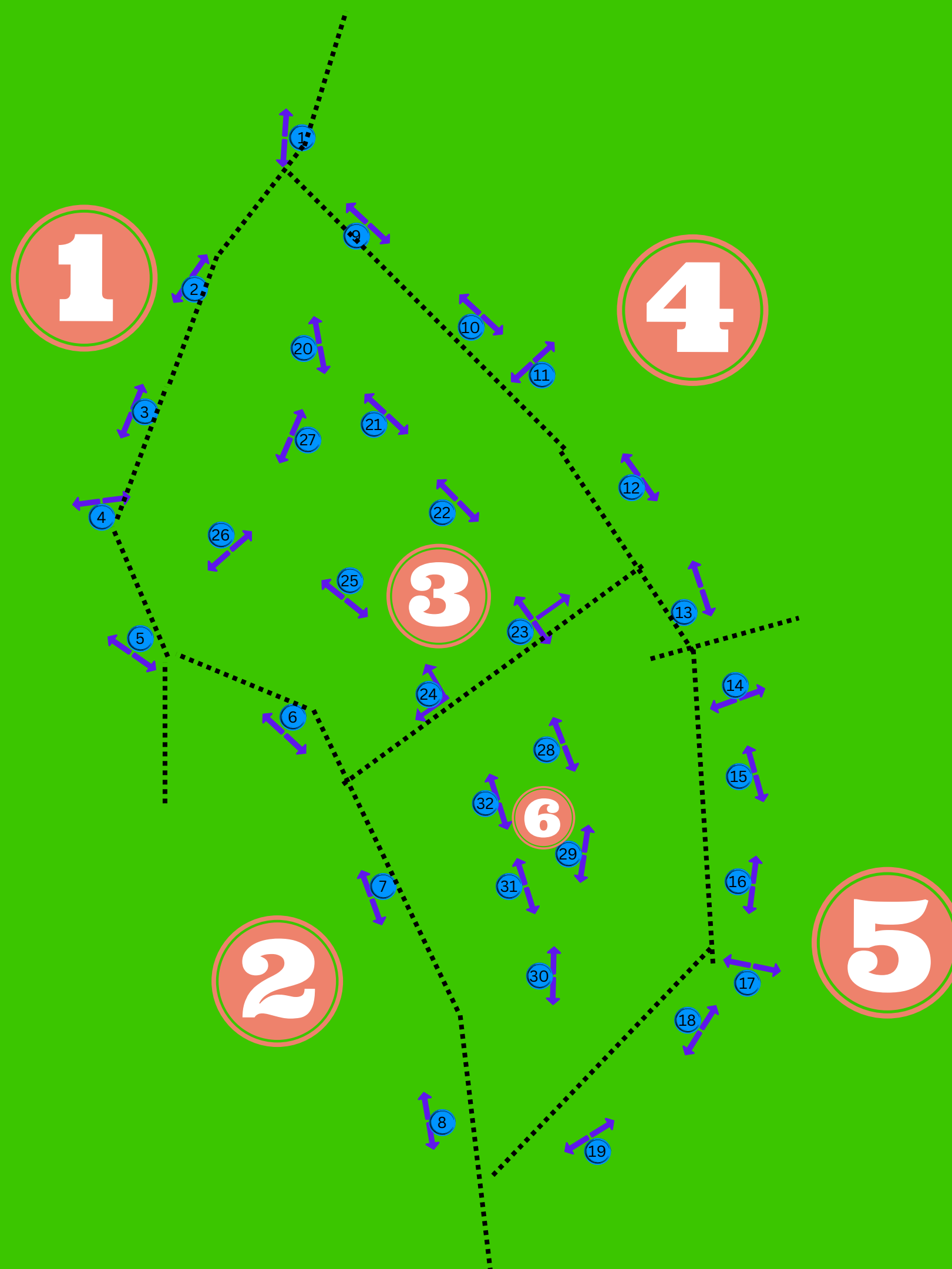SDES

Safe Directioal Evacuation System

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The Zone System

Interzone Encoding
0-No fire
1-001
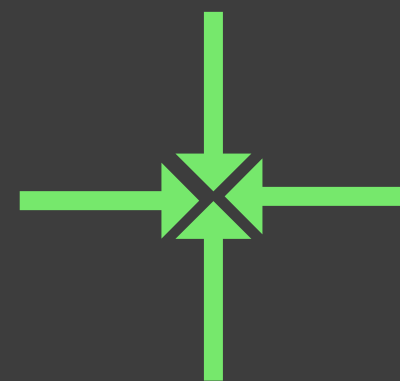2-010
3-011
4-100
5-101
6-110
7-Dont Care

The Reliable Design (No Arduino needed)

Input Logic unit

Generates Y2Y1Y0 which indicates the zone with fire. This is sent to all zonal logic units to be processed further. This unit takes 6 inputs, which is OR of all the sensors in the zone

Zonal Intra-zone Logic unit

Works if the input is the zone number of the zone itself. (For eg, 010 for zone 2). Each LED has one logic for each sensor within the zone.

Zonal Inter-zone Logic unit

Works if the input is not equal to the zone number of the zone itself. (For eg, 010-110 for zone 1). Each LED has 1 logic for fire in each zone.

