

# Electret Microphone Amplifier Guide

## Introduction

This document will guide you how to connect the electret microphone amplifier (EMA) to the Beaglebone Green via GPIO.

This guide assumes you have the Zen Cape loaded.

## Wiring

The wiring is as simple as this, with only 3 wires and a breadboard (see Figure 1):

- EMA's VDC pin (**orange** wire) can be connected to either pin 3 or 4 on the P9 header of the Zen Cape (VDD\_3V3)
- EMA's GND pin (**green** wire) can be connected to pin 1 or 2 on P9 header of the Zen Cape (DGND)
- EMA's OUT pin (**yellow** wire) can be connected to any pin from 33 to 40 (except 34) on the P9 header of the Zen Cape (AIN\_ pins)
  - Note: The potentiometer uses AIN0 (pin 39) so if you need to use it, please choose another pin on the list above.

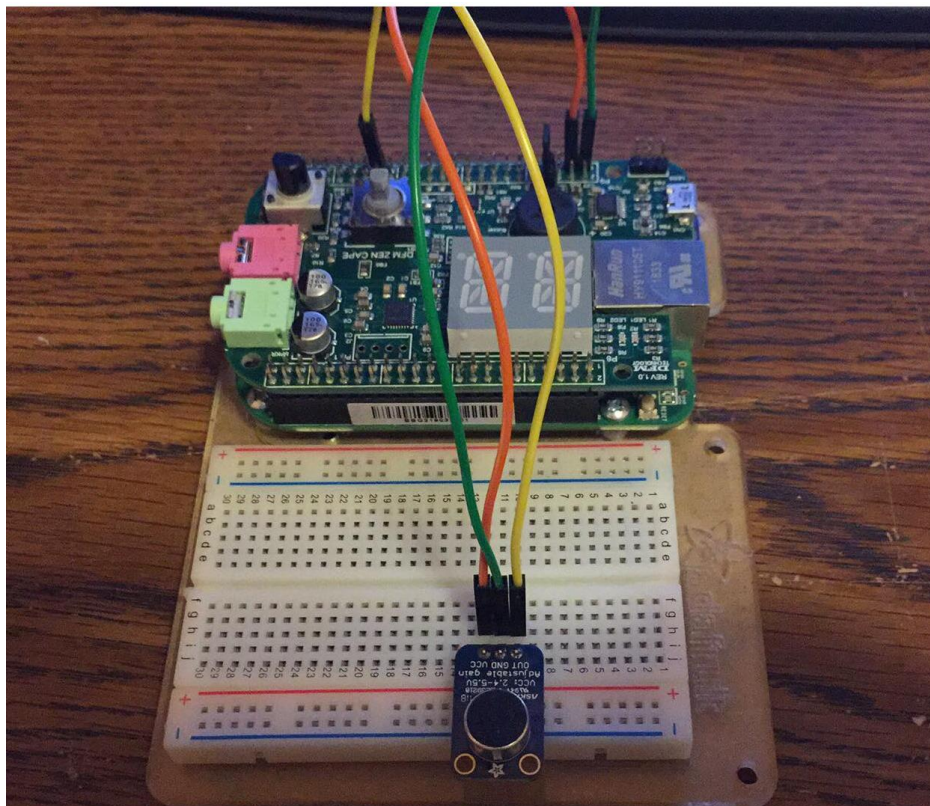


Figure 1: EMA wiring

## Reading input

The code is mostly taken from Dr. Brian Fraser's A2D guide. In this guide we assume the OUT pin is connected to AIN4 (pin 33 on P9).

Sample code that reads the raw values (environment sound).

Note:

- `in_voltageX_raw` with X refers to the number after AIN that you use.
- The EMA only measures the loudness of the environment so you may need a good noise filtering algorithm to filter out unnecessary sounds (if any). Also, that means it is probably not possible to do speak recognition with this device.

```
#include <stdlib.h>
#include <stdbool.h>
#include <stdio.h>

#define A2D_FILE_VOLTAGE0 "/sys/bus/iio/devices/iio:device0/in_voltage4_raw"

int getVoltage0Reading()
{
    // Open file
    FILE *f = fopen(A2D_FILE_VOLTAGE0, "r");
    if (!f) {
        printf("ERROR: Unable to open voltage input file. Cape loaded?\n");
        printf(" Check /boot/uEnv.txt for correct options.\n");
        exit(-1);
    }

    // Get reading
    int a2dReading = 0;
    int itemsRead = fscanf(f, "%d", &a2dReading);
    if (itemsRead <= 0) {
        printf("ERROR: Unable to read values from voltage input file.\n");
        exit(-1);
    }

    // Close file
    fclose(f);

    return a2dReading;
}

int main()
{
    while (true) {
        int reading = getVoltage0Reading();
        printf("Value: %d\n", reading);
    }

    return 0;
}
```

## Troubleshooting

1. Normally A2D is enabled by default. But if not, you can enable it by using this command and you may need to wait for a few minutes for it to set up.

```
# echo BB-ADC > /sys/devices/platform/bone_capemgr/slots
```

If you can run this command, it means the set up is done

```
# cd /sys/bus/iio/devices/iio\:device0
```