

Course Structure- Overview

Basic of Device Electronics	Basics of Digital Electronics	Basics of C
<ul style="list-style-type: none"> • Resistors, Capacitors, Inductors. • PN-Junction. • Diodes. • Transistor. • MOSFET/CMOS. • Interpretation Data Sheet. • Half-Wave Rectifiers/ Full-Wave Rectifier. • Power Supply 3.3V,5.0V,12.0V, Voltage regulators. • Crystals • Switches, Relays. • 7-Segment • 555 Timers in AS/MS/BS 	<ul style="list-style-type: none"> • Number System – Binary, Hex, Decimal, BCD System. • Addition/Subtraction of binary, 2's complements. • Interconversion of number system. • Logic Gates – AND/OR/NOR/EXOR. • Flip-flop, Memory element. • Mux- De-Mux, Decoders. • Shift Registers. • Counters. 	<ul style="list-style-type: none"> • Getting Started • Scope of Variables • Control flow Constructs • The C Pre-processor • More ON Functions • Bit Manipulation • Strings & Arrays • Pointers • Structures • Unions

Basic of Embedded Systems	Advanced C	Advanced Embedded Systems
<ul style="list-style-type: none"> • Microprocessor Basic Concepts and Review • Microcontroller Basic Concepts and Review • Embedded C & Integrated Development Environment • Introducing ARM Architecture 	<ul style="list-style-type: none"> • Structure and union • Function Pointers • Dynamic memory allocation • File operations • String operations 	<ul style="list-style-type: none"> • Introduction • Overview of Architecture of 8051 • Low-level Programming Concepts • Middle Level Programming Concepts • On-Chip Peripherals • External Interfaces • Protocols • Keil's RTX51 Tiny / Pumpkin's Salvo • Selective Discussion during Project Development

Tools Including S/W and H/W for Embedded Systems Training	
<p>Multimeter</p> <ul style="list-style-type: none"> • Measuring Voltage/Current/Registers • Measuring continuity • Introducing BBT – Baring Board Test 	<p>Logic Analyzer</p> <ul style="list-style-type: none"> • What is Logic Analyzer • How to use Logic Analyzer • What is the use of a logic analyser? • For which protocol we can use a logic analyser

Course Structure- Detailed

Basics of C

<p>CHAPTER 1: GETTING STARTED</p> <ul style="list-style-type: none"> • What is C? • Data Types • Variables • Naming Conventions for C Variables • Printing and Initializing Variables 	<p>CHAPTER 2: SCOPE OF VARIABLES</p> <ul style="list-style-type: none"> • Block Scope • Function Scope • File Scope • Program Scope • The auto Specifier • The static Specifier • The register Specifier • The extern Specifier • The register Specifier • The extern Specifier
<p>CHAPTER 3: CONTROL FLOW CONSTRUCTS</p> <ul style="list-style-type: none"> • If • if else • while • for • Endless Loops • do while • break and continue • switch • else if 	<p>CHAPTER 4: THE C PREPROCESSOR</p> <ul style="list-style-type: none"> • #define • Macros • #include • Conditional Compilation • #ifdef • #ifndef
<p>CHAPTER 5: MORE ON FUNCTIONS</p> <ul style="list-style-type: none"> • Function Declarations • Function Prototypes • Returning a Value or Not • Arguments and Parameters • Organization of C Source Files • Extended Example 	<p>CHAPTER 6: BIT MANIPULATION</p> <ul style="list-style-type: none"> • Defining the Problem Space • A Programming Example • Bit Wise Operators • Bit Manipulation Functions • Circular Shifts
<p>CHAPTER 7: STRINGS & ARRAY</p> <ul style="list-style-type: none"> • Fundamental Concepts • Aggregate Operations • String Functions • Array Dimensions • An Array as an Argument to a Function • String Arrays • Example Programs 	<p>CHAPTER 8: POINTERS (PART 1)</p> <ul style="list-style-type: none"> • Fundamental Concepts • Pointer Operators and Operations • Changing an Argument with a Function call • Pointer Arithmetic • String Functions with Pointers • Pointer Difference • Prototypes for String Parameters • Relationship Between an Array and a Pointer • The Pointer Notation *p++
<p>CHAPTER 9: STRUCTURES</p> <ul style="list-style-type: none"> • Fundamental Concepts • Describing a Structure • Creating Structures • Operations on Structures • Functions Returning Structures • Passing Structures to Functions • Pointers to Structures • Array of Structures • Functions Returning a Pointer to a Structure • Structure Padding 	<p>CHAPTER 10: UNIONS</p> <ul style="list-style-type: none"> • typedef – New Name for an Existing Type • Bit Fields • Unions • Non-Homogeneous Arrays • Enumerations

