Contents

1 Arduino Intermediate Class

In this class each week will go over a specific circuit from the vilros book, going over some electronics and programming before building and testing the circuits. Students are welcome to try other circuits from the book if they have already ompleted this exercises, and we will try and provide tips as time allows.

1.1 This weeks Circuit: Buzzer Class

This week we will build the buzzer circuit, and then add an RGB circuit to add lights to the music.

2 Brief overview of using the buzzer

The buzzer uses a piezoelectric device. That's basically a material that changes it shape depending upon the voltage applied. We use the tone routine

```
// indefinite tone until noTone() is called
tone(myPin, myFrequency);
// tone of lenght myDuration long in milliseconds
tone(myPin, myFrequency, myDuration);
```

to create a square wave of on myPin with frequency of myFrequency. The square wave is 50% duty cycle which simply means the high time is equal to the low time.

2.1 Important: Using the tone command may affect your ability to use the PWM command because they both use the timer circuit on the Arduino microprocessor

Arduino TONE documentation

3 Excercise 1 Make the Buzzer Circuit

Copy the diagram out of the Book from Circuit 09

4 Buzzer Code - Using array

The main new structure that is used in the program is an Array. An array is a kind of list of values. You create an array the same as a variable, by

adding a [] after the variable name. You can access an array by using an index starting with zero.

```
// initialize value
int myArray[] = {7,9,10};
int a = myArray[0];  // a is now 7
int c = myArray[2];  // c is now a 10
myArray[0] = c + 1;  // array now is {11,9,10};
```

The important thing with arrays is to only access them within the bounds. Accessing outside the bounds can produce strange effects. From example above

```
d = myArray[3];  // This is illegal out of bounds
e = myArray[-1];  // Also illegal
```

5 Excercise 2 Make the Buzzer + LED Circuit

This is simply adding the LED circuit from the book and moving the positive buzzer signal to another pin. I used pin 6

6 Programming excersise - LED and Buzzer

In the example sketch we have provided I have provided two routines as well as the pin declarations and initializations required to make the LEDs work.

```
// This function takes a note character (a-g), and returns the
// corresponding corresponding color code
int note2color(char note)

// Takes an integer color code (0-7) and
// turns on the RGB LED to the corresponding value
void color2led(int color)
```

Try and modify the loop routine so that everytime a sound is played the LED lights up with the color corresponding to the note. Hint: Look at how the loop uses notes[i] to set use the tone routine? Also color2led(0) will turn off all the LEDs.