College of Engineering (LBRCE) was established in the year 1998 by Er. Lakireddy Bali Reddy garu. The institute is established with the sole aim of providing high quality educational opportunities in the field of science, engineering, technology and management. It is approved by AICTE, affiliated to JNTUK, Kakinada and attained autonomous status in the year 2010. It attained NAAC accreditation. The institute is certified by ISO: 9001-2015. The Department of Mechanical Engineering was started in the year 1998. The Department is accredited by NBA (Tier-I). The Dept. is recognized as a Research centre by JNTUK Kakinada.

### About the Workshop

The area of robotics has been expanding in a wide range of applications in the fields of industrial, biomedical, space and underwater exploration. The design and control of the robots that are involved in these applications are quite challenging. A new era of industry 4.0 has increased the adoption of robotics, automation, and artificial intelligence in the industries. Researchers and scientists are actively engaged in the advanced fields of robotics to address these challenges. This workshop aims to bring a clear understanding of robot kinematics, dynamics and control aspects pertaining to industrial applications. It comprises essential theory and hands on session in robot simulation and making of real-time working models of robots.

#### Registration link:

<https://forms.gle/pRFkQ4KT9H5zVs2LA>

#### Fee Particulars:

- There is no registration fee

#### Important Dates:

- Workshop starts on 28-06-2021
- All the sessions are conducted online through Microsoft Teams App.



E-certificate will be given to the participants that satisfy the criteria set by the organizing committee.

### CONTENTS

- Introduction to Robotics
- Robot Kinematics
- Path and Trajectory Planning
- Robot Control and Design
- Wheeled Mobile Robots
- Actuators, Sensors, Mechatronics
- Industrial Applications
- Demo on RoboAnalyzer Software
- Demo on CProg Software

### COMMITTEE MEMBERS

#### Chief Patrons:

- Er. Lakireddy Bali Reddy, Chairman
- Sri L. Jaya Prakash Reddy, Co-Chairman
- Sri L.R.N.K. Prasad Reddy, Vice-Chairman

#### Patrons:

- Sri G. Srinivasa Reddy, President
- Dr. K. Appa Rao, Professor & Principal
- Dr.K. Haranadha Reddy, Prof. & Vice- Principal

#### Convener:

Dr. S.Pichi Reddy, Professor & HoD

#### Coordinators:

- Mr. J. Subba Reddy, Associate Professor
- Mr.V.Sankara Rao, Assistant Professor
- Mr. V.Venkatrami Reddy, Assistant Professor

#### Resource persons:

- Dr. K.R.L. Prasad, Professor, EEE
- Mr. J.Subba Reddy, Associate Professor, ME
- Mr. B.V.N.R. Siva Kumar, Associate Professor, ECE

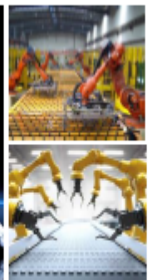
#### Contact Person(s):

- Mr. J.Subba Reddy, Associate Professor  
[jonnalasu@yahoo.co.in](mailto:jonnalasu@yahoo.co.in), Cell 9985100936
- Mr. V.Sankara Rao, Assistant Professor,  
[sankar.356@gmail.com](mailto:sankar.356@gmail.com), Cell 9493245354
- Mr. V.Venkatrami Reddy, Assistant Professor,  
[vvreddy.324@gmail.com](mailto:vvreddy.324@gmail.com), cell 9989460311

### A Three-Day Online Student Workshop

ON

**ROBOTICS AND AUTOMATION -  
INDUSTRIAL APPLICATIONS**  
(28 June - 30 June 2021)



Timings: Evening 6 PM - 7 PM

Organized by

**DEPARTMENT OF  
MECHANICAL ENGINEERING**

**In Association with  
Robotics Club**

**LAKIREDDY BALI REDDY COLLEGE OF  
ENGINEERING (A)**

(Accredited by NAAC & NBA (CSE, IT, ECE, EEE, ME),  
ISO 9001:2015 Certified Institution Approved by AICTE,  
New Delhi and Affiliated to JNTUK, Kakinada  
L.B.REDDY NAGAR, MYLAVARAM, KRISHNA DIST., A.P.-521 230.

**Registration and joining details of workshop:**

The Robotics Club, Department of Mechanical Engineering wish and hope you and your family members are safe and taking all necessary healthy precautions under this COVID-19 pandemic.

It gives us immense pleasure to announce that **The Robotics Club**, Department of Mechanical Engineering, Lakireddy Bali Reddy College of Engineering (A), Mylavaram is conducting **a students workshop on Robotics and Automation – Industrial Applications” from 28 to 30 June 2021 from 6 PM to 7 PM** through Google Teams app. The workshop is focused on the students who are interested in brushing up their basic concepts in the fundamentals of Robotics & Automation and its Industrial Applications. The faculty and Alumni will share their experiences during the workshop. Successful projects will be shown in the workshop by Alumni and concepts of Robotics and Automation will be covered in the workshop.

Participants will get an E-certificate on successful participation and submission of feedback at the end of the workshop.

