Embedded Systems

Sheet 5

Date and Time,

I2C and SPI Communication,

Advanced Topics

For the following questions: provide both the software part and draw the hardware schematic for all required embedded systems.

Q1. Using LCD display develop a digital clock with four push-buttons. The clock show the time and date (MM:DD:YYYY HH:MM SS). User must be able enter the setup mode and alter each date/time field separately. Know that, setTime() function returns false if invalid time value is provided.

Q2. Develop an embedded system that produce a wake up alarm signal at 6:00 AM of every day except Friday. Know that, weekday() function get the week day (Sunday = 1).

Q3. Design an embedded system that measure and store temperature values inside an external 128KB EEPROM. Use first 2 bytes to store the number of stored temperature values. If the memory is full stop writing in the memory and turn off an indicator LED. The device should store temperature value every one minute. Use TMP75 thermometer to measure the temperature value.

If the system is connected to computer, the computer should be able to acquire the whole temperature values. After dumping the values the memory should be cleared.

Q4: Using I2C port expander to create a bouncing light system with 16 LED.

Q5: Develop a real time clock that shows (HH MM SS). Use following components: (I2C Real Time Clock, SPI 7-Segment Driver, Six 7-Segments Modules).

Q6: Develop an embedded system that can be used to show text information to guide peoples in public places. User can alter the displayed using external computer device. It is required to keep the text information even if the device is switched off and on again.