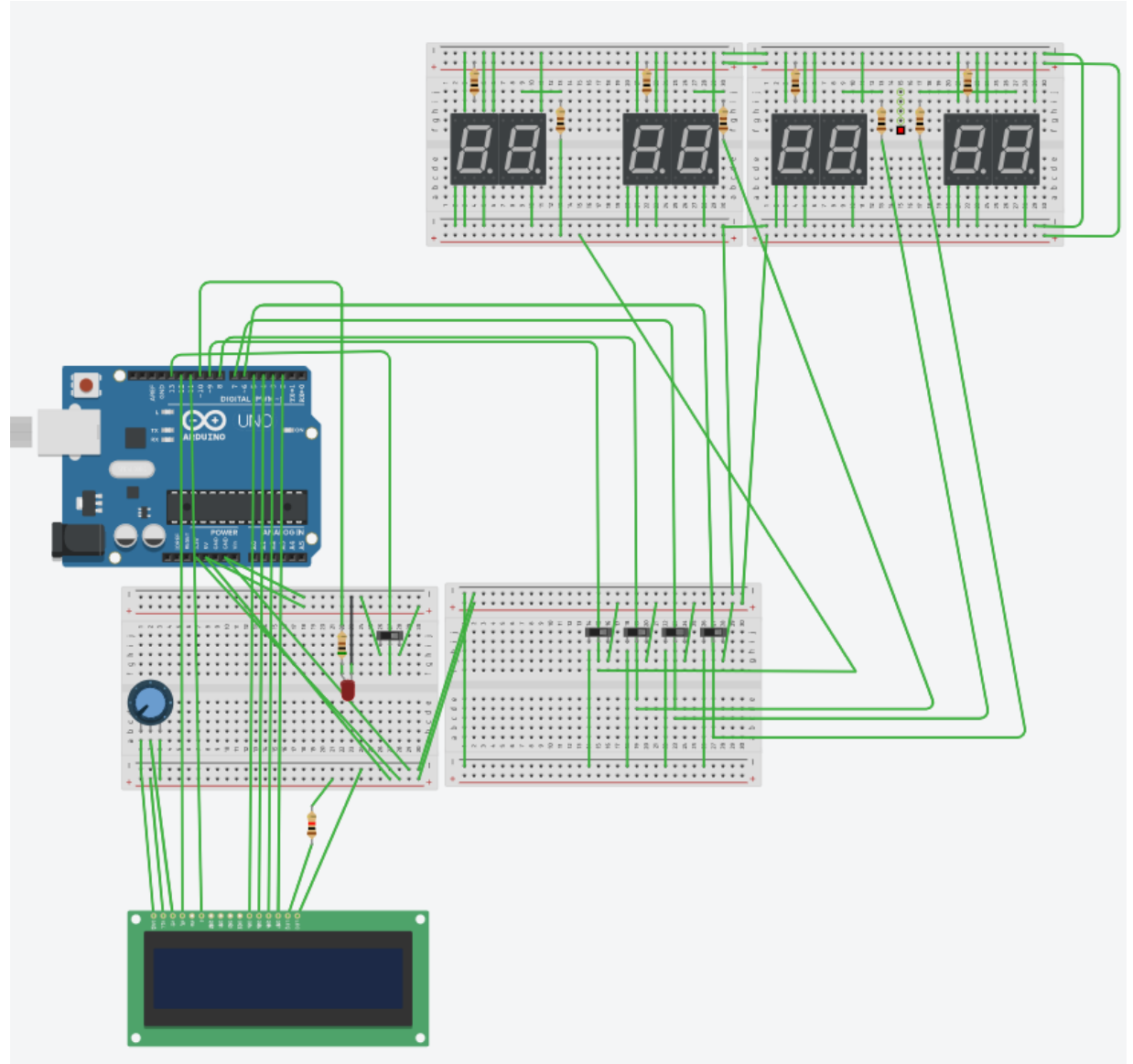


Microprocessors

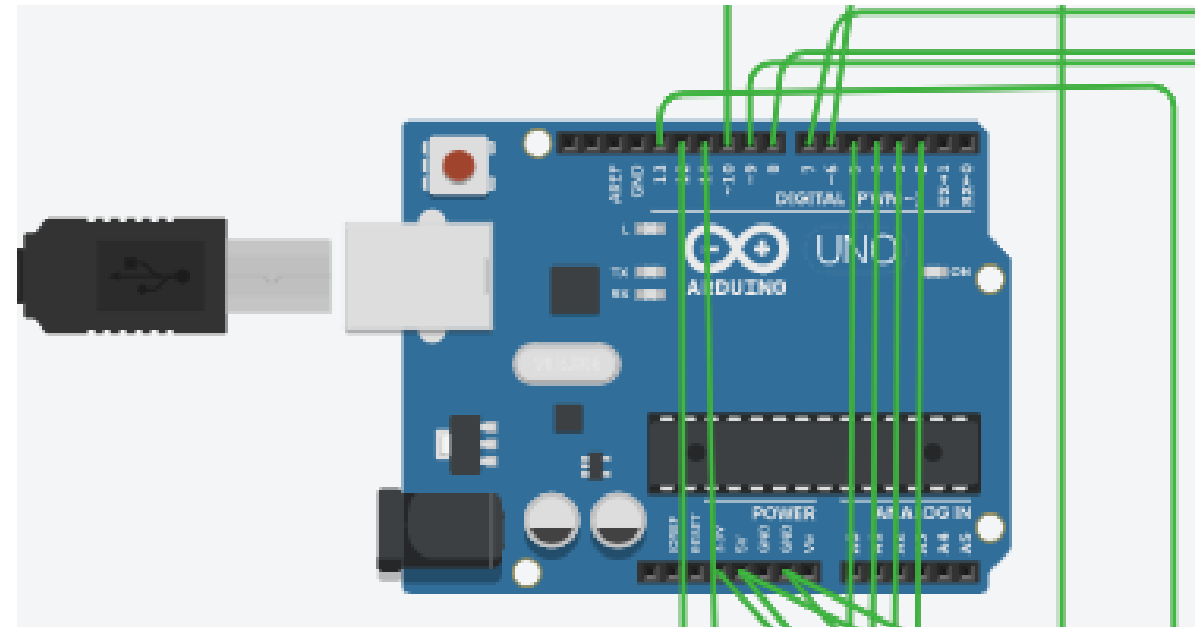
Angel Gil

Even parity Hamming code calculator (7,4)



Assigning variables for connections

```
1 #include <LiquidCrystal.h>
2 int led = 10;
3 int switchpin1 = 9;
4 int switchpin2 = 8;
5 int switchpin3 = 7;
6 int switchpin4 = 6;
7 int switchpin5 = 13;
8 int a;
9 int b;
10 int c;
11 int d;
12 int e;
13 int f;
14 int g;
15 int switchstate;
16 const int rs = 12, en = 11, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
17 LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
18 void setup()
19 {
20   Serial.begin(9600);
21   lcd.begin(16,2);
22   pinMode(led, OUTPUT);
23   pinMode(switchpin1, INPUT);
24   pinMode(switchpin2, INPUT);
25   pinMode(switchpin3, INPUT);
26   pinMode(switchpin4, INPUT);
27   pinMode(switchpin5, INPUT);
28 }
```