Registration Details of the workshop: Free

Registration Link for 'Fundamentals of Robotics and Automation':

<https://forms.gle/pRFkQ4KT9H5zVs2LA>

The students can join into the whatsapp group with the following link:

<https://chat.whatsapp.com/EjHHh9xawioLPeBJlPwU6>

Link for Joining the Workshop:

<https://teams.microsoft.com/l/channel/19%3a690b1bb7c87c481998d1eafe6c05d11c%40thread.tacv2/General?groupId=59bde8d8-440b-4718-bf39-dea0627ed802&tenantId=07f3ae2f-c55d-46be-9215-1453785ba103>

**Robotics Club Student Coordinators:**

Mr. G. Gunakar, IV yr Mechanical

Mr. Sk. Akbar, IV yr Mechanical

**Faculty Coordinators:**

Mr. J. Subba Reddy, Associate Professor, 9985100936

Mr. V. Shankara Rao, Assistant Professor, 9493245354

Mr. V. Venkatrami Reddy, Assistant Professor, 9989460311

Convener Dr. S.Pichi Reddy, H.O.D., Mechanical Engineering,

Principal: Dr.K.Appa Rao, LBRCE.

Email: [jonnalasu@lbrce.ac.in](mailto:jonnalasu@lbrce.ac.in), Website: [www.lbrce.ac.in](http://www.lbrce.ac.in)



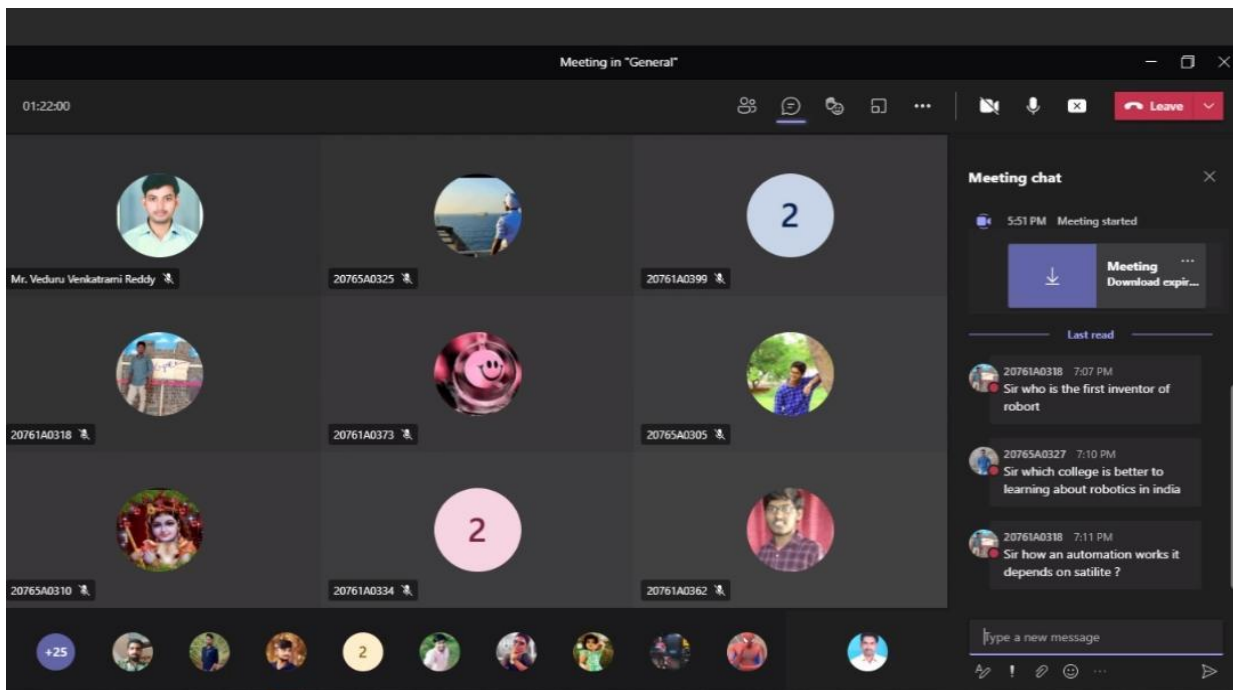
**Report on workshop:**

**Day 1 (28<sup>th</sup> June 2021):**

**Resource Person: Mr. J. Subba Reddy, Associate Professor, LBRCE, Mylavaram**

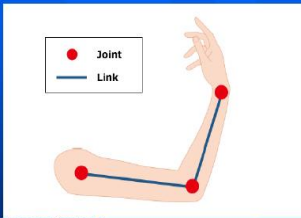
**Topics covered:**

1. Introduction to robotics
1. Mechanical design & kinematics
2. Drive systems
3. Control of Arm Motion
4. Robot Controller
5. End-Arm Tooling
6. Robot Programming
7. Application of Industrial Robots
8. Industry 4.0 & Robotics




### Mechanical Design of Industrial Robots

The **mechanical design of industrial robots** is based on combinations of movable components (**joints**) and adjacent **links**;

