



**Name of the course: PCB design, Embedded system interfacing with Arduino and robotics**

**Course code: ECV004**

**Course duration: 33 hrs**

**Academic year: 2021-22**

**Coorinator: Ms.Surekha/A.Parimala**

**ECV004- PCB DESIGN EMBEDDED SYSTEM INTERFACING WITH ARDUINO AND ROBOTICS SYLLABUS**

**Course Objective:**

- To learn the basic structure of embedded systems.
- To understand the basic concept of Robotics with Arduino IDE
- To apply the PCB fabrication process.
- To be familiar with embedded computing platform design and analysis
- To design a system, component or process to meet desired needs within realistic constraints.

**UNIT – I INTRODUCTION 3 T + 3 P**

Introduction – Embedded system – Microcontroller/Microprocessor - Types – Pin Details - Difference – Real time Application. Arduino Introduction – Atmega32 Microcontroller – Arduino Pin Details – Specification of Arduino Prototypes – Types – Interface with computer. Installation of Arduino IDE – Configuration Setting – Testing Arduino Board – Working With Arduino IDE - Explanation of Structure, Functions, Variables, Data Types – Sample Program.

**UNIT – II INTRODUCTION TO ARDUINO 3 T+ 3 P**

Installation of Proteus 7 IDE – Working With Proteus ISIS Circuit Simulator – Draw Sample Circuit – Run Simulation. Blinking LED and IR module Program, Button Program, Loop Program, Analog Input Program, Physical Pixel Program, Buzzer Program, RGB LED Program, Phototransistor Program, Proteus Simulation of Servo Motor using Arduino, Motor Driver Program, Proteus Simulation of Serial Communication Using Arduino, Relay Driver and Debounce Program, Fading and Temperature sensor Program – Explanation – Upload to Arduino Board – Testing Output.

**UNIT – III ADVANCE PROGRAMMING IN ARDUINO 3 T+ 3 P**

7-segment Display and Knock Program, Boolean and Humidity Program, Battery tester and Photo cell Program, Pot Control Motor Speed Program, Knight Rider Program, Home Automation Program – Explanation – Upload to Arduino Board – Testing Output – Proteus General Simulation.

**UNIT – IV PCB DESIGN 3T+**

**3P**

Proteus 7 IDE – Working With Proteus ARES PCB Design – Draw Sample Layout – Routing – DRC Check – Output View as 3D Image. PCB fabrication.

**UNIT – V****ROBOTICS****3T+ 3 P**

Assemble Robotic Parts – Circuit Construction for Line Follower Robot and Obstacles Avoider Robot, Circuit Construction for Light Seeking Robot and TV Remote Control Robot, Circuit Construction for Bluetooth control Robot and RF Control Robot – Testing Robots.

Total Hours (15 Theory + 15 Practical) : 30 hrs.

Course Outcomes

- Understanding of Embedded system, programming.
- Analyze Programming concepts of Arduino Microcontroller with various interfaces like memory & I/O devices.
- Apply the PCB Design and fabrication concepts.
- Design the robot using microcontroller for various applications.

**Text Book:**

1. Marilyn Wolf, “Computers as Components - Principles of Embedded Computing System Design”, Third Edition, Morgan Kaufmann Publisher. ISBN: 9780123884428, 2012.

**Reference Book:**

1. Simon Monk, Duncan Amos, “Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards”, 2nd Edition, Kindle Edition, McGraw-Hill Education, ISBN-13: 978-1260019193, ISBN-10: 1260019195.
2. Michael McRoberts, Beginning Arduino, Technology in action publications.
3. Simon, D.E., An Embedded Software Primer, Dorling Kindersley, 2005.
4. K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, Dream Tech Press, 2005.

**External/Internal Trainers Details**

S.No	Name of the Trainer	Designation	Company
1	Mr.Sandeep Agashe	Product Trainer	Embedded Automation Anywhere
2	Ms.Parimala	Assistant Professor	Jeppiaar Institute of Technology
3	Ms.Surekha	Assistant Professor	Jeppiaar Institute of Technology

