

EEE-4706 Mandatory Features to be Included in the Project:

Temperature Controlled Motor:

1. Use a temperature sensor to control a DC fan motor with three speed stages: low, medium, and high. The microcontroller (μ C) will take three temperature values (min, medium, max) via the keypad.
2. If T is less than min, the motor turns off. ($T < T_{MIN}$). If T is between min and medium, the motor runs at low speed. ($T_{MIN} < T < T_{MED}$) . If T is between medium and max, the motor runs at medium speed. ($T_{MED} < T < T_{MAX}$). If T is greater than max, the motor runs at max speed. ($T_{MAX} < T$)
3. Add a critical temperature threshold. If exceeded, the motor stops and displays an alert message. Display Temperature and Speed on LCD

DC Motor with Speed Control

1. Use the keypad to select clockwise or anticlockwise control, allowing the motor to rotate in the specified direction. Display the selected direction on the LCD.
2. Add buttons for predefined motor speeds (LOW, MED, HIGH). By pressing a button, the motor will reach the corresponding speed. As the speed changes gradually, display the real-time RPM update on the screen.
3. Simulate an overload protection system. If the motor exceeds a specified limit, activate a buzzer for alert purposes and turn the motor off.

Pulse width and frequency measurement:

1. Read in a signal (you may create a signal or read from any other source) and measure the frequency and duty cycle of the signal and display it on the LCD. However, only allow frequency of a specific range, if the input signal is beyond the range then specify that the signal is less/more than the specific range. The range should be at least 80 Hz.
2. Take three signals, measure their frequencies and generate a new signal equal to the sum of the smallest two frequencies.
3. Continuously carry out the above tasks and LED 1 should be turned on when the first task is being carried out, and LED 2 should be turned on when the second task is being carried on.

Bluetooth interfacing with Microcontroller:

1. Control all the 8 LEDs via Bluetooth and send out a Morse code from your Bluetooth device using any one of the LEDs. While you are sending out the Morse code, the corresponding “dash” or “dot” should be displayed on the LCD. On the next line display the coded message. [Transmit a very short code, like may be just your name].
2. Use 2 relays to connect two lights and control them using Bluetooth.
3. Send an encrypted message from your Bluetooth device and display the decrypted message on the LCD. For example you may send “MJWFSQPPM” and display “LIVERPOOL” on the LCD. You may use any other encryption/decryption method.

Real Time Clock:

1. Interface RTC for designing a clock. Use of display: Show time and others in LCD/7-segment display. Display the clock in either 12-hour (with AM/PM) or 24-hour format. Users can select their preferred mode. Add a stopwatch mode that can start, pause, and reset a timer.
2. Beep or produce a chime sound every hour. (use a small piezo buzzer)
3. Display the date and name of the day. Use a temperature sensor to display the temperature of the surroundings and show an hourly weather "status" on the display, like "Cold," "Warm," or "Hot." besides the temperature value. (Implement basic thresholds (e.g., $<15^{\circ}\text{C}$ = "Cold," $15\text{-}25^{\circ}\text{C}$ = "Warm," $>25^{\circ}\text{C}$ = "Hot")

Digital Alarm Clock:

1. Use of display to show outputs, use of keypad to take input from the user, use of loud sound to alert the user during an alarm. Allow users to set multiple alarms
2. Include a snooze function with options for different snooze durations (5, 10, or 15 minutes).
3. When the alarm rings off. Five LEDs—red, green, blue, yellow, and white—will be present. Three LEDs will randomly light up whenever the alarm is activated (for instance, red, green, white the first time, blue, yellow, red the second time, etc.). Therefore, the user must enter the right keyboard pattern in accordance with the LED indication in order to stop the alarm (buzzer) (for example: Red=0, green=1, blue=2, yellow=3, white=4). For the first example, the user should hit 014 to stop the alert.

Calculator with Keypad and LCD:

1. Able to perform addition, subtraction, multiplication and division only for any digits operand. Max limit 3 digits operand.
2. Able to perform square and cubic power only for single digit operand.
3. Able to perform bracket operation priority wise

Password protected DC motor :

1. Show * when a key is pressed
2. Implement an "Close Enough" message when the input closely matches the password.
3. Locking the system for 3 unsuccessful tries and motor will run in the reverse direction.