Grace Tech Solutions

Training | Development | Placement

Advance Embedded System

LEVEL 1-BASIC ELECTRONICS

- Resistors, Capacitors, Inductors
- Diodes, Transistors
- Thyristor, SCR
- TRIAC, BJT, MOSFET
- Switches, Relays
- Crystals
- Voltage Regulators, Filters
- LCD, 7-Segment Displays
- Bread-board, ICs (Digital, Analog, µP/µC etc.)
- Soldering Components etc.

PROJECT UNDERTAKEN BASED ON THIS

- Fixed DC Power Supply
- Positive DC Power Supply
- Negative DC Power Supply
- Variable DC Power supply
- Transistor as switch (NPN & PNP)
- Transistor Application as Relay Driver (Darlington Pair)
- Transistor Application as Voltage Level-Shifter
- Dark/Light Activated Relay Operation
- DC Motor driving

Level-2: Digital Electronics

- TTL, CMOS
- Logic gates
- Mix, Demux
- Decoder, Encode
- Flip/Flops
- Shift Register
- Counter, Timer
- Buffers, Drivers

**PROJECT UNDERTAKEN BASED ON THIS

- Verification of Truth table of Digital Gates (NAND, X-OR etc.)
- Flip-Flops(R-S, J-K etc.)
- 555 Timers
- Astable Mode
- Bistable Mode
- Monostable Mode
- Counters (Binary/Decade)
- Display Drivers/Decoders
- Multiplexers (MUX)
- Demultiplexers (DEMUX)

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Level-3: Analog Electronics:

- Op amps
- Instrumentation Amplifier
- AC Amplifier
- V-I/I-V Converter
- Sample & Hold Circuit
- Log & Antilog Amplifiers
- Multiplier & Divider
- Differentiator
- Integrator
- Comparator
- D/A, A/D etc.

**PROJECT UNDERTAKEN BASED ON THIS

- Amplifier
- Summing Amplifier
- Subtracting Amplifier

programming with Data Structure

Introduction to 'C'

- Objectives of C Applications of C
- Relational and logical operators'
- Bit wise operators
- The assignment statement
- Intermixing of data types
- Type conversion
- Cast Operator
- Multiple assignment
- Type definitions
- Input/Output Routines

OPERATORS & EXPRESSIONS

- Arithmetic operators
- Relational Operators
- Logical operators
- Increment and decrement operators
- Bitwise Operators
- Assignment operators
- Conditional Operators
- Special Operators
- Operator Precedence
- Operator Associativity

CONTROL STRUCTURES: BRANCHING

- Decision making with 'if statement'
- If....else statement
- Nested if .....else statement
- Else ....if ladder
- Switch statement
- Goto statement
- The?: Operator

CONTROL STRUCTURES LOOPING

- The While statement
- Do statement
- For statement
- Jumps in Loop

ARRAYS & STRINGS

- Declaration of an Array
- Initialization of Arrays
- Types of Arrays
- 1D, 2D, Multi D

- Compile Time Arrays and Runtime Arrays
- Limitations of an Array
- Declaration of Strings
- Initialization of Strings
- Operations performed on String
- String Handling Functions
- 2-D Strings

HANDLING POINTERS

- Understanding basics of Pointers
- Rules for Pointers
- Pointer Declaration
- Accessing a Variable through its Pointer
- Pointers and Arrays

FUNCTIONS

- Why Functions
- Types of Functions
- A Multi Functional Program
- Return Values & their types
- Call By Value and Call By Reference
- Arguments & Return Types
- Nesting of Functions
- Recursion

Scope / Visibility of Variables

- Auto Storage Class
- Register Storage Class
- Static Storage Class
- Extern Storage Class

STRUCTURES & UNIONS

- Defining a Structure
- Why a Structure is used?
- Structure Initialization
- Arrays With in Structures
- Arrays Of Structures
- Structures within Structures
- Passing structures to Functions
- Unions & its properties
- Access Union Member