### COURSE DELIVERY

<b>S.NO</b>	<b>SESSION-1 PLAN 3.00 PM -4.00 PM</b>	<b>SESSION- 2 PLAN 4.00-5.00 PM</b>	<b>HOURS</b>
<b>1</b>	Introduction , Embedded system	Introduction- Microprocessor/- Microcontroller	2 Hours
<b>2</b>	Real time Application. Arduino Introduction	Atmega32 Microcontroller – Arduino	2 Hours
<b>3</b>	Specification of Arduino Prototypes – Types	<b>Applications of Process Automation</b>	2 Hours
<b>4</b>	Installation of Arduino IDE	Configuration Setting – Testing Arduino Board – Working With Arduino	2 Hours
<b>5</b>	IDE - Explanation of Structure,	Buzzer Program, RGB LED Program, Phototransistor Program	2 Hours
<b>6</b>	Proteus Simulation of Servo Motor using Arduino	Motor Driver Program, Proteus Simulation of Serial Communication Using Arduino,	2 Hours
<b>7</b>	7-segment Display and Knock Program, Motor Speed Program,– Explanation –	Boolean and Humidity Program, Battery tester and Photo cell Program, Pot Control	2 Hours
<b>8</b>	Knight Rider Program, Home Automation Program	Upload to Arduino Board – Testing Output	2 Hours
<b>9</b>	Proteus 7 IDE – Working With Proteus ARES PCB Design	Draw Sample Layout – Routing	2 Hours
<b>10</b>	DRC Check – Output View as 3D Image	PCB fabrication	2 Hours
<b>11</b>	Assemble Robotic Parts	Circuit Construction	2 Hours
<b>12</b>	Obstacles Avoider Robot,	Line Follower Robot and and TV Remote	2 Hours
<b>13</b>	and RF Control Robot	Light Seeking Robot	2 Hours
<b>14</b>	Circuit Construction for	Bluetooth control Robot	2 Hours
<b>15</b>	Control Robot,	Testing Robots	5 Hours

## ENROLLED LIST OF STUDENTS

DEPARTMENT OF ELECTRONICS AND COMMUNICATION  
ENGINEERING

SL.NO	REGISTER NUMBER	NAME OF THE STUDENT
1	210620106002	ADHIYAMAAN. N.S
2	210620106003	ADLIN JENCY .A
3	210620106004	AJAY .A.V
4	210620106007	ALVIN BASIL .A
5	210620106008	ANTONY PAUL SHABIN.E
6	210620106010	ASHWIN .MD
7	210620106012	BHARATH .A
8	210620106013	BINOLIN REX .J
9	210620106014	BOOMIKA.EM
10	210620106015	DERLIN HYGES.S
11	210620106017	Don Paul
12	210620106019	GOKULNATH .V
13	210620106020	GOWTHAM.P
14	210620106021	GUGAN.R
15	210620106022	HARI PRASANTH .K
16	210620106024	HEMAPRIYA .R
17	210620106025	ILLAKIYA .A
18	210620106026	JACSON J.C
19	210620106027	JENIFER MARY
20	210620106028	JINU BINOSHINI .R
21	210620106029	JOLAMALINI .S
22	210620106031	KARTHIK .K
23	210620106033	KEERTHI.M
24	210620106034	LAKSHMI PRASANNA .S
25	210620106037	LIBIN RAJ.D.S
26	210620106038	MANI RANJAN
27	210620106039	MELVIN DANI PREETHI .D
28	210620106041	NANDHITHA .K
29	210620106044	NICKALSON SAJAKE .X
30	210620106045	RAHUL RAKESH .J
31	210620106046	RAJAJI.D(CBSE)
32	210620106047	RAYNNA .J.S
33	210620106049	RICHARD FREDRICK .J
34	210620106050	RUAMINIE.H
35	210620106051	SAHAYA ROSY PRIYA .J
36	210620106052	SAMYUKTHA .L
37	210620106053	SANDEEP.S
38	210620106054	SANDHIYA .T
39	210620106055	SANDHYA .R

40	210620106056	SESHADRI .S.D
41	210620106057	SINDHUJA .T
42	210620106058	SIVARAMAN .G
43	210620106061	SREEVARI.A.S
44	210620106062	SUBASH
45	210620106063	SURESH KUMAR .S
46	210620106064	SWETHAA .P.B
47	210620106065	TWIGHT PAUL .P

### **SUMMARY REPORT**

Department of Electronics and Communication Engineering has organized Anna University Approved value added course on “PCB DESIGN, EMBEDDED SYSTEM INTERFACING WITH ARDUINO &ROBOTICS” from 03.09.2021 to 17.12.2021 in online mode through Microsoft Teams Platform for all third year and second year students for a duration of 30 Hrs. Total of 47 students enrolled in the course. Evaluation process is carried out through internal assessment and the same was reported to the Anna University. The students were graded based on the internal assessment and all the enrolled students completed the course successfully. The course has provided sufficient training for individuals to develop their interpersonal skills and knowledge for creating innovative projects. The training covers effective teaching learning process to enhance their level of understanding in Arduino board and PCB design. The students have gained sufficient potential to create new projects thereby improving the knowledge on embedded system as well as enhancing their interpersonal skills.

#### Course Outcomes

- Understanding of Embedded system, programming.
- Analyze Programming concepts of Arduino Microcontroller with various interfaces like memory & I/O devices.
- Apply the PCB Design and fabrication concepts.
- Design the robot using microcontroller for various applications.