Contact: Sebastian Stöcklin
sebastian.stoecklin@imtek.uni-freiburg.de

Exercise sheet 6 - Dynamic circuit configuration

Note:
You will present your results of this exercise sheet to your tutor in a **colloquim**. Exact dates for each group will be announced by the individual tutors.

In exercise sheet 5, we connected the piezo buzzer to a pin of the microcontroller, which was used for both driving the buzzer as well as for reading the voltage output while using it as vibrational sensor. In this task, we want to use a separate analog front-end for the sensor element. Therefore, change your setup of exercise sheet 5 as follows:

1. Connect the buzzer `Buzzer:X1` to the single pole of the relay, i.e. to the pin on `CON4` which can be routed either to the right or to the left output of the relay (have a look on the circuit diagram). This way, you can use one path of the relay to connect the buzzer to your audio output pin and the other path to connect the buzzer to the analog front-end.
2. Connect the switching outputs of `CON4` to `DAC_IN:X2` (the input of the analog front-end) and to an output pin of the microcontroller for the playing the audio that supports PWM (called `YY` in the following).
3. Additionally connect `COMP_OUT:X7` (the output of the analog front-end) to a pin of the microcontroller which supports interrupts (called `ZZ` in the following). Moreover, set `JP5` to `VFO`.
4. Connect the control pin of the relay `REL_STAT:X5` to the microcontroller.

Task 1

a) Modify your code of exercise sheet 5 in a way that you can switch the buzzer's connector actively between `DAC_IN:X2` (input of analog front-end) and `YY` (audio output) with the help of the relay. Now, use the pin `ZZ` (connected to `COMP_OUT:X7`, the output of analog front-end) for capturing the vibration signal and use `YY` to play the melody. You are allowed to delete the code for reading the push buttons `PB5` and `PB6`. However, keep the capability of playing two melodies (**6 pts.**).

b) In a separate text file, explain how the resulting circuit works (especially the analog front-end) and show the advantages compared to the read-out structure of experiment 5 (**3 pts.**).

Task 2

a) Create a file `feedback.txt` with a brief feedback statement, which contains specific problems and issues you experienced while solving the exercise, additional requests, positive remarks, etc. (**1 pt.**).

b) Import this text file `feedback.txt` in your Code Composer Studio project, so that you can upload it together with your software deliverable.