ELEC 334 - Project #2

Objective

Main objective of this project is to create **a digital voice recorder** that can record your voice, playback a selected voice recording, and delete single or all recording data. During this project, you will use various modules such as Timer, PWM, ADC, and External Interrupts.

This project will get you to incorporate all the modules that you implemented individually into one project. As you have seen previously, getting all of them working correctly is not that easy, and if not carefully designed, can cause a lot of problems. So I would strongly recommend you tackle problems individually.

Submission

You should submit the following items organized in a folder:
- **Lab report** - Written in English. PDF file. Should include
  - a cover page
  - a flow chart
  - a block/connection diagram
  - pictures/photos if any/requested
  - code listing
  - at least one paragraph explanation/comment about that problem, code listing
  - final project conclusion about what you've learned.
- **Source files** - should have proper comments and pin connections if there are any external components.
- **Elf files** - generated elf file with debug information.

Requirements

Technical requirements

- Written in C. No HAL or equivalent libraries. (Using CMSIS, and stm32xxx.h kind of headers is fine.) Connect a microphone to record your voice. Keep in mind that if this microphone does not have an on-board amplifier, you will need to build one yourself.
- Build an amplifier and connect a speaker with a variable pot to playback the recordings.
- Connect 2 x 24LC512 EEPROMs on the same I2C bus. Keep in mind when wiring the bus will require pull-up resistors on both lines, and each of these devices need a different address to communicate.
- You should be able to at least record 4 tracks with 5 seconds each. 5 seconds should be fixed, but if you can fit more tracks that is fine.
  - Calculate the maximum data size for two EEPROMs for keeping your data and create a table of how many seconds can be recorded with different data rates. Pick one that will fit the requirement.
- A keypad should be attached to operate the device.

- ○ Assign a key for recording a voice. The recording will go for 5 seconds and automatically stop/save it. After the track is played, it will stop and go back to IDLE state.
    - ■ Pressing any other button should not have any effect.
- ○ Assign first 4+ number keys for track select when not recording. For example pressing 1 will select the first track, pressing 2 will select the second track, etc. This key press will not do anything else.
- ○ Assign a key for playing/pausing the selected track when not recording. After the track is played, it will stop and go back to IDLE state.
    - ■ Pressing any other button should not have any effect.
- ○ Assign a key for deleting the selected track. After the track is deleted, it will go back to IDLE state. Assign a key for seeing the track status. After the key is pressed, SSD shows the number of available tracks.
- ● An SSD should be attached to display the operations and status. You should have multiple states, some of which include:
    - ○ START state which only happens when the board powers up SSD should show your ID (first 2 and last 2 digits)
    - ○ IDLE state which displays IdLE on the SSD and does not do anything else. (waiting for track select or record start)
    - ○ FULL state which displays FuLL on the SSD and prevents going into RECORD state.
    - ○ RECORD state where the SSD shows rcd and a countdown from 5 seconds indicating the recording. (i.e. rcd3, rcd2)
    - ○ PLAYBACK state where the SSD shows PLb and the track being played back (i.e. PLb2, PLb1)
    - ○ STATUS state where the SSD shows Ava the number of available tracks. (i.e. Ava3, Ava0)
- ● If no button is pressed for 10 seconds, the device should go back to IDLE state.

Quality requirements

- ● No bouncing on the buttons
- ● No considerable delay with button presses
- ● No flickering on the displays AND no brightness difference on the SSDs
- ● Recording should be understandable
- ● Code should be properly commented with your name / school ID added in the beginning