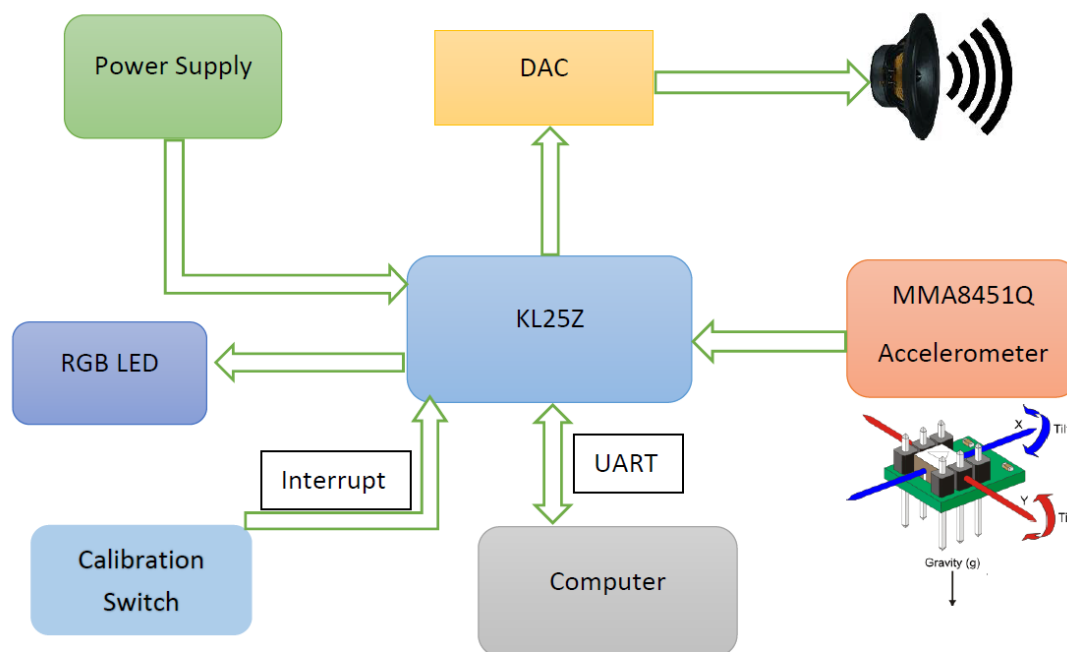


PES 5813 FINAL PROJECT: TILT ANGLE DETECTION WITH INTERACTIVE USER INTERFACE

Functionality:

Tilt detection is used for measuring the tilt in multiple axes of a reference plane. The goal of this project is to develop a bare – metal firmware which measure the angle of inclination and provides user with visual and audio feedback. This project initializes the inbuilt MMA8451Q Accelerometer in the FRDM KL25Z development board and measures the respective X, Y, Z coordinates. Then using some computation of these raw values, the angle of inclination is detected. It will calibrate the sensor using a tactile switch by causing an external interrupt. It allows user to enter the required inclination in any of X and Y axis and then provides visual feedback in terms of LED output and audio feedback in terms of Speaker output if the accelerometer reaches the required inclination.

Block Diagram:



Code Flow and Usage:

- 1) Import this project and run on MCUXpresso v11.2.0 using File->Open Projects from file system
- 2) Calibration switch is used as external interrupt in pull-down mode and connected to pin PTA13 on port A
- 3) Buzzer is connected to the output of DAC J10 11 header
- 4) Rest components are present on the board itself.

- 5) Code starts with initializing modules and components used like UART, gpio interrupt, I2C, DAC, TPM, and lastly accelerometer sensor.
- 6) Respective status after initializing is printed on uart.
- 7) Then it asks user to press the calibration switch by placing the board at reference angle.
- 8) That angle is now zero reference angle.
- 9) Code is stopped unless the user calibrates it first.
- 10) Then it asks the target angle via UART in certain range.
- 11) Valid ranges are accepted and then it starts measuring the angle from that reference angle in anticlockwise direction on X axis (roll angle).
- 12) If the board reaches correct angle, it is confirmed by the LED turning Green and buzzer making a small tone sound.