

Embedded Systems Diploma 9

Reservation

- **Fees:** 1000LE
- **Course Start Day:** Friday 29/1/2016
- **Course Days:** Every Friday and Saturday.
- **Course Time:** 9.00 AM to 2.00 PM
- **Place:** Al-Manyal in front of Salah-eldin mosque, Cairo.
- **Diploma Duration:** 11-12 weeks.
- **For reservation send mail with your name & mobile phone to this mail:**
mtarek.embedded.diploma9@gmail.com
and wait for my reply.

“Please do not send reservation mail unless you are sure that you will attend the diploma courses😊”

Why this diploma?

1. Qualify you to work in any embedded company in Egypt like Mentor Graphics, Valeo, Axxcelera, Atmel, Avelabs and Ejad.
2. Courses contents, projects and assignments are same as ITI.
3. Instructor will provide you with all the required materials, references and videos to master the embedded systems programming.
4. Learn how to write any embedded driver from the hardware specifications and datasheets (You will not use any vendor or readymade libraries).
5. Learn how to divide the SW to several layers (SW Architecture).
6. Learn how to Design, implement, document and test your software.
7. Final project to apply all your gained knowledge in the diploma.

Embedded Systems Programming Diploma Contents (150 Hours)

1. C Programming Revision Course (20 Hours)

- Introduction to C Programming.
- Structured Program Development in C.
- C Data types and Casting.
- Bitwise Operations and Bit manipulation.
- C Arrays.
- C Strings.
- C Pointers.
- C Structures, Unions, bit-fields and Enumerations.
- C Programming Interview tricks 😊

2. Introduction to Embedded Systems (12 Hours)

- Embedded Systems Definition.
- Embedded Systems Characteristics.
- Embedded Systems Applications.
- Embedded Systems Design.
- Embedded HW
- Processing Engines.
- Micro-processor vs. Micro-controller.
- Micro-controller main components.
- Micro-controller other components.
- Embedded Systems Constrains.
- Embedded Systems Market.

3. Computer Architecture (12 Hours)

- Micro-processor architecture and design.
- Memory types and interfaces.

4. Introduction to AVR Microcontrollers (20 hours)

- Introduction to AVR Microcontrollers.
- I/O Ports and interfacing with switch, led, 7-seg and motors.
- External Interrupts.
- Timers in three different modes: Overflow, Compare and PWM.

5. Embedded C Programming (24 Hours)

- Programming Languages for Embedded Systems.
- Embedded C Definition.
- C Compilation Process.
- C Preprocessor Directives.
- Pragmas.
- In-line Assembly (How to write assembly with C code).
- C Variable Scope and Life time.
- C Storage Classes.
- Memory Mapped Registers.
- Static & Dynamic Memory Allocation.
- Microcontroller Memory Segments.
- Modular Programming.
- Software Layered Architecture Design.
- Static and Dynamic Systems Design.
- Embedded Programming Concepts :
 - Startup file and finalizing code.

- Interrupt Handling.
- Call Back Function.
- Synchronous vs. Asynchronous Function.
- Reentrant vs. Non-Reentrant Function.
- Critical Section.
- Software Time Out.
- Embedded Systems Programming Interview tricks.
- Coding Style and Comments.
- Misra C rules for embedded automotive applications.

6. Software Engineering (6 Hours)

- Software Definition.
- Attributes of good software.
- Software Engineering.
- Software Engineering Definition.
- Software Development Life Cycle.
 - Waterfall Model.
 - V-Model.
 - Agile Scrum.
- Software Design Documents.

7. Microcontroller Architecture and Interfacing with AVR Microcontrollers (25 Hours)

- How to interface with keypad and LCD.
- How to interface with DC Motor, Servo Motor and Stepper Motor.
- Analog to digital converter and know how to deal with analog and digital sensors.
- EEPROM.

- Universal Synchronous Asynchronous Receiver Transmitter (USART) and how to interface with PC.
- Serial peripheral Interface (SPI).
- Inter integrated Circuit (I2C) and how to interface with external EEPROM.
- Hardware Labs for all the above points.

8. Automotive Buses Technologies (8 Hours)

- LIN Protocol.
- CAN Protocol.

