**Introduction**
This course is designed for engineering students and professional with specific focus towards the use of MATLAB in hardware applications. Students will practically learn how to connect MATLAB work space and SIMULINK blocksets with an intelligent I/O module comprising of AVR microcontroller, ADC and DAC. Due to ease of programming in MATLAB, students may later develop control applications using MATLAB/SIMULINK. Course material such as presentation slides/ handouts shall be provided.

**Course Details (The contents below covers both theory and Labs/Hands-on practice)**

**PART I (BASICS)**
- Basic introduction, overview of MATLAB/SIMULINK product family and toolboxes.
- MATLAB desktop, variables, arrays, structures, strings, relational and logical operations.
- Control flow, matrix computations, plotting, writing M-files and M-functions.

**PART II (NUMERICAL SOLUTION OF DYNAMICAL SYSTEM FOR EMBEDDED APPLICATIONS)**
- Introduction to MATLAB's control toolbox, basic analysis commands for an LTI system.
- Techniques of implementing a dynamical system, for example, a PID controller in an embedded system.
- Implementation code of first, second and higher order LTI system for embedded targets.

**PART III (SIMULINK)**
- SIMULINK family overview, simulation parameters and basic environment.
- Simulation of a closed loop control system in SIMULINK.

**PART IV (HARDWARE INTERFACING WITH 89C51 BASED INTELLIGENT MODULE)**
- Serial Port/Parallel port overview, pin assignments, data format.
- Creating serial port objects in MATLAB, setting communication configuration.
- Serial port interfacing between PC (running MATLAB) and the AVR microcontroller.
- Parallel port interfacing between PC (running MATLAB/SIMULINK) and the AVR microcontroller.

**PART V (TEMPERATURE MONITORING AND CONTROL)**
- Implementing MATLAB-AVR microcontroller based temperature monitoring and control system.

**PART VI (DC MOTOR SPEED CONTROL)**
- Implementing DC motor speed control with PWM signals generated from MATLAB.

**Training Facilities**
Multimedia classroom, P-IV machines, hardware lab, aircon and back-up generator.

**Timings and Duration**
3pm-5pm, 20-25 HOURS (4 HOURS/WEEK). Weekends: 6 Hrs/Day.

**Course Fee:** Rs. 7000/-

**Venue and Registration**
Rastek Technologies, C-15, Classic Center, Block-16, near PIA office, Gulshan-e-Iqbal, Main University Road, Karachi.
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