Advanced C

CHAPTER 1: STRUCTURES AND UNIONS

- Combination of Structure and union.
- Bit fields in Structure.
- Pointers to structure and union.
- The advantage of Structure and union

CHAPTER 2: FUNCTION POINTERS

- Microcontroller Basic Concepts and Review
- Function pointers.
- Callbacks
- Advantage/use of functions pointers

CHAPTER 3: DYNAMIC MEMORY ALLOCATION

- Malloc
- Calloc
- free
- re-alloc

CHAPTER 4: FILE OPERATIONS

- Opening A file
- Closing a file
- Writing some data in a file and reading back and printing.
- The different mode in which file can be open and write.

CHAPTER 5: STRING OPERATIONS

- Srtcpy
- strcmp
- strcat
- strlen
- strstr

Basics of Embedded Systems

CHAPTER 1: BASICS OF EMBEDED SYSTEMS

- Definition
- Nomenclature
- Buses – Address, Data, and Control
- Architecture
- Interfacing memory & I/O devices
- Programming (Assembly)
- Monitor program

CHAPTER 2: BASICS OF MICROCONTROLLER

- Architecture
- Interfacing memory & I/O devices
- Programming (Assembly)
- Assignments

CHAPTER 3: EMBEDDED C & INTEGRATED DEVELOPMENT

- Embedded C Programming
- Data types
- Pointers
- Arrays
- Pointer functions
- Loops

CHAPTER 4: INTRODUCING ARM ARCHITECTURE

- Induction of ARM Architecture
- ARM7TDMI
- Difference between ARM9/ARM11
- Different ARM concepts
- The advantage of ARM.

Advanced Embedded Systems- Microcontroller Intel 8051

<p>CHAPTER 1: INTRODUCTION</p> <ul style="list-style-type: none"> • Basic Introduction • Microprocessor vs Microcontroller • CISC vs RISC 	<p>CHAPTER 2: OVERVIEW OF 8051 ARCHITECTURE</p> <ul style="list-style-type: none"> • Processor Core and Functional Block Diagram • Description of memory organization • Overview of ALL SFR's and their basic functionality
<p>CHAPTER 3: LOW LEVEL PROGRAMMING CONCEPTS</p> <ul style="list-style-type: none"> • Addressing Modes • Instruction Set and Assembly Language (ALP) • Developing, Building and Debugging ALP's 	<p>CHAPTER 4: MIDDLE LEVEL PROGRAMMING CONCEPTS</p> <ul style="list-style-type: none"> • Cross Compiler • Embedded C Implementation, prog. * Debugging • Differences from ANSII-C • Memory Models • Library reference • Use of #pragma directive • Functions, Parameter passing and return types
<p>CHAPTER 5: ON-CHIP PERIPHERALS</p> <ul style="list-style-type: none"> • Ports: Input/output • Timers & Counters • Interrupts, UART 	<p>CHAPTER 6: EXTERNAL REFERENCES</p> <ul style="list-style-type: none"> • LEDS • Switches (Momentary type, Toggle type) • Seven Segment Display: (Normal mode, BCD mode, • Internal Multiplexing & External Multiplexing) • LCD (4bit, 8bit, Busy Flag, Custom Character Generation) • Keypad Matrix
<p>CHAPTER 7: PROTOCOLS</p> <ul style="list-style-type: none"> • I2C (EEPROM), SPI (EEPROM) 	<p>CHAPTER 8: KELL'S RTX51 TINY/PUMPKIN'S SALVO</p> <ul style="list-style-type: none"> • Overview • Specifications • Single-Tasking Programs • Multi-Tasking Programs • RTX51 Tiny Programs • Theory of Operation • Timer Tick Interrupt • Task Management & Scheduler Events • Round-Robin & Co-operative Task Switching • Idle Task • Stack Management • Function Reference • Porting on to H/W • Implementation Examples
<p>CHAPTER 9: SELECTIVE DISCUSSION DURING PROJECT DEVELOPMENT</p> <ul style="list-style-type: none"> • A/D & D/A Converter • Stepper motor, DC Motor • I2C Protocol (RTC:800583,DS1307 ADC:PCF8591, DS1621) • SPI Protocols (ADC:MCP3001) • IR Communications (Phillips RC5 Protocol) • ZIGBEE, GSM, GPS, USB, MMC & SD • Ethernet MAC, CAN Protocol 	