Task, basic requirements and hour distribution for Lab work

This course contains 16 contact hours lab work. Lab work should be arranged synchronous with the course schedule, so as to enable the students to get a better understanding of the theoretical principle, be familiar with how to use the internal resources, master the design & development and debugging methods of a microcontroller based system, enhance students' ability to apply the theory into practice.

Lab 01. Learn how to use the Microcontroller development environment (2 hours)

Through editing the source codes of a simple program, compiling source codes into object code, loading object codes into emulator, and debugging the program, students can learn how to develop and debug a microcontroller based system, and know how to use a microcontroller development environment.

Lab 02. External interrupts programming (2 hours)

Use a single pulse signal to generate an interrupt request. ISR should be programmed to toggle the output state of on an I/O pin. For example, the P1.0 pin is connected with a LED to see an intuitive phenomena. Once the single pulse signal generates an interrupt signal, the ISR shoud be able to record the number of interrupts and show this number on LEDs. For example, the P1 port is connected with 8 LEDs. Throught this lab work, students should at least know how to do external interrupt programming.

Lab 03. Timer/Counter programming (2 hours)

Task: Use the microcontroller's internal timer and I/O port to generate a periodical wave.

Throught this lab work, students should at least know how to do timer/counter programming and be able to program an interrupt service routine.

Lab 04. Serial port programming (2 hours)

Task: Design and debug a program for serial communication between two microcontrollers.

Throught this lab work, students should at least know how to do serial port programming by polling or interrupt.

Lab 05. Interfacing and programming for keypad and seven segment LED display (2 hours)

Task 1: Show 6 decimal numbers on 6 seven segment display, where 6 numbers are stored at

internal date memory.

Task 2: Scan the keypad, and then show the key value on a seven-segment display.

Lab 06. Interfacing and programming for DAC & ADC (2 hours)

Task 1: Program the DAC to generate a sawtooth wave and a triangle wave or a sine ware.

Task 2: Program the DAC to generate a DC voltage, and program the ADC to sample the DC voltage, then show the sampled value on a seven-segment display or send the sampled value to the hyper terminal or a serial debugging assistant program running on PC machine by serial communication.

Lab 07. Comprehensive experiment (4 hours)

Task: Design and implement a digital clock system. Internal resources including timers, interrupts, serial port, keypad, seven segment displays, should be involved in this system. The time should be shown on the seven segment displays.

Throught this lab work, students's integrated design capability can be cultivated, students' engineering consciousness and engineering ability can also be improved.