9. Real Time Operating Systems (20 Hours)

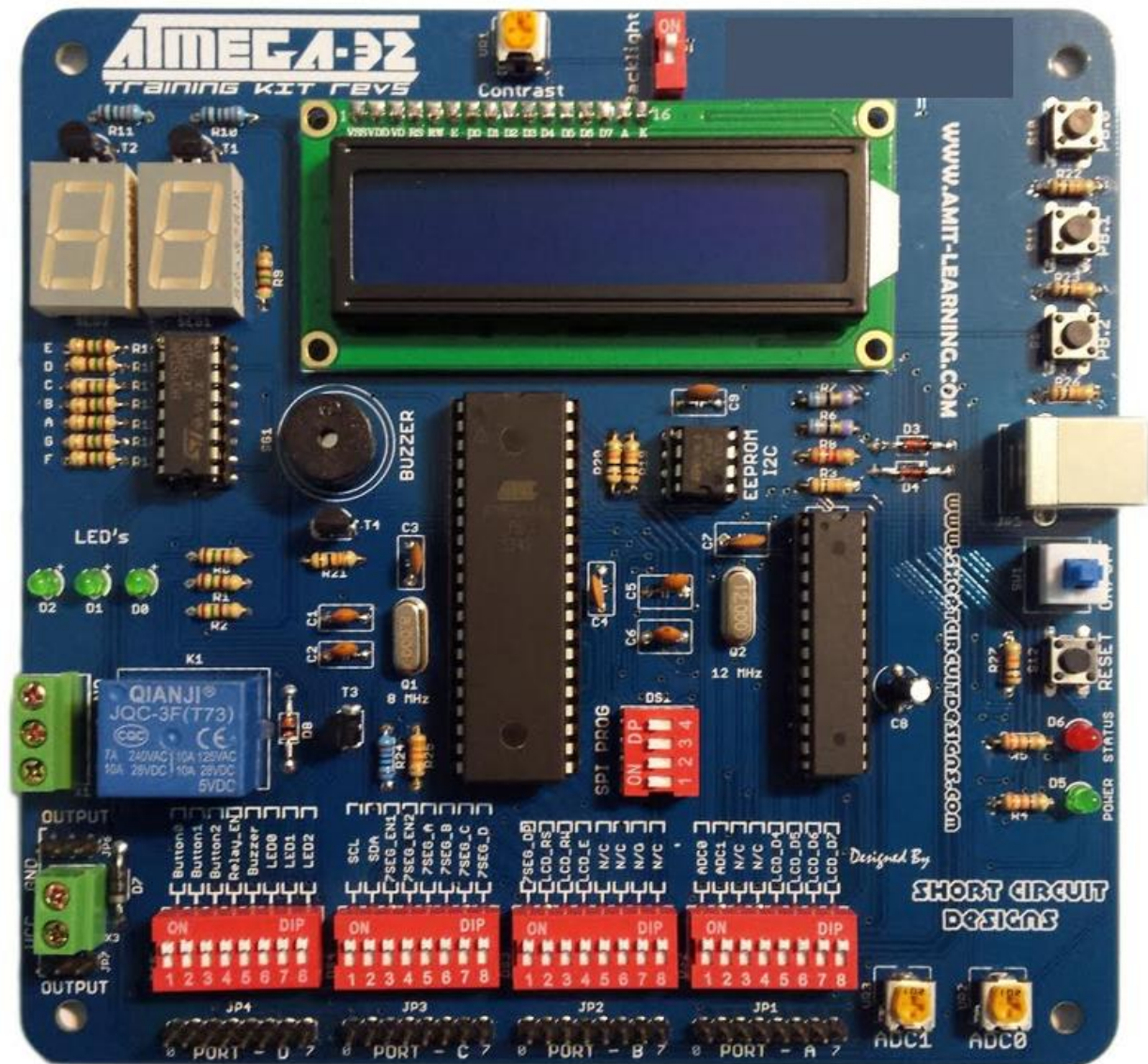
- Introduction to Real Time Systems.
- Introduction to Real Time Operating Systems.
- Real Time Systems Concepts.
- Time Management.
- Memory Management.
- Porting.

10. Embedded Systems Tools (8 Hours):

- How to use Eclipse and external Tool-chains.
- How to build C files using command line interface.
- Git and SVN Software Version Control.

11. Final Project

Hardware Lab Kit



Instructor

Basic Information

- Name: Mohamed Tarek Mahmoud.
- Mobile: 01115154316
- BSc. Communication and Electronics Department Cairo University with grade very good with honor.

Work Experience

- **Embedded Software Engineer** at **Mentor Graphics** Company, from April 2014 till now.
- **Embedded Software Engineer** at **Intel Mobile Communications** Company, from August 2013 till April 2014.
- Embedded Systems **Instructor** for Intake34 2013-2014, Intake35 2014-2015 and Intake36 2015-2016 classes at **Information Technology Institution (ITI)**, Suez Canal Branch.
- Embedded systems **Instructor** at **AMIT-Learning** and **SGEC** Centers from January 2014 till now.

Thanks and Good Luck