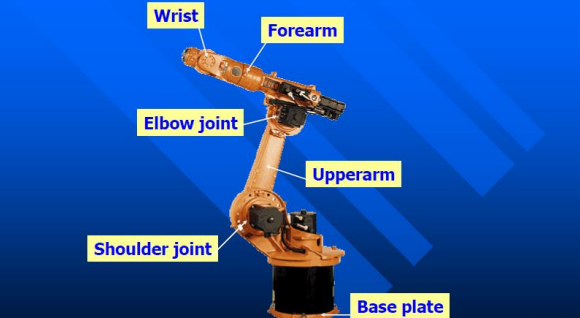


Source: Kawasaki



Source: Pinterest

### Articulated Robot Manipulator: Kinematics



## Articulated Robot Manipulator: Kinematic

Robot workspace extension by linear track systems



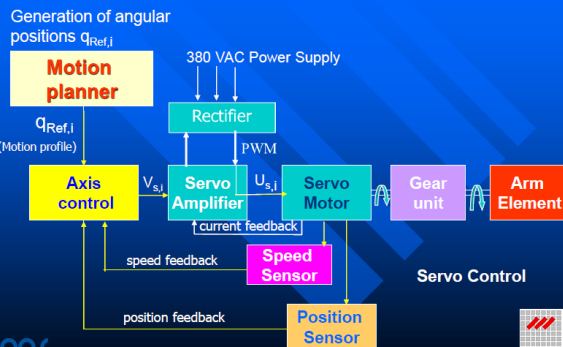
Sources: Indiamart, Kuka, linearmotiontips

## Industrial Robots



Control of Arm Motion

## Robot Arm Motion Control



## Industrial Robots



Robot Controller

# Robot Controller

## Main controller tasks:

- **Motion Control & Path Planning**
- **Programming**
- **Operator support** (set-up, programming, test /automatic mode)
- **Control of Processes** (welding, sealing, drilling, milling, etc.)
- **Control of Peripheral devices** (turn tables, conveyors, etc.)
- **Control of tools** (gripper, weld gun, dispenser, etc.)
- **Sensor data processing** (adaptive functions)
- **Communication** (with control panel, teach box, external PC)
- **Control of I/O operations** (digital, analog, serial, fieldbus)
- **Data management** (display, store, print, delete, etc.)
- **Error management**
- **Safety functions** (emergency stop, reduced speed, etc.)



Tap to return to meeting 02:42

In meeting (43) Mute all

Organiser

JONNALA SUBBA REDDY  
Organiser

Participants

- 18761A0318 Attendee
- 18761A0333 Attendee
- 18761A0337 Attendee
- 18761A0341 Attendee
- 18761A03F9 Attendee
- 19761A0318 Attendee
- 19761A0334 Attendee On hold

Tap to return to meeting 02:51

In meeting (43) Mute all

- 20761A0320 Attendee
- 20761A0330 Attendee
- 20761A0334 Attendee
- 20761A0335 Attendee
- 20761A0362 Attendee
- 20761A0365 Attendee
- 20761A0373 Attendee
- 20761A0378 Attendee
- 20761A0384 Attendee

Tap to return to meeting 02:47

In meeting (43) Mute all

- 19761A0348 Attendee On hold
- 19761A0349 Attendee
- 19761A0354 Attendee On hold
- 19761A0377 Attendee On hold
- 19761A0387 Attendee
- 19761A03A8 Attendee On hold
- 19765A0302 Attendee
- 20761A0303 Attendee
- 20761A0318 Attendee

Tap to return to meeting 02:55

In meeting (43) Mute all

- 20761A0389 Attendee
- 20761A0398 Attendee
- 20761A0399 Attendee
- 20765A0302 Attendee
- 20765A0303 Attendee
- 20765A0305 Attendee
- 20765A0307 Attendee
- 20765A0310 Attendee
- 20765A0315 Attendee



**Day 2 (29<sup>th</sup> June 2021):**

**Resource person: Mr. B.V.N.R. Siva Kumar, Associate Professor, Dept of ECE, LBRCE**

**Topics covered: Robot sensors, actuators and wheeled mobile robots**

The screenshot shows a Zoom meeting interface. The main window displays a presentation slide titled "Robot Sensors". The slide content is as follows:

**Robot Sensors**

- Sensors are devices for sensing and measuring geometric and physical properties of robots and the surrounding environment
  - Position, orientation, velocity, acceleration
  - Distance, size
  - Force, moment
  - temperature, luminance, weight
  - etc.

Below the text, there are three images of sensors labeled: "ultrasonic sensors", "Infra-red sensors", and "touch sensors".

The Zoom interface includes a "Participants" list on the right with names like Mr. Veduru Venkatrami Reddy, JONNALA SUBBA REDDY, and SIVA KUMAR, B.V.N.R. The bottom of the screen shows a video gallery with several participants.

### Internal Sensors

for position and speed feedback

Sensor directly coupled to the motor shaft

### Absolute Encoder Principle

Angular position of the motor shaft is transferred to the servo controller as binary code.

Rotary/Shaft Encoder

Binary Code: 0 1 1

capture-plate, light-sources, photo-elements, shaft, code-disc

Each angular position corresponds to a binary code. Therefore: No need for a zero reference signal.

