



GOVERNMENT OF TAMILNADU

DIRECTORATE OF TECHNICAL EDUCATION, CHENNAI-25

STATE PROJECT COORDINATION UNIT

(Established under Canada India Institutional Cooperation Project)

CURRICULUM

Course Name	BUILDING ARDUINO ROBOTS
Course Code	EC/2020/012
Course Duration	40 Hours
Minimum Eligibility Criteria	8 th /10 th /+2/ITI/Diploma/Graduate
Pre-requisites (if any)	-
Course Objectives	Training module has been designed for the participants to - Understand the Arduino Software and Its features. - Learn the Concept of Robot Motor control - Practice on Interfacing IR sensors with Arduino - Practice on Assembling of Arduino based Robot using Chase, Arduino controller and sensors.
Course Outcomes	At the end of training, the trainees will be able to - Explain the overview of Arduino Software - Write Arduino program for Motion control of Robot - Interface IR sensor with Arduino controller - Perform assembling of Robot and operate it as per the requirement
Expected Job Roles	Arduino Project Designer

TEACHING AND SCHEME OF EXAMINATION

Course Code	Course Name	Hours		Assessment Marks		Duration of Examination
				Min	Max	
EC/2020/012	BUILDING ARDUINO ROBOTS	Theory	16	10	20	3 Hours
		Practical	24	40	80	
		Total	40	50	100	

DETAILED SYLLABUS

Unit No	Modules	No.of.Hours	
		Theory	Practical
I	Understanding Arduino Software	10 Hours	
1.1	Basics of Electricity, Overview of Basic Electronics Components	07	03
1.2	Overview of Arduino Board, Installation of Arduino IDE, Overview of Arduino IDE		
1.3	Programming concept, Program formatting and Syntax, Getting started with setup() and loop(), Initializing variables		
1.4	Develop Arduino sketch for LED blink		
1.5	Develop Arduino sketch to read the status of switch, Writing conditional statements		
1.6	Working with loops, Serial communication		
1.7	Using Arduino Libraries, Common coding errors		
II	Understanding the basics of Motor control	15 Hours	
2.1	Basic concept of DC Motor, Servo Motor and Stepper – Motor Driver	05	10
2.2	Practical:Turing ON a Motor with a switch		
2.3	PWM Technique - Controlling the speed of a Motor with a Potentiometer		
2.4	Practical:Controlling Multiple Motor with the Arduino		
2.5	Practical:Controlling speed and Direction of Motor		
2.6	Practical:Controlling Motors with Serial communications		
III	Practical:Assembling Robot	15 Hours	
3.1	Line following Robot	04	11
3.2	Obstacle avoiding Robot		
3.3	Fire Fighting Robot		
3.4	Develop Robot for custom applications		
Total theory / Practical Hours		16	24
Total hours		40	

HARDWARE REQUIREMENT

S.NO	LIST OF TOOLS /EQUIPMENTS
1	Arduino Board
2	DC Motor and Drivers
3	IR Sensors, Ultrasonic Sensor
4	Robot Chase and Wheels
5	Battery and Connecting Leads

SOFTWARE REQUIREMENT

S.NO	LIST OF SOFTWARE
1	Arduino IDE

REFERENCE BOOKS

S.NO	NAME OF THE BOOK	AUTHOR	PUBLISHER
1	Industrial Robotics	Mikell P Groover, Mitchel Weiss, Roger N Nagel, Nicholas G Odrey, Ashish Dutta	Tata McGraw-Hill Education.
2	Robotics programming	Danny staple	Packt Publishing Ltd.
3	Foundations of Robotics	Yoshikawa	The MIT Press
4	Introduction to Robotics	S K –Saha	McGRAW-HILL
5	Arduino cook Book	Micheel Margolis	"O'Reilly Media, Inc.

ASSESSMENT AND CERTIFICATION

S.No	Criteria for assessment
1.	A trainee will be assessed based on the performance in End Examination for Theory and Practical conducted internally in the CIICP Project Polytechnic College for a duration of 3 hours
2.	A trainee must have 75% of attendance to appear for End examination in Theory and Practical.
3.	The assessment for theory part will be based on the marks scored in the end examination on the knowledge bank of questions (1 word/objective type questions)
4.	The assessment for practical part will be based on the marks scored in the end examination conducted by the CIICP Project Polytechnic and assessed by the Examiners approved by Strategic Plan Implementation Committee (SPIC) of the project polytechnic.
5.	The passing criteria for successful completion of training is every trainee should score 50% of marks in theory and practical examination.
6.	On successful completion of training, certificate will be issued to the participants by the Directorate of Technical Education through the Project Polytechnics.

END EXAMINATION

ALLOCATION OF MARKS

S.NO	Description	Max. Marks
1.	Theory Examination	20
2.	Practical Examination	
	a)Objective and Program	20
	b)Procedure and Connections / Execution	20
	c)Result and Viva	20
	d)Record	20
Total Marks		100

THEORY MODEL QUESTION PAPER

EC/2020/012 – BUILDING ARDUINO ROBOTICS

(Maximum Marks: 20)

(N.B: Answer any **Twenty** questions)

20x1= 20 Marks

1. Expand: PWM
2. Which technique is used to control the speed of DC Motor in Arduino?
3. What is necessity of Motor Driver Circuit?
4. Develop Arduino sketch to blink LED for 1 sec.
5. What is the use of TX and RX pin in Arduino?
6. What is the use of Encoder in Robot?
7. Which command is called repetitively over and over again as long as the Arduino has power?
8. Why is a resistor important to interface LED with Arduino?
9. A resistor with color bands: orange, orange, brown, gold is how many ohms?
10. State True or False. A potentiometer is also known as a Variable Resistor.
11. What is the correct polarity of LED connection?
12. Which function is used to configure the digital I/Os in Arduino IDE?
13. What is int?
14. What is the function of digitalWrite()??
15. How is Arduino powered?
16. What is a robot?
17. Why a robot used?
18. What are the components of a robot?
19. What are various types of sensors used in the robotics?
20. What is meant by Line following Robot?
21. What is the use of Infrared sensor in Line following Robot?
22. What is meant by Obstacle avoiding Robot?
23. What is meant by Fire Fighting Robot?
24. What is Servo controlled robot?
25. Name of the industry which highly used the robots?