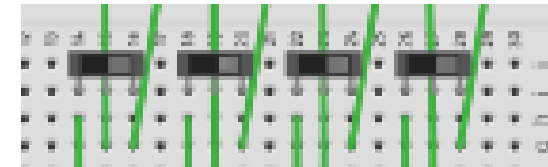
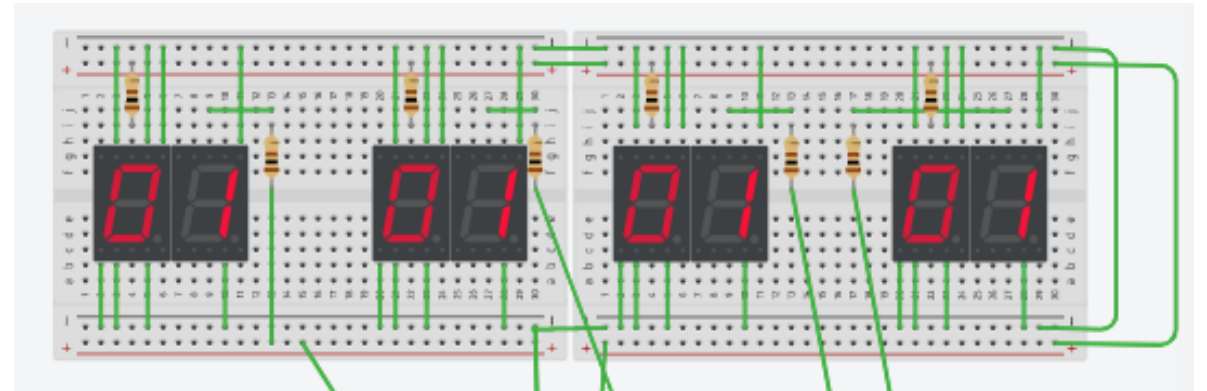
Beginning our void loop function



```
29 void loop()  
30 {  
31   lcd.clear();  
32   lcd.setCursor(0,0);  
33   lcd.print("Choose 4 bits 4");  
34   lcd.setCursor(0,1);  
35   lcd.print("Even hamming");  
36   delay(250);
```

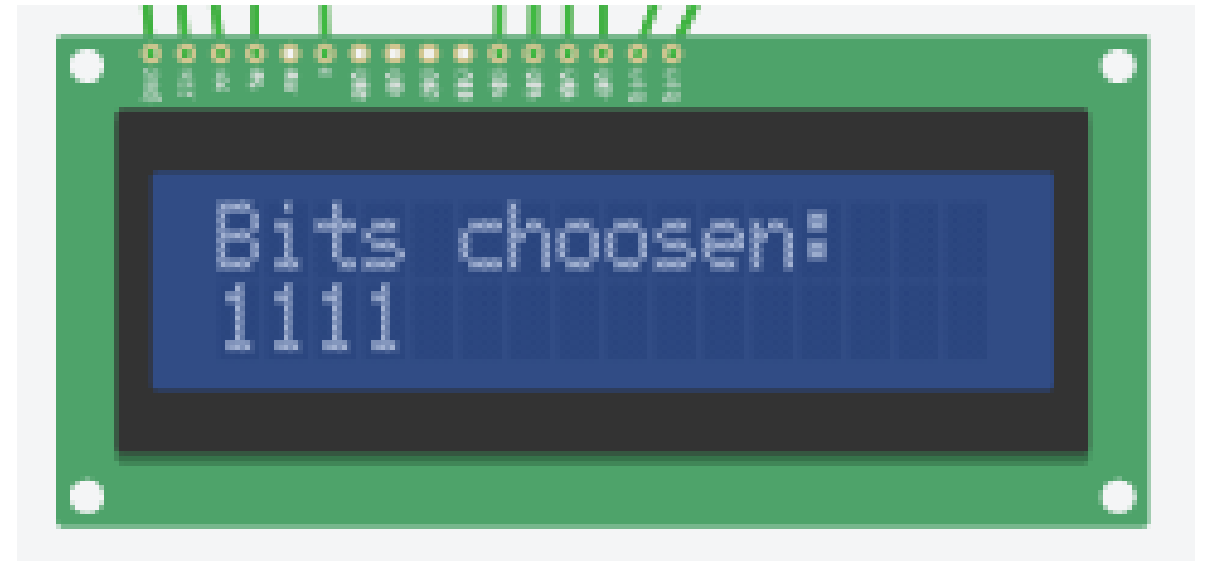
Reading the 7-segment displays

```
37  if (digitalRead(switchpin1))
38  {
39    c=1;
40  }
41  else
42  {
43    c=0;
44  }
45    if (digitalRead(switchpin2))
46    {
47      e=1;
48      delay(250);
49    }
50    else
51    {
52      e=0;
53      delay(250);
54    }
55      if (digitalRead(switchpin2))
56      {
57        f=1;
58        delay(250);
59      }
60      else
61      {
62        f=0;
63        delay(250);
64      }
65        if (digitalRead(switchpin2))
66        {
67          g=1;
68          delay(250);
69        }
70        else
71        {
72          g=0;
73          delay(250);
74        }
75
```