### Resolver Principle

Resolver principle = inductive principle

RH, Rotor (Ref), RL, Rotor Shaft Angle ( $\theta$ ), Stator ( $K \text{ Ref Cos } \theta$ ), S2, S4, Stator ( $K \text{ Ref Sin } \theta$ ), S3, S1, Inductive Transformer

Used in Brushless Resolvers Only

Reference signal input by inductive transformation

- Rotor winding is energized with sinusoidal voltage as reference.
- Voltage signals are induced in the two secondary windings (SIN, COS) in acc. to angular rotor position.

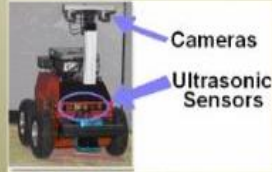
### Drive Systems

#### Requirements:

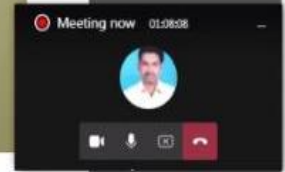
- low weight; small volume
- low moment of inertia; fast response
- wide range of rotational speed (low –high)
- high stiffness (high positioning accuracy)
- high overload capacity ( in case of high acceleration or spontaneous brake)
- brakes (to hold position)
- easy to control

## External Sensors

- External sensors: Obtain the information in the surrounding environment.
  - Cameras for viewing the environment
  - Range sensors: IR sensor, laser range finder, ultrasonic sensor, etc.
  - Contact and proximity sensors: Photodiode, IR detector, RFID, touch etc.
  - Force sensors: measuring the interaction forces with the environment,
  - etc



A mobile robot with external sensors



SIVA KUMAR. B.V.N.R



Day 3 (30<sup>th</sup> Jan 2021):

Resource person: Dr. K.R.L. Prasad, Professor and Mr. J.Subba Reddy, Associate Professor

Topics covered: Mechatronics, RoboAnalyzer and CProg softwares.

MECHATRONICS – a key technology

MECHATRONICS – Introduction to a Key Technology

JONNALA SUBBA REDDY

MECHATRONICS – a key technology

Mechatronics – Where does it come from?

Firstly mentioned: Ko Kikuchi, President of YASKAWA Electric Corp., and Tetsuro Mori (Senior Eng.) Japan 1969. Mechatronics as Trademark of YASKAWA Electric Corporation, 1971

Basic understanding: new field of engineering which is focused on the integration of mechanical components with electrical functionality. It enables products with new design and improved performances. mechanism + electronics + mechatronics

JONNALA SUBBA REDDY

MECHATRONICS – a key technology

Mechatronics Engineering today:

Definition: Interdisciplinary field of Engineering, which integrates the traditional disciplines Mechanical engineering, Electrical engineering and Computer science. (Prof. Schmitz, ETH Zurich 1989)

JONNALA SUBBA REDDY

MECHATRONICS – a key technology

Systematics of Mechatronics System Development:

Guideline VDI 2206: Replaces the sequential development process. Favours an interdisciplinary design methodology. Promotes interdisciplinary teamwork.

JONNALA SUBBA REDDY

### Robot Programming

#### What is ROBOT Programming?

In general, the robot software for programming is **of proprietary nature**. Each robot manufacturer provides their own software.

There is currently a **lack of standardization**.

However, **similarities between different programming languages** help to gain a broad understanding of robot programming without having explicit knowledge of each language.

### Robot Programming

**Teach Pendants** are handheld devices that are used to operate or program robot systems.

**Modern Teach Pendants** are designed like **touchscreen tablets**.

They are **effective tools** that combine the evolving **technical solutions** with **ergonomical demands** of the robot users.

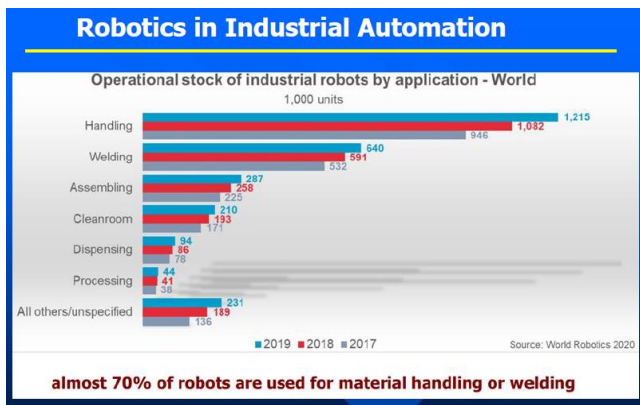
FANUC      KUKA      ABB

Source: KUKA

Source: just-auto.com

## Robot Handling

Source: Bär-Automation



## Quality Assurance in Manufacturing Automation

### Quality Inspection → In-line Measurement Technology:

Source: production.de

- Use of **Laser sensors and cameras** to control the **quality of vehicle bodies**;
- Search for **deviations** to enable more precise installation of **windshields, door panels, and Fenders**.

## Why Industry 4.0?

Due to the globalization of the markets, the increase of competition, and the strong customization of products, industries are continuously forced

- to increase the **flexibility of their production**
- to invest into appropriate **technical innovation**,
- to boost **factory efficiency**,
- to increase **product quality**,
- to improve **speed-to-market**,
- to enhance **workers assistance**,
- to care for **workers' safety, IT security, and sustainability**, and
- to remain **profitable**.

