

Winter Training on Advanced Robotics

Greetings for the day!

This document gives detailed information about the training and workshop program by RoboImagine. The content and structure of the training is prepared by the most experienced technocrats in RoboImagine. Below are some *unique features of this training program*.

- **Industry/Job oriented training:** The content is very close to what industries demand these days.
- **Exposure to advanced robotics:** Training covers the engineering behind some of the most advanced robots developed in the world and what it takes to build them.
- **Collaboration for students' final year projects:** Selected students may carry on their final year projects with the company.
- **Most interactive hardware and software tools:** Most of the hardware used in the training is from Arduino family which is the most popular among robotics community in the world. There is a vast collection of freely available libraries on internet for this particular hardware.
- **Analytical approach for training:** As per the company's philosophy, we emphasize upon the in-depth engineering analysis part. We believe that physical and practical analysis of the results is even more important than just getting the results.

**Thanks and Regards,
Technical Consultancy Dept.**



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Schedule of 15 days Winter Training on Advanced Robotics

A. First Day – Introduction to Robotics

1. **1st session: *Interaction session***
 - Thorough discussion on the training content and its plan of progression
2. **2nd session: *Basics of Robotics***
 - Categories and classification of robots
 - Usages and applications of robots in industries
3. **3rd session: *Building blocks of Robotics***
 - Sensors(e.g. Infrared, Temperature, Pressure, Gyroscope), Actuators (e.g. DC, AC Servo, Stepper), Motor drivers (e.g. , L293D, L298, and industrial motor driver like Sabertooth), Transducers, Batteries (e.g. Regular and Intelligent), Controllers (Atmel, PIC, Galil, Texas Instruments)

B. Second and Third Day – Embedded Systems

4. **4th session: *Microprocessors and Microcontrollers***
 - Detailed study on Microprocessors and Microcontrollers
 - In-depth study of Architecture and functionalities of Microcontrollers
 - Correlation between Microcontrollers and Industrial Controllers
5. **5th session: *Microcontroller Interfaces, operations and Programming***
 - Atmel Atmega 328P in details with programming examples

C. Fourth and Fifth Day– Hardware Hands-On (Arduino)

6. **6th session: *Sensors and Actuators interfaces and Controls***
 - Pulse Width Modulation (PWM) generation using delays and timers
 - Position control of a servo motor and stepper motor using PWM
 - Speed control of a DC motor using PWM
 - Sensors Interface
 - DC motor open loop control using infrared sensor command

D. Sixth and Seventh Day – Advanced Robots Demonstrations

7. **7th session: *Demonstrations_1***
 - Proportional-Integral-Derivative (PID) Controls implemented on a Line-following Robot, Self-Balancing Robot, Segway
 - Practical demonstration of MPU6050 Gyroscope chip used in RC Aircrafts, Mobile phones, Segway

8. 8th session: *Demonstrations_2*

- Self-Balancing Robot (A two wheeled, Self-Balancing Robot (SBR))
- Serial Robotic Arm, its design challenges and industrial usage
- Introduction to Microsoft Kinect (Video demonstration), Gestures reader
- Quadcopter and its functionalities

E. Eighth to Fourteenth Day (7days) – Building of a Robotics Project

9. 9th session: *Robot development based on last 7 days training followed by a competition. Examples of some of the options in projects are as follows.*

- PID controls based project
- Automated Guided Vehicle
- Robot commanded by gestures
- Other projects based on intelligent modules

10. 10th session: *Wireless modules*

- Xbee, Zigbee
- HC-05, X-CTU Software

F. Fifteenth Day– Kinematics and Dynamics and their Control Techniques

11. 11thsession: *Kinematics*

- Forward Kinematics
- Inverse Kinematics
- Industrial Robot example on Kinematics

12. 12thsession: *Dynamics*

- Forward Dynamics
- Inverse Dynamics
- Industrial Robot example on Dynamics

13. 13th session: *Controls Schemes*

- Position, Velocity and Torque Control

Information on fees and Registration Dates:

We charge Rs. 5000 /- per student. (For a batch of 5 students or lesser)

Last Date of registration is: 1st Dec, 2015

(1000/- Rs are to be paid in advance as a confirmation of registration. Rest, Rs. 4000/- has to be paid at commencement of the training.)

Payment can be made by

- 1. By Cheque
In favor of "ROBOIMAGINE TECHNOLOGIES LLP"*
- 2. By Online Transfer
To: ROBOIMAGINE TECHNOLOGIES LLP
Account number: 914020018746884,
Branch: Baiyanpur, Sonipat, Haryana,
IFSC Code: UTIB0001992*
- 3. Or by Cash or DD in Hand*

Each student will get certification of participation on successful completion of the training.