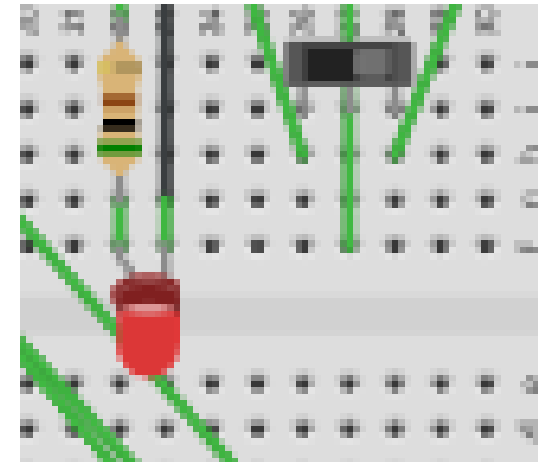
Displaying the user's 4-bit code

```
76  lcd.clear();
77  lcd.setCursor(0,0);
78  lcd.print("Bits chosen:");
79  lcd.setCursor(0,1);
80  lcd.print(c);
81  delay(250);
82  lcd.setCursor(1,1);
83  lcd.print(e);
84  delay(250);
85  lcd.setCursor(2,1);
86  lcd.print(f);
87  delay(250);
88  lcd.setCursor(3,1);
89  lcd.print(g);
90  delay(1000);
```



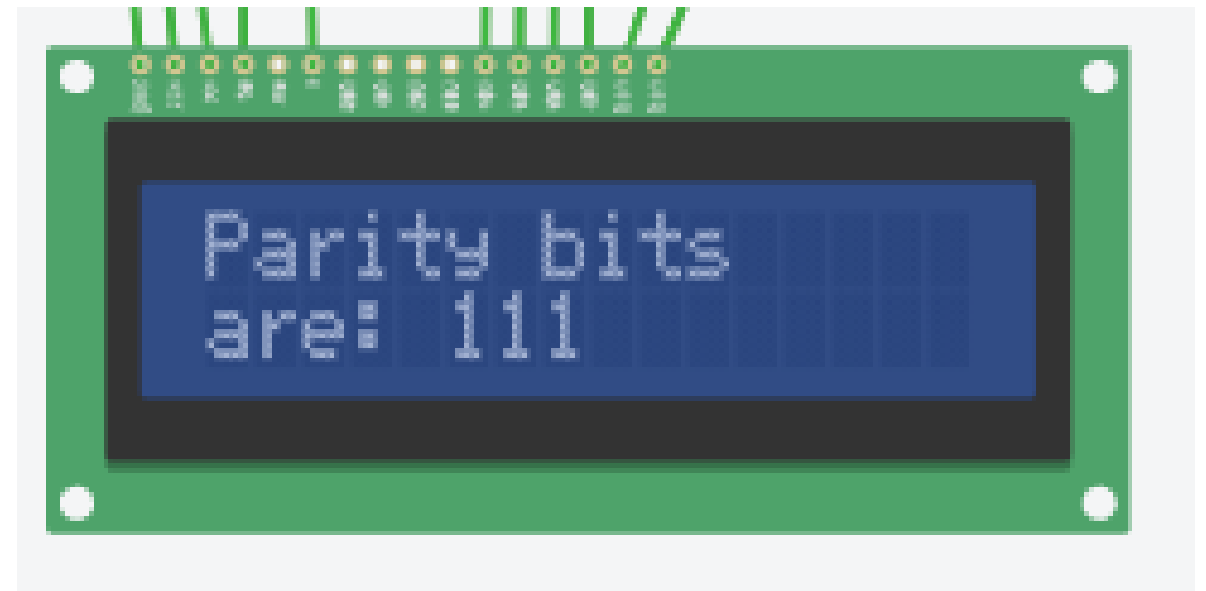
Calculating the even parity Hamming code

```
91 if (digitalRead(switchpin5))
92 {
93   digitalWrite(led, HIGH);    // turn the LED on (HIGH)
94   delay(250);
95   lcd.clear();
96   lcd.setCursor(0,0);
97   lcd.print("Even Hamming:");
98   delay(1000);
99   if ((c+e+g)%2 ==0)// parity bit 1 checks b3,b5,b7
100   {
101     a=0;
102   }
103   else
104   {
105     a=1;
106   }
107   if ((c+f+g)%2==0) // parity bit 2 checks b3,b6,b7
108   {
109     b=0;
110   }
111   else
112   {
113     b=1;
114   }
115   if ((e+f+g)%2==0) // parity bit 3 checks b5,b6,b7
116   {
117     d=0;
118   }
119   else
120   {
121     d=1;
122   }
123   lcd.setCursor(0,1);
124   lcd.print(a);
125   lcd.setCursor(1,1);
126   lcd.print(b);
127   lcd.setCursor(2,1);
128   lcd.print(c);
129   lcd.setCursor(3,1);
130   lcd.print(d);
131   lcd.setCursor(4,1);
132   lcd.print(e);
133   lcd.setCursor(5,1);
134   lcd.print(f);
135   lcd.setCursor(6,1);
136   lcd.print(g);
137 }
```