## Industry 4.0 & Robotics

Source: [https://www.dlr.de/rm/desktopdefault.aspx/tabid-12464/21732\\_read-8962/](https://www.dlr.de/rm/desktopdefault.aspx/tabid-12464/21732_read-8962/)

- Frameless motor
- Position sensors
- Harmonic Drive Gear
- Force/Torque sensor
- Joint and Motor control

The three sensors per axis allow the control of motion and compliant behavior by means of:

- position data;
- speed data; and
- torque/force data

## Industry 4.0 & Robotics

### A vision becomes reality: Human/Robot Collaboration (Cobots)

Source: <https://asianroboticsreview.com/frame30.html>

## Research trends: Human/Robot Collaboration

Cognitive Robotics

Rehabilitation Robotics

Robot mobility

Logistics / warehouse robots

## MECHATRONICS – a key technology

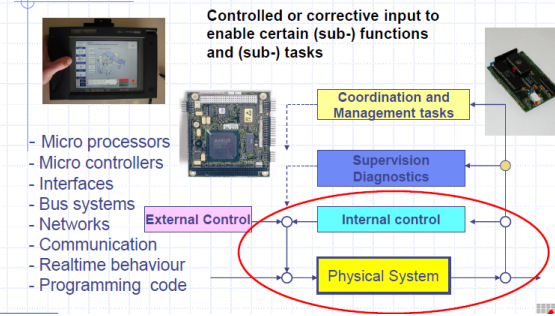
**MECHATRONICS**  
-Part of our daily life-

MECHATRONICS 2021



## MECHATRONICS – a key technology

### Computer technology as a core element

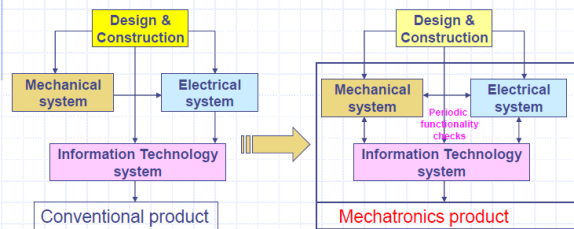


### Miniaturisation as a separate goal:



### Novel Method in Mechatronics Design and Product Development

- Mechanic and electronic components are mostly developed in two independently operating production areas
- Holistic approach in engineering
- Interdisciplinary
- Concurrent engineering



## MECHATRONICS – a key technology

### Skills Expectation from Industry:

- Mathematics
- Physics (fundamental)
- Electrical engineering
- Mechanical engineering
- Thermo dynamics
- Fluid-Dynamics
- Instrumentation and controls engineering
- Skills in system engineering
- Skills in modeling and simulation
- Skills in design- and construction technology
- Skills in software-engineering
- Skills in computing
- Skills in machine safety and reliability
- Quality management
- Project management
- Foreign languages

## Mechatronics – Today and in Future



Source: www.northeastern.edu

Innovation through Research and Development

### Fields of Research & Development:

- **New Applications** (Automotive, machinery, process industry, production automation, logistics, medical, service robotics, traffic, transport, domestic, entertainment, etc.)
- **Integration of „Intelligence“** (‘embedded’ systems)
- **Self-optimising systems** (‘smart’ mechatronics)
- **Co-operating systems** (‘cooperating objects’, ‘wireless’)
- **Adaptronics**
- **Biomimetics** (use of construction principles and solutions of technical problems taken from nature)
- **Mikrosystems, micro mechatronics**
- **Nano mechatronics**

### Mechatronics in Automotive Technology

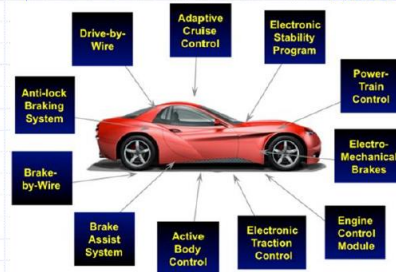


Mega trend: **Self-driving vehicles**



### Pioneer of Mechatronics Engineering:

#### Automotive industry



Today:

- ABS
- ASR
- Brake-by-wire
- Steer-by-wire
- Parking assistant
- ESP
- Active suspension

and tomorrow....?