POINTERS

- Pointers and Addresses
- Initialization Of Pointers
- Pointer to Pointer
- Pointer Expressions
- Pointer Increments and Scale factors

  Pointers and Arrays
- Pointers and Strings
- Arrays of Pointers in Strings
- Pointers as Function Arguments
- Function returning Pointers
- Null Pointers in C

DYNAMIC MEMORY ALLOCATION

- malloc
- calloc
- realloc
- free

FILE HANDLING IN C

- What is a File?
- File Structure
- Defining & Opening a File
- Input/Output Operations on Files

AVR MICROCONTROLLER

- Assembly Language for AVR Microcontrollers
- AVR Architecture
- Block diagram
- I/O Details
- Embedded C Language for AVR Microcontrollers
- AVR Microcontroller Analog Comparator
- AVR Microcontroller AD Converter
- AVR Microcontroller Interrupt Sub-system
- AVR Microcontroller Timer/Counter
- AVR Microcontroller Serial USART
- AVR Microcontroller Serial UART
- AVR Microcontroller Interfacing
- AVR Microcontroller Projects
- Sensors Interfacing
- Embedded development tools

Assembler
Interpreter
Compiler Simulator

ARM MICROCONTROLLER

- ARM Architecture
- Introduction to ARM Architecture
- Block Diagram Functional Diagram
- AMBA bus architecture
- Register and memory of ARM7TDMI
- ARM Register Set
- Modes in ARM Exception entry and return from different modes
- 32 bit CPU registers
- ARM Instruction Set's
- PIN Control Block
- GPIO register and peripheral register
- Interfacing of switches & keyboard matı
- Real world interfacing – MOT ORS
- Types of sensors
- Linux basics and commands
- Real time clock
- Pulse width modulation
- LCD Interfacing
- Other communication protocols

RASPBERRY PI

- ARM Architecture / Microprocessor
- RAM 1GB
- 128 GB SD card
- GPIO pins

What you will need

Hardware

- A Raspberry Pi computer with an SD car
- A monitor with a cable (and, if needed, an HDMI adaptor)
- A USB keyboard and mouse
- A power supply
- Headphones or speakers (optional)
- An ethernet cable (optional)/Wi-Fi inbu

Software

- Raspbian, installed via NOOBS
- Python Programming
- C programming
- Linux flavor

- Raspbian
- Boot time Function/ Real Time System.
- GPIO programmable.

ARDUINO MICROCONTROLLERS

- AVR Microcontroller Serial USART
- AVR Microcontroller Serial UART
- AVR Microcontroller Interfacing
- AVR Microcontroller Projects
- Sensors Interfacing
- I/O Details
- KEYPAD INTERFACING
- SERVO MOTORS INTER FACING
- ROBOTIC CARS
- LCD interfacing
- ULTRASONIC Sensors interfacing
- Soil tester.

External Interfaces Study, Programming and Applications:

- LEDS
- Switches(Momentary type, Toggle type)
- Seven Segment Display: (Normal mode, BCD mode,Internal Multiplexing & External Multiplexing)
- LCD (8bit, 4bit, Busy flag, custom character generation)
- Keypad Matrix

Protocols Study, Programming and Applications :

- I2C (EEPROM and RTC)
- SPI (EEPROM)
- I Wire(Sensor)
- Infrared Communication(RC5 protocol)

Selective Discussion during Project Development

- A/D & D/A Converter
- Stepper Motor, DC Motor
- RF Communcation
- RFID
- CAN
- ZIGBEE
- GSM/GPS
- USB
- MMC & SD
- Ethernet MAC

IOT

- Architecture of Internet of Things
- IoT components, devices, hardware and software requirements
- Various layers of IoT infrastructure
- IoT embedded systems and micro-controllers
- Working with Big Data and deploying Dat Analytics
- Arduino and Raspberry Pi interface for Io
- USB, HDMI and Ethernet protocols of IoT communication
- Controlling physical IoT devices like switches, motors and sensors
- Programming for IoT components and systems

- IoT support, security, testing, compliance and data management

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