Binary Counter

During this project we will use a circuit and an Arduino to make a binary counter. The final device will count from 0 to 15 in binary.

Introduction to Binary

Binary is a number system, instead of using 10 digits (0 to 9) binary uses only 2 digits (0 and 1). In our normal base 10 numbering system we can divide our numbers into columns, such as a 1's column, 10's column, 100's column etc... In binary we still use columns but, instead of going up by powers of 10, they increase by powers of 2. In binary we have a 1's column, 2's column, 4's column, 8's column, etc...

Here is a chart showing the first 16 binary numbers (poor formatting on GitHub is due to a bug in the GitHub markdown engine):
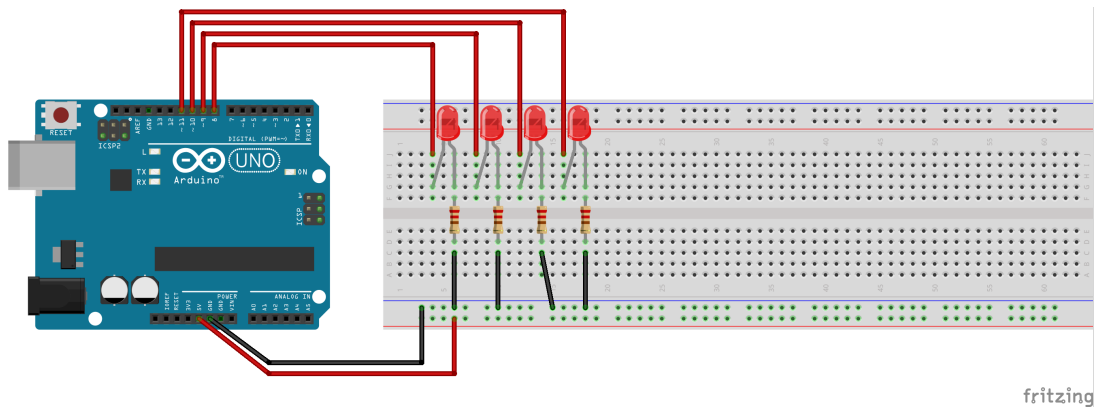
Decimal	Binary
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
10	1010
11	1011
12	1100
13	1101
14	1110
15	1111

The Circuit

The circuit requires the following components:

- 4 resistors (500 - 1000 ohms)
- 1 Arduino
- several wires

Below is a diagram of the circuit on a bread board:

The Code

The code for the binary counter is available in the `binary_counter.ino` file, but it is copy and pasted here as well.

```
int COLUMN1 = 11;
int COLUMN2 = 10;
int COLUMN4 = 9;
int COLUMN8 = 8;

int digits[4] = {COLUMN1, COLUMN2, COLUMN4, COLUMN8};

void setup() {

  pinMode(COLUMN1, OUTPUT);
  pinMode(COLUMN2, OUTPUT);
  pinMode(COLUMN4, OUTPUT);
  pinMode(COLUMN8, OUTPUT);

}

void loop() {

  int y = 0;

  while(1){
```

```
    showNumber(y);
    y = (y + 1) % 16;

    delay(500);
  }


}

/**
 * Shows the input number on the binary LED array.
 */
void showNumber(int x){

  int i = 0;

  for(i = 0; i < 4; i++){

    if(x % 2 == 0){
      digitalWrite(digits[i], LOW);
    }else{
      digitalWrite(digits[i], HIGH);
    }

    x = x/2;

  }

}

int getButton(){

  int val = analogRead(BUTTON);

  if(val > 0){
    return 1;
  }else{
    return 0;
  }
```

```
}
```