## Mechatronics in Automotive Technology

**THE COMING FLOOD OF DATA IN AUTONOMOUS VEHICLES**

RADAR ~10-100 KB PER SECOND  
 SONAR ~10-100 KB PER SECOND  
 GPS ~50KB PER SECOND  
 CAMERAS ~20-40 MB PER SECOND  
 LIDAR ~10-70 MB PER SECOND

**AUTONOMOUS VEHICLES 4.000 GB PER DAY... EACH DAY**

Self-driving vehicles

## CNC Bending

- Fully automated bending: load sheet metal and the finished bent parts come out
- Can bend complex shapes

Smart Production Machines

Energy in Efficient Use

## MECHATRONICS – a key technology

- Cutting width control
- Pulling point setting
- Servomatic control center
- Ploughing depth
- Stone protection

Intelligent Plough Technology

Automatic pulling point adjustment with track sensors

Stone protect

Operating depth adjustment with depth sensor

User terminal with job select calculator

Servo control

Source: A. Poettinger (www.poettinger.at)

## MECHATRONICS – a key technology

Construction Machines

Machine technology

Automatic Recovery of damaged roads by Cold Recycling with Foam Bitumen

Onboard control

Human-Machine Interaction

granularity

moisture

Microwave-Sensors

Recovery with Foam Bitumen

## MECHATRONICS – a key technology

Co-bot

Advanced ROBOTICS

Source: DLR, München

Source: Schunk

Source: Festo

## MECHATRONICS – a key technology

Manipulator Robot

Driver-less transport

Care-o-bot

Source: IPA Stuttgart

Cleaning robot

Source: Siemens AG

US Sensors, 60kHz (environment)

IR Sensor (Floor)

Vacuum cleaner

Quelle: Electrolux

Help-Mate

Source: Uni Bochum

Source: Faulhaber GmbH

## Personal Mobility

### Systems Uses

- Tilt and pressure sensors
- Microcontroller
- Motors
- Onboard power source



- Advantages
- Simple and intuitive personal transportation device

Segway



## MECHATRONICS – a key technology

### Vision:

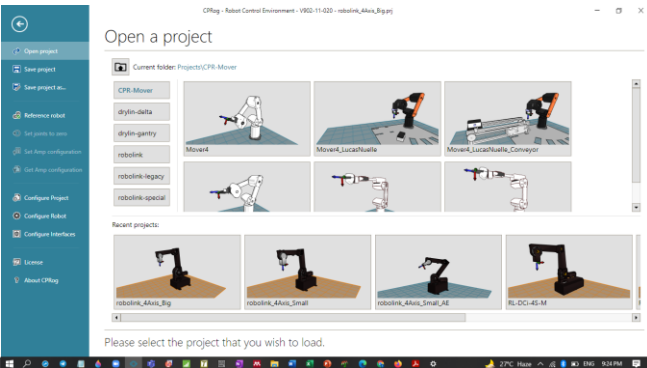
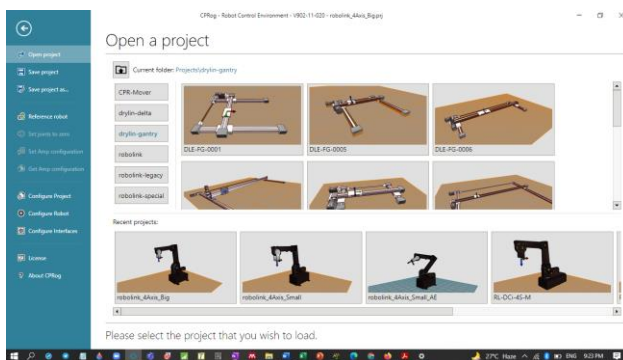
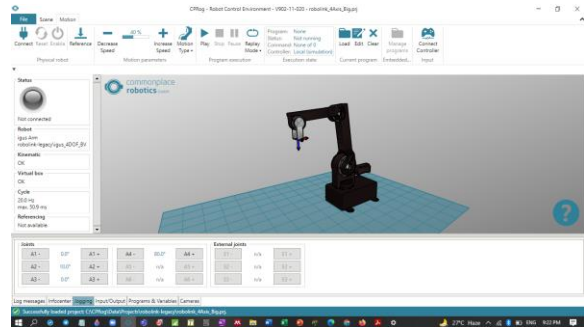
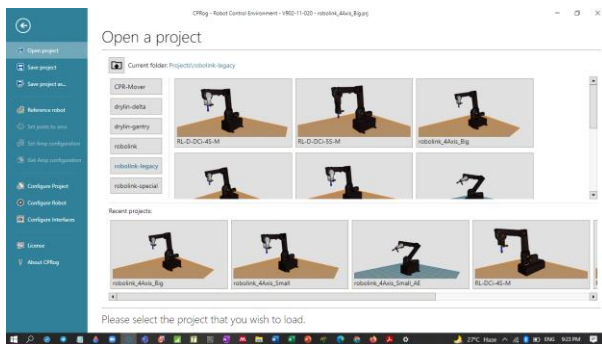
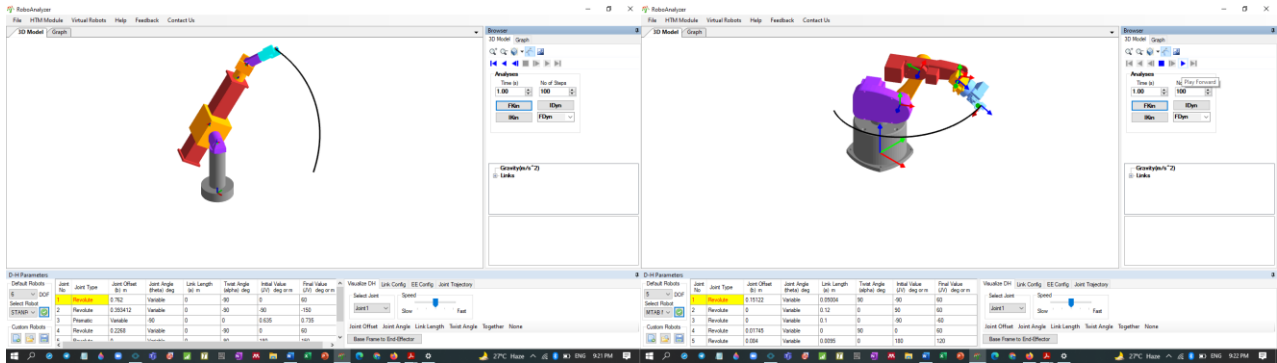
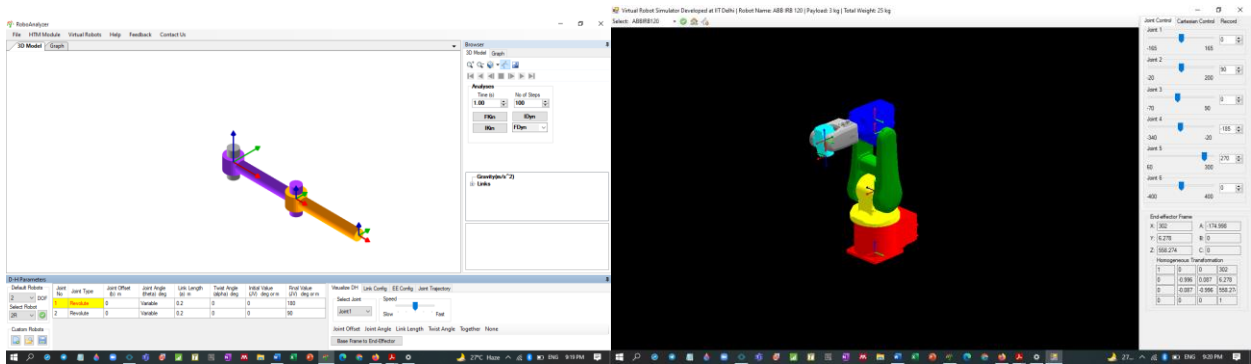
### Nano-mechatronics



