ET 095G Programming Exercise 1: Digital Inputs and Outputs

September 6, 2021

1 Background and Learning Goals

Simple digital inputs and outputs (often referred to as General-Purpose Inputs/Outputs, GPIO) are the most basic type of input/output interfaces a microcontroller provides. However, they are used in many applications and a thorough understanding of these IOs is essential. In this exercise you will learn how to control GPIOs in the mbed system. This exercise is also a good starting point to familiarize yourself with the basic structure of any embedded system program and the mbed build process. After this exercise, you should be able to:

- Understand and develop simple mbed applications with common C/C++ elements.
- Control the state of a GPIO pin (digital output).
- Monitor the state of a GPIO pin (digital input) and utilize this information for decisions in your mbed application.

2 Project Requirements

Although you will have a lot of freedom in this exercise, a few requirements have to be fulfilled for successful project completion. The application you develop needs to:

- Utilise resources that you have previously completed exercises on.
- Utilise at least four such resources (i.e., cover contents of at least four exercises).
- Include reading of a sensor (ADC readings can be regarded as reading a sensor).
- Visualise the obtained sensor data in some form.

3 Preparation

All required information for this exercise can be found in chapter 2 and 3 of the course book. You can find further information on mbed and its API functions at https://docs.mbed.com.

4 Evaluation and Presentation

For evaluation, submit a functioning .bin file and the main.cpp file of your program. The main file should be well commented. For submission, use the respective inbox for this exercise on the moodle course page.

5 Task

Your program should allow the usage of the joystick on the application board to control the LEDs on the LPC1768. Cause and effect should be in the following manner (see also Figure 1):

- moving the joystick to the left position toggles (i.e., inverts the state of) LED1.

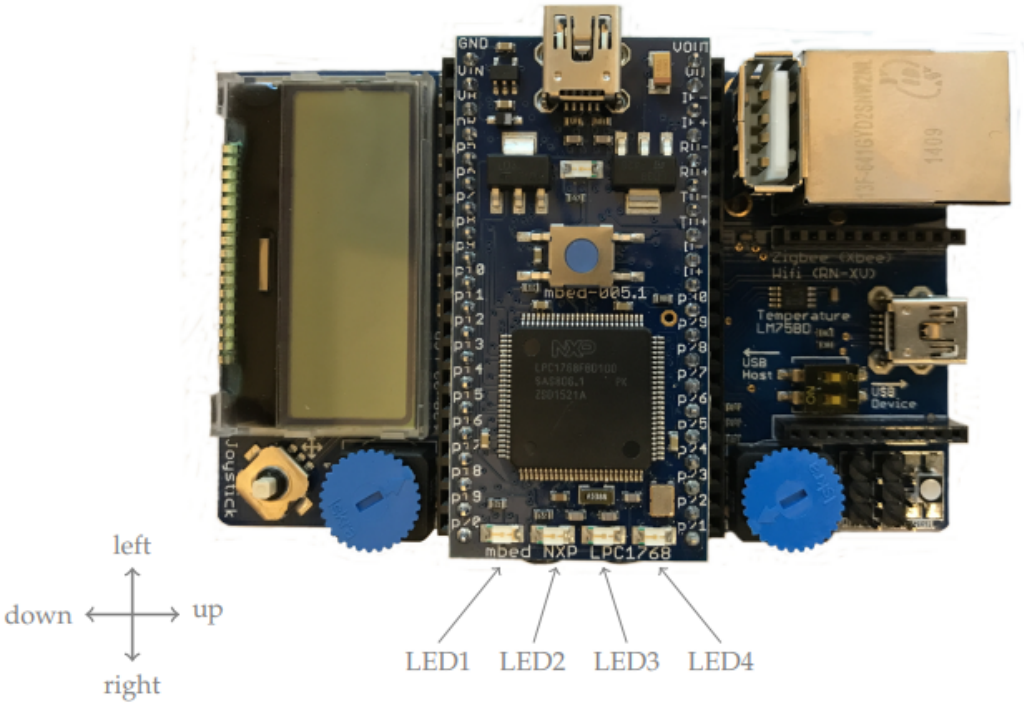

Figure 1: Joystick orientation on the application board and LED order on the LPC1768.

- moving the joystick to the up position toggles LED2.
- moving the joystick to the right position toggles LED3.
- moving the joystick to the down position toggles LED4.
- pushing the joystick in the center position clears all LEDs.

Note: Both DigitalIn/DigitalOut, as well as BusIn/BusOut can be used in this task.