EECS 388 Laboratory Exercise #2
SpeakerBuzz

Demonstrate in lab the week of September 17, 2018

Gary J. Minden

1 Introduction

For this laboratory you will implement a new task to generate a tone using the Digital to Analog (DAC) and speaker on the TI Audio BoosterPack evaluation board. The TI Audio BoosterPack is an add-on board to the Tiva TM4C1294 evaluation board. The TI Audio BoosterPack board will be installed on the Tiva evaluation boards by EECS Shop staff.

The TI Audio BoosterPack looks like:

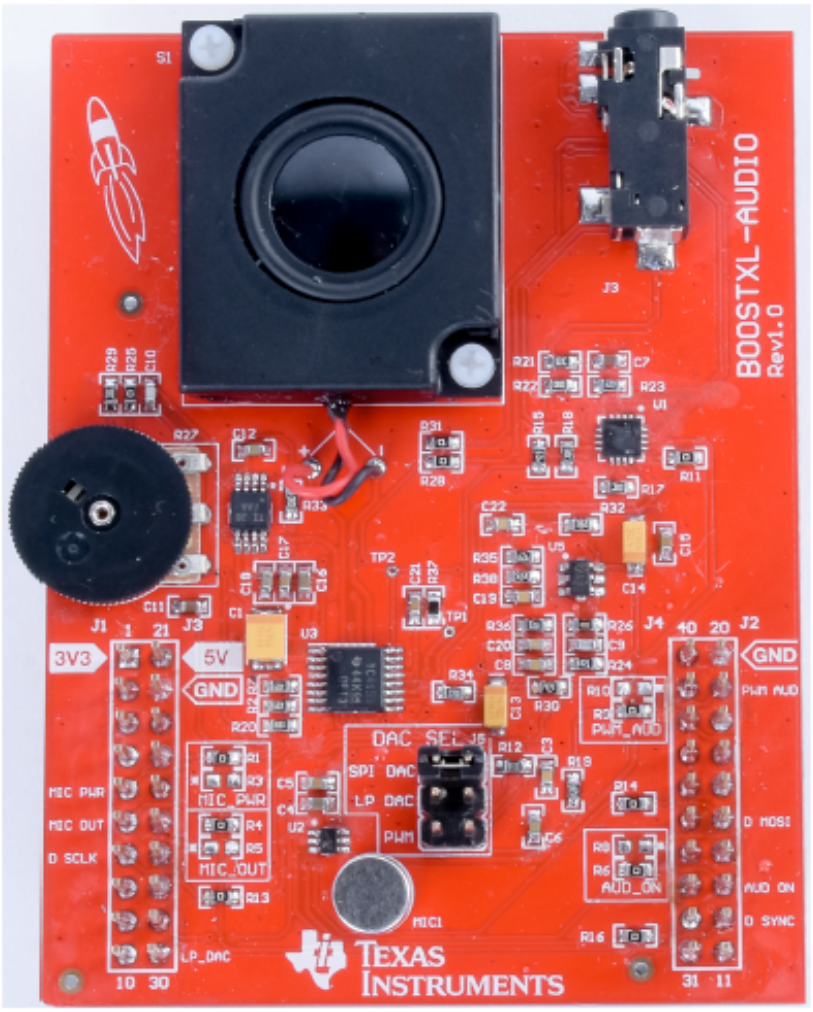

Figure 1. BOOSTXL-AUDIO BoosterPack Plug-in Module

The DAC converts a number between 0 and 16Ki-1 (0 – 0x3FFF) to an analog voltage. The voltage is amplified and then used to drive the speaker. The analog

voltage is also available at a headphone jack. The volume of the generated sound is controlled by a potentiometer.

Your GTA will assign additional parts of this exercise.

1.1 Starting your project

To begin this lab, make a copy of the EECS_388_Base_Project_Fa18 project in your workspace.

1. Select the EECS_388_Base_Project_Fa18 project and right-click.
2. Select "Copy"
3. In the workspace pane, right-click and select "Paste"
4. When asked for a project name, use the project name "Project_SpeakerBuzz"
5. Within the new project in the "Tasks" directory, make a copy of "Task_Blinky_PortN_1.c" to "Task_Speakerbuzz.c"

1.2 TI Audio BoosterPack API

For this project you will use a provided subroutine to send data to the digital to analog converter (DAC) on the TI Audio BoosterPack add-on. The subroutine you need consists of EECS388_DAC.c (program) and EECS388_DAC.h (API definition). The subroutine files are at:

http://www.ittc.ku.edu/~gminden/Embedded_Systems/Software/

Put the files in the "Drivers" directory of your new project.

To use the DAC subroutine:

(a) Add:

```
#include   "Drivers/EECS388_DAC.h"
```

in your new task.

(b) Initialize the DAC with the following call:

```
//
// Initialize the EECS_388 DAC interface.
//
EECS388_DAC_Initialization();
```

(c) Send data to the DAC with the subroutine call:

```
//
// Set the current DAC value.
//
EECS388_WriteDAC( DAC_State );
```

The DAC converts a 14-bit integer to an analog voltage. DAC values can between 0x0000 and 0x3FFF (0-16,383).

1.3 Tone Generation Task

Write a new task named “Task_Speakerbuzz.c”. Define necessary state variables and functions. Follow the structure in “Task_Blinky_PortN_1.c” and the material presented here and in lecture.

Your new task should initialize the TI Audio BoosterPack DAC. Then your new task should send alternate values between 0x0000 and 0x3FFF to the DAC. Your GTA will give you a frequency to use, e.g. they might give you a frequency of 300 Hz.

You can vary the volume with the potentiometer on the TI Audio BoosterPack. You can plug in earphones to hear the sound with earphones rather than the speaker.