Firmware Design

Final Project

Due date: January 3, 2025

Application

The idea is to design and implement 4-floor elevator controller (GF, F1, F2 and F3). You may work in groups of two and the project should be submitted via a GitHub repository. This should reflect collaboration and synchronization between team members.

Floor information

On each floor there are:

- One 7-segment-digit display for floor number indication.
- One UP button (except on F3).
- One DOWN button (except on GF).
- UP/DOWN LED arrow indication.
- Three limit switches for cabin feedback:
    - One indicates the STOP position.
    - One indicates SPEED CHANGE when going UP (except of F3).
    - One indicates SPEED CHANGE when going DOWN (except on GF).

Cabin information

Cabin interior:

- Four buttons each for a floor.
- One 7-segment-digit display for floor number indication.
- Four 7-segment-digit display intended to show time (HH:MM), date (DD MM) and temperature (TT dC) in sequence, 10 seconds apart.
    - Two options for the calendar implementation aka Real-Time Clock (RTC):
        - Either you implement it by software, or
        - Use an I2C-based external RTC (datasheet included).
            - **A bonus will be added when using external RTC.**
    - The temperature is delivered by the famous LM35 analog sensor.

Motor:

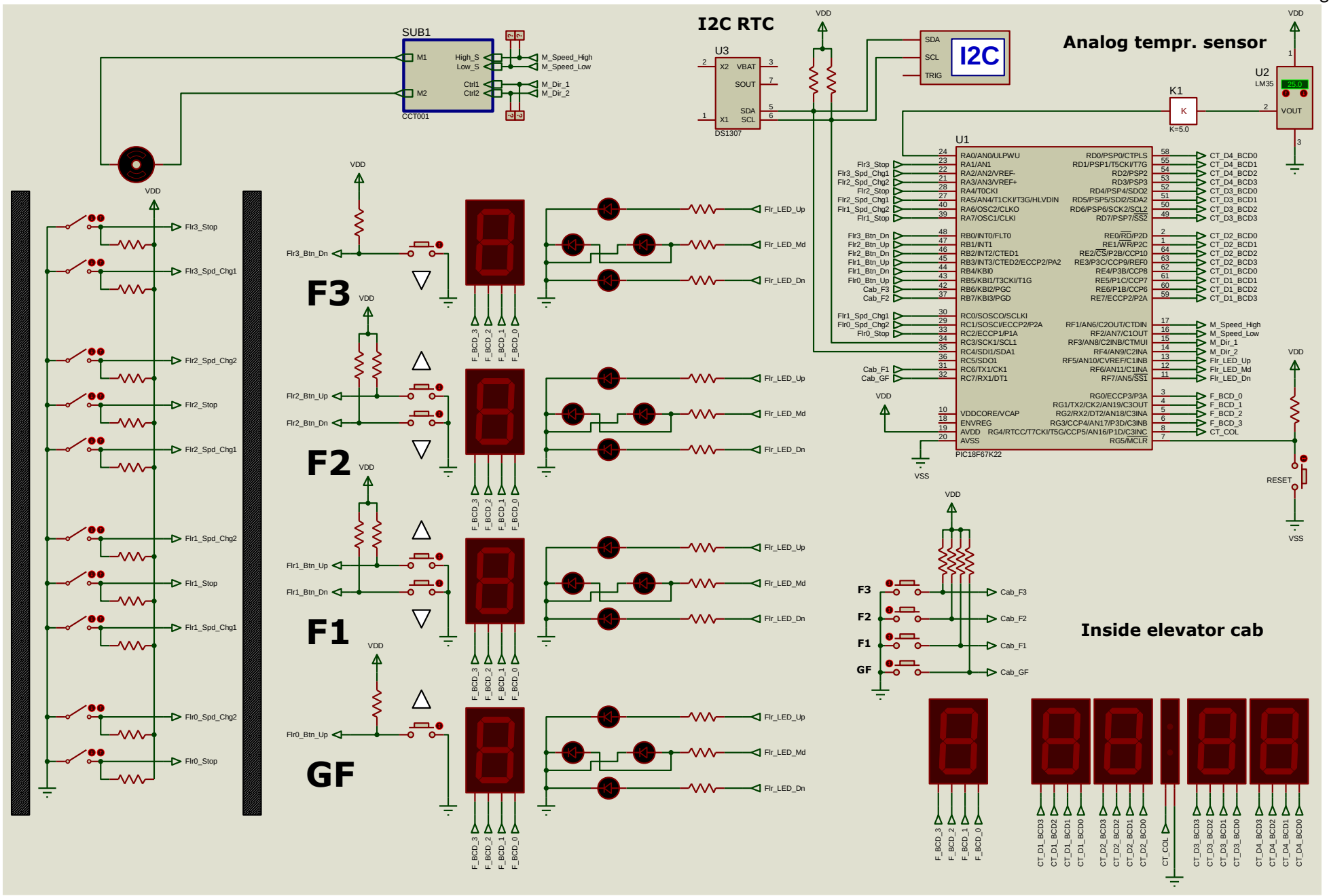
- Two-level speed control.
- Dual direction control.

To do

In addition to the code and simulation (delivered via a repo), you should prepare:

- Documentation (**without** source code):
  - Abstract
  - Introduction
  - Firmware architectures
  - Block diagrams
  - Flowcharts
  - Procedures
  - Problems encountered
  - Possible expansions
  - Conclusion
- Presentation
  - About 10 slides
  - A demo

Good luck!


I2C RTC
Analog tempr. sensor
Inside elevator cab
SUB1
CCT001
U1
PIC18F67K22
U2
LM35
U3
DS1307
K1
K=5.0
I2C
F3
F2
F1
GF
VDD
VSS
RESET
Flr3_Stop
Flr3_Spd_Chg1
Flr2_Spd_Chg2
Flr2_Stop
Flr2_Spd_Chg1
Flr1_Spd_Chg2
Flr1_Stop
Flr1_Spd_Chg1
Flr0_Spd_Chg2
Flr0_Stop
Flr3_Btn_Dn
Flr2_Btn_Up
Flr2_Btn_Dn
Flr1_Btn_Up
Flr1_Btn_Dn
Flr0_Btn_Up
Flr_LED_Up
Flr_LED_Md
Flr_LED_Dn
Cab_F3
Cab_F2
Cab_F1
Cab_GF
F_BCD_3
F_BCD_2
F_BCD_1
F_BCD_0
CT_COL