Embedded Systems Development

Exercise 1

1. Construct a microcontroller-based system to chase 5 LEDs one after another from left to right, repeatedly.

    a. If the system is supplied with 5V and an LED is driven with 2V and 15mA, what is the resistor required to limit the current to the LED?

    ……

    ……

    ……

    ……

    ……

    ……

    b. Prepare a BOM.

    ……

    ……

    ……

    ……

    ……

    c. Draw the schematic diagram using a suitable schematic editor.

d. Draw the wiring diagram using Fritzing.

e. Write the required firmware in C and explain your code using comments in detail.

2. Rewrite the firmware written for 1 (e) above making it more efficient.

3. Modify your system to drive 5 LEDs in Night Rider pattern efficiently.

4. Extend the system constructed for 3 above to handle 10 LEDs using a maximum of seven I/O pins. Give schematic diagram, wiring diagram and firmware source code.

   Hint: Use two BC547 transistors biased with 1kΩ resistors to switch the GND line between first 5 and second 5 sets of LEDs.

Schematic diagram

Wiring diagram

Firmware source code