### Expected Applications:

- Surgery
- Diagnosis and Testing
- Gene therapy
- Cancer detection & treatment







Sample Participation certificate:

Certificate ID:LBRCE/MECH/WORKSHOP/Robotics Club/GCJ9L8-CE000329



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L.B.Reddy Nagar, Mylavaram, Andhra Pradesh 521230



**Certificate of Participation**

This is to Certify that

**T.Venkata Lakshmi**

III Yr B. Tech MECHANICAL ENGINEERING, LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, MYLAVARAM

has actively participated in the **Three day Online Workshop on “ Robotics and Automation - Industrial Applications ”** organized by the Robotic Club, Department of Mechanical Engineering, Lakireddy Bali Reddy College of Engineering, Mylavaram, Krishna (Dt.), Andhra Pradesh, India from **28-06-2021 to 30-06-2021.**



Organized by  
**Robotics Club**  
Department of  
Mechanical Engineering,  
**LBRCE**

Mr. V. Venkatrami Reddy (Co-Coordinator)    V. Sankararao (Co-Coordinator)    J. Subba Reddy (Co-ordinator)    Dr. S.Pichi Reddy (Convonor)    Dr. K.Appa Rao (Principal)

Made for free with Certify'em

Certificate ID:LBRCE/MECH/WORKSHOP/Robotics Club/GCJ9L8-CE000095



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Approved by AICTE, New Delhi & Affiliated by JNTUK, Kakinada  
L.B.Reddy Nagar, Mylavaram, Andhra Pradesh 521230



**Certificate of Participation**

This is to Certify that

**SANKARARAO VINJAVARAPU**

ASSISTANT PROFESSOR, LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING, MYLAVARAM

has actively participated in the **Three day Online Workshop on “ Robotics and Automation - Industrial Applications ”** organized by the Robotic Club, Department of Mechanical Engineering, Lakireddy Bali Reddy College of Engineering, Mylavaram, Krishna (Dt.), Andhra Pradesh, India from **28-06-2021 to 30-06-2021.**



Organized by  
**Robotics Club**  
Department of  
Mechanical Engineering,  
**LBRCE**

Mr. V. Venkatrami Reddy (Co-Coordinator)    V. Sankararao (Co-Coordinator)    J. Subba Reddy (Co-ordinator)    Dr. S.Pichi Reddy (Convonor)    Dr. K.Appa Rao (Principal)

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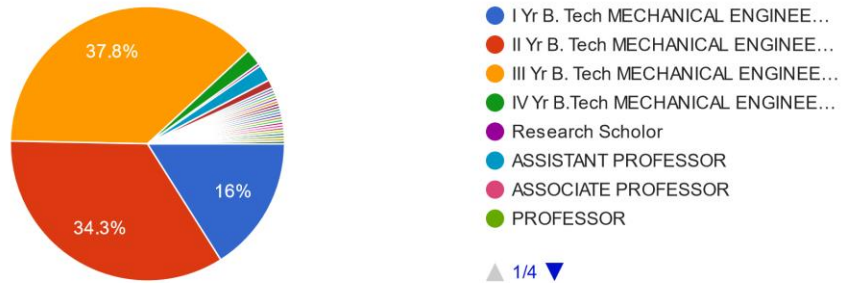
### Feedback / Suggestions:

1. To conduct advanced topics on robotics like robot programming and softwares.
2. To arrange virtual tour to robotics industries.