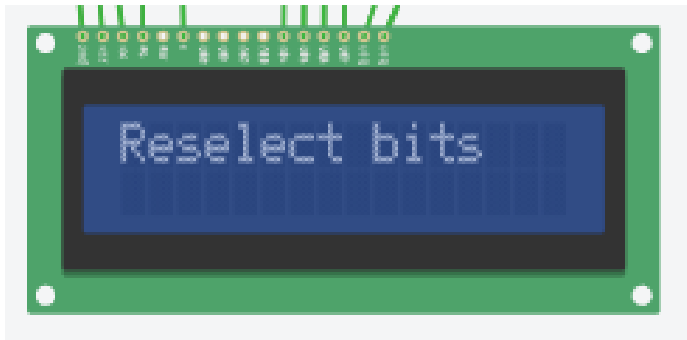


Displaying the parity bits

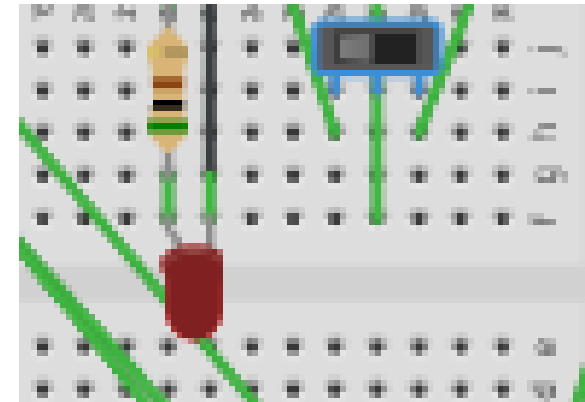
```
138  lcd.clear();  
139  lcd.setCursor(0,0);  
140  lcd.print("Parity bits");  
141  lcd.setCursor(0,1);  
142  lcd.print("are:");  
143  lcd.setCursor(5,1);  
144  lcd.print(a);  
145  lcd.setCursor(6,1);  
146  lcd.print(b);  
147  lcd.setCursor(7,1);  
148  lcd.print(d);  
149  delay(1000);  
150  }
```



Reselecting bits to proceed in the program



```
151 else
152 {
153   digitalWrite(led, LOW);    // turn the LED off
154   delay(250);
155   lcd.clear();
156   lcd.setCursor(0,0);
157   lcd.print("Reselect bits");
158   delay(1000);
159 }
160 }
```



- The End
- Thank you!