Lab 3 Report

ECSE 426 – Microprocessor Systems

Group 7

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# 1. Abstract

The primary goals of this lab are to measure the acceleration of the STM32 discovery board and provide a simple graphical output using the board’s LEDs, as well as to implement a pulse width modulation (PWM) algorithm using the board’s timers and to provide an output on the board’s LEDs, and finally to provide the user a method of switching between the two modes of operation by tapping on the board. This experiment involved the use of an accelerometer, hardware timers and interrupts, basic output using LEDs, as well as some signal processing to calibrate the accelerometer.

# 2. Problem Statement

The end goals of this experiment are to have a simple LED display indicating the tilt angles of the board, to display PWM on the LEDs using a hardware timer as well as to provide a way of switching between modes of operation by tapping on the board. The problem can be broken down into five parts

* Acquiring data from the accelerometer
  + The accelerometer must be sampled at a rate of 25 Hz,
  + The accelerometer must be calibrated to provide an accuracy within 4 degrees
* Updating the LEDs according to the tilt angles
  + The pitch and roll of the board must be computed in real time for each accelerometer reading
  + The LED frequencies must be updated according to the
* Developing the PWM algorithm
* Providing the user a way of switching modes of operation via tapping the board

# 3. Theory and Hypothesis

# 4. Implementation

# 5. Testing and Observations

# 6. Conclusion

# Appendix

# Appendix A - References