**Feedback Report:** The student participants gave their feedback on the three day online workshop and the responses were shown in the form of graph given below.

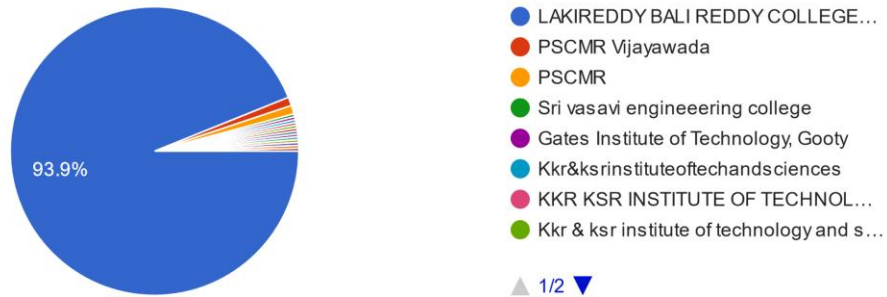
### Participants Details

Yr of Studying / Designation  
312 responses



### Participants from different organizations

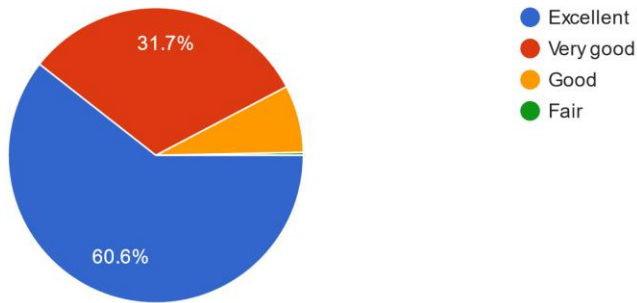
Name of the Organization /College/University with the name of Village/Town/City  
312 responses



## Feedback from the participants:

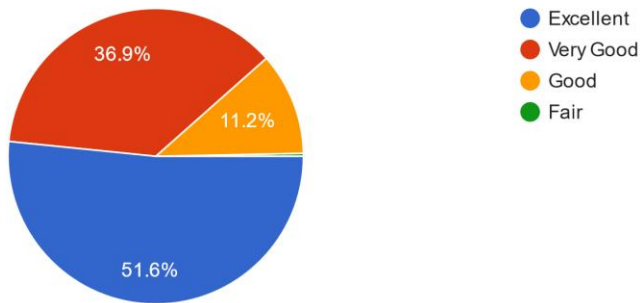
### 1. How were the Sessions?

312 responses



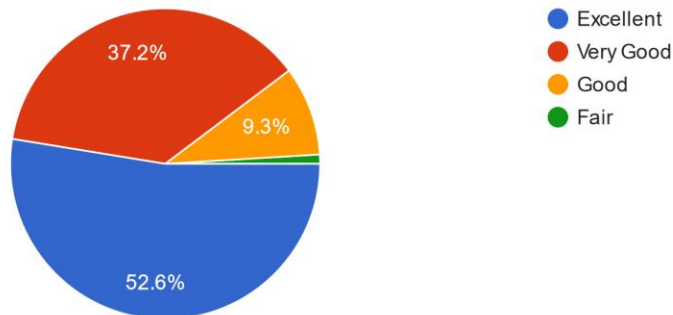
### 2. How were the presentations and interaction with the speaker?

312 responses



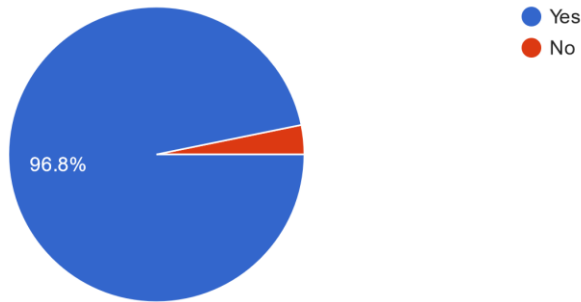
### 3. How would you rate the overall learning experience?

312 responses



4. Do you wish to learn in more innovative sessions on Robotics (We will plan another session based on your feedback)

312 responses



5. Any other Comments/Suggestions?

312 responses

Improve the vizualization skills on videos

Like we want offline classes

Thank you for giving valuable information

Please conduct more class

Better

Good sessions

Excellent

It is nice experience and great learning

Teaching is excellent

<b>Mr. V. Venkatrami Reddy</b>	<b>Mr. V. Sankararao</b>	<b>Mr. J. Subba Reddy</b>	<b>Dr. S.Pichi Reddy</b>
<b>(Co-Coordinator)</b>	<b>(Co-Coordinator)</b>	<b>(Coordinator)</b>	<b>(Convenor)</b>

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