Report on

"Task based Hands-on Workshop on Embedded Systems using Firebird V Robot"

Resource Persons:

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Workshop Dates

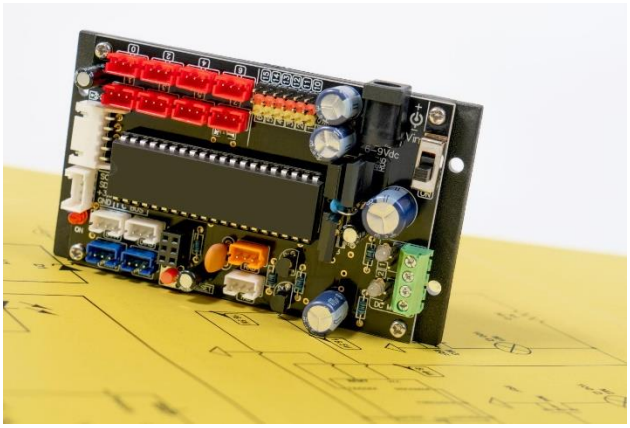
- **4A-6/3/26, 13/3/26, 10/4/26,24/4/26, 8/5/26**
- **4B-5/3/26, 12/3/26, 9/4/26, 16/4/26, 30/4/26, 7/5/26, 14/5/26**

Introduction to Robotics

A comprehensive workshop titled **"Task based Hands-on Workshop on Embedded Systems using Firebird V Robot"** was successfully organized and conducted on the above mentioned dates. The workshop was strategically divided into three core phases to give students a holistic hands-on experience:Robotics is an interdisciplinary field that combines **mechanical engineering**, **electrical engineering**, **computer science**, and **artificial intelligence** to design, build, and operate robots.A **robot** is a machine capable of sensing its environment, processing information, and performing actions automatically or semi-autonomously.

Major Building Blocks of Robot

A robot is typically composed of several essential building blocks that enable it to sense, process, and interact with its environment



Introduction to FireBird ATmega-2560 Platform

The ATmega2560 microcontroller serves as the central processing unit of the robot. It receives data from various sensors, processes the information, and generates control signals for the motor driver. The motor driver interfaces the controller with the DC motors, enabling movement of the robot. The LCD module provides real-time status information, while the wireless communication module facilitates remote monitoring and control. A regulated power supply powers all subsystems of the robot

I/O on ATmega2560 and Buzzer Interfacing

Input/Output (I/O) on ATmega2560

The **ATmega2560** is an 8-bit AVR microcontroller with a large number of programmable Input/Output (I/O) pins. These pins can be configured either as **inputs** to receive signals from sensors and switches or as **outputs** to control devices such as LEDs, motors, and buzzers.

Features of I/O Ports

- 54 Digital I/O pins (15 PWM outputs)
- 16 Analog Input pins
- Operates at 5 V logic level
- Programmable as input or output through software
- Internal pull-up resistors available for input pins

I/O Configuration

- **Input Mode:** Reads signals from sensors, push buttons, and switches.
- **Output Mode:** Sends signals to actuators such as LEDs, relays, and buzzers.

Interfacing motors with constant velocity

In robotic applications, motors are often required to run at a **constant velocity** to ensure smooth and accurate movement. The **ATmega2560** controls motor speed using **Pulse Width Modulation (PWM)** signals through a motor driver such as L293D or L298N. By maintaining a fixed PWM duty cycle, the motor can operate at an approximately constant speed.

LCD Interfacing

Hardware Description of HD44780 16×2 Alphanumeric LCD

The HD44780 is a widely used LCD controller for alphanumeric displays. A 16×2 LCD can display 16 characters per line and consists of two display rows. The controller provides an easy interface with microcontrollers through command and data registers.

Features

- 16 characters × 2 lines display
- Built-in HD44780 controller
- 5 V operating voltage
- Supports 4-bit and 8-bit communication modes
- Cursor and display control functions

Using LCD as output device for Firebird V

The Firebird V robot is equipped with a **16×2 alphanumeric LCD module** based on the HD44780 controller. The LCD serves as an output device that enables the robot to communicate information directly to the user. It is interfaced with the ATmega2560 microcontroller and can display characters, numbers, symbols, and status messages..

Use the LCD to display a message using boot switch

The boot switch on the Firebird V robot acts as a digital input device. The ATmega2560 microcontroller continuously monitors the state of the boot switch. When the switch is pressed, the microcontroller executes the corresponding instruction and sends a predefined message to the LCD for display.

Visuals of the Workshop


GPS Map Camera
Agara, Karnataka, India
Jyothy Institute Of Technology, Jyothy Institute Of Technology, Agara, Karnataka 560082, India
Lat 12.840608° Long 77.511792°
Thursday, 14/05/2026 02:28 PM GMT +05:30
Google


GPS Map Camera
Thathaguni, Karnataka, India
34, Ciirc, Jyothy Institute Of Technology, Campus, Thathaguni, Karnataka 560082, India
Lat 12.840605° Long 77.511775°
Thursday, 07/05/2026 04:04 PM GMT +05:30
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