EE5803 - FPGA LAB
Assignment-2

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EE22RESCH01005

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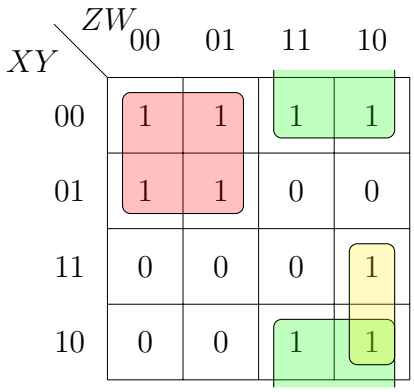
Q. Verify the result obtained in Assignment-1 using Arduino. Given problem is

$$F(X,Y,Z,W) = \sum(0,1,2,3,4,5,10,11,14) \tag{1}$$

Sol. The given boolean expression can be expressed in K-Map as follows,



The implicants in 0,1,4,5 gives us $\bar{X}\bar{Z}$
The implicatns in 2,3,10,11 gives us $\bar{Y}Z$
The implicants in 10,14 gives us $XZ\bar{W}$

Combining all the above terms will give us

$$F(X,Y,Z,W) = \bar{X}\bar{Z} + \bar{Y}Z + XZ\bar{W} \tag{2}$$

The above boolean expression which is same as obtained in Assignment-1 is verified using the following code in Arduino.

The corresponding code to be flashed into Arduino is as follows,

```
#include <Arduino.h>

# define X 2
# define Y 3
# define Z 4
# define W 5

int x, y, z, w, out;

void setup() {
  pinMode(LED_BUILTIN,OUTPUT);
  pinMode(X, INPUT);
  pinMode(Y, INPUT);
  pinMode(Z, INPUT);
  pinMode(W, INPUT);
  // put your setup code here, to run once:
}

void loop() {
x = digitalRead(X);
y = digitalRead(Y);
z = digitalRead(Z);
w = digitalRead(W);

out = ((!x)&&(!z)) | ((!y)&&(z)) | ((x)&&(z)&&(!w));
if (out==1)
digitalWrite(LED_BUILTIN, HIGH);
else
digitalWrite(LED_BUILTIN, LOW);
}
```

The above code can be found in Git with the name Assignment-2.cpp and the same is verified by flashing into the Arduino.