Input logic Unit

I1	I2	I3	I4	I5	I6	Y2	Y1	Y0
1 X	X	X	X	X		0	0	1
X	1 X	X	X	X		0	1	0
X	X	1 X	X	X		0	1	1
X	X	X	1 X	X		1	0	0
X	X	X	X	1 X		1	0	1
X	X	X	X		1	1	1	0
						Y2=I4+I5+I6	Y1=I2+I3+I6	Y0=I1+I3+I5

Zonal InterZone logic Unit

Led Number	2	3	4	5	6	N/W	S/E
1 N/S	N	N	S	N	N	Y1 + Y2Y0	Y2Y1'Y0'
2 N/S	N	N	S	N	N	Y1 + Y2Y0	Y2Y1'Y0'
3 N/S	S	S	S	S		0	Y1 + Y2
4 W/E	W	W	W	W	W	Y1 + Y2	0
5 N/S	N	S	S	S		Y2'Y1Y0'	Y2 + Y1Y0

Led	1	3	4	5	6	N	S
						Y2Y1'Y0'	
6 N/S	S	N	N	N	N	Y2 + Y1Y0	Y2'Y1'Y0
7 N/S	S	S	N	S		Y2Y0	Y2'Y0 + Y2Y0'
8 N/S	S	S	S	S		Y2Y0	Y2'Y0 + Y2Y0'

LED	1	2	4	5	6	BL for S/W	BL for N/E	
20 N/S	S	N	S	N	N	Y1'.(Y2xorY1)	Y1Y0'+Y2Y1'Y0	
21 N/S	S	N	S	N	N	Y1'.(Y2xorY1)	Y1Y0'+Y2Y0	
22 N/S	S	S	S	S	N	Y2Y1'+Y1'Y0+Y2'Y1Y0'	Y2Y1Y0'	
23 N/S/E	E	E	S	E	E	Y2Y1'Y0'	Y2Y1(N)	(E)Y2'Y1Y0'+Y1'Y0
24 W/N	W	N	W	W	N	Y2Y1'+Y2Y0+Y1'Y0	Y1Y0'	
25 N/S	S	N	N	N	N	Y2'Y1'Y0	Y2+Y1Y0'	
26 W/E	E	E	W	W	W	Y2	(E)Y2'.(Y1xorY0)	
27 NE/SW	SW	NE	SW	SW	SW	(SW)Y2+Y1'Y0	(NE)Y2'Y1Y0'	

Led	1	2	3	5	6	Logic for north	Logic for south	Logic for east	Logic for west
9 N/S	S	N		N		y2'y1+y1y0'+y2y1'y0	y2'y1'y0	0	0
10 N/S	S	S	S	S	N	y2'y1'y0'	y2'y0+y1'y0+y1y0'	0	0
11 W/E	E	E	E	E		0	0	y2'y0+y1'y0+y1y0'	0
12 N/S	N	N	N	N	N	y2'y0+y1'y0+y1y0'	0	0	0
13 N/S	S	S	S	N		y2(y1'y0+y1'y0')	y2'(y0+y1)	0	0
14 W/E	E	E	E	E		0	0	y2'y0+y1'y0+y1y0'	0

Led	1	2	3	4	6	For North	For South	For West	For East
15 n/s	n	n	n	s	n	Y2'Y0 + Y1Y0'	Y2Y1'Y0'	0	0
16 N/S	S	S	S	S		0	(Y0 xor Y2) + (Y0'Y1)	0	0
17 E/W	E	E	E	E		0	0	0	(Y0 xor Y2) + (Y0'Y1)
18 N/S	N	N	N	N		(Y0 xor Y2) + (Y0'Y1)	0	0	0
19 N/S	S	N	S	S		Y2'Y1Y0'	Y2Y0' + Y1Y2'	0	0

Led	1	2	3	4	5	Logic for North	Logic for South
28 N/S	N	N	S	S	N	Y2'(Y1^Y0)+Y2Y0	Y1Y0+Y2(Y1^Y0)'
29 N/S	S	N	N	N	N	Y1(Y2^Y0)+Y2(Y1^Y0)'	Y2'Y0+Y2(Y1^Y0)'
30 N/S	S	N	N	N	N	Y1(Y2^Y0)+Y2(Y1^Y0)'	Y2'Y0+Y2(Y1^Y0)'
31 N/S	S	N	N	N	N	Y1(Y2^Y0)+Y2(Y1^Y0)'	Y2'Y0+Y2(Y1^Y0)'
32 N/S	S	N	S	N	N	Y2'Y0	Y2Y1'+Y1(Y2^Y0)'

Demonstration in Unit Testing Mode

Inputs given through Arduino for testing demonstration purposes

Intra zone testing

Initially Input set to 0. If any button is pressed in zone, then Input changed to that zone number

Inter Zone testing

Inputs to each zone is iterated from 0 to 6 to demonstrated all cases.

Intra zone testing code

```
void setup() {
  pinMode(12,OUTPUT);pinMode(11,OUTPUT);pinMode(10,OUTPUT);
  pinMode(A0,INPUT);
  Serial.begin(9600);
}
void loop() {
  Serial.println(analogRead(0));
  if(analogRead(0)>500){
    digitalWrite(10,LOW);digitalWrite(11,HIGH);digitalWrite(12,LOW);
  }
  else{
    digitalWrite(10,LOW);digitalWrite(11,LOW);digitalWrite(12,LOW);
  }
}
```

Inter zone testing code

```
void setup() {
  pinMode(12,OUTPUT);pinMode(11,OUTPUT);pinMode(10,OUTPUT);
  Serial.begin(9600);
}


void loop() {
  // put your main code here, to run repeatedly:
  Serial.println(0);
  digitalWrite(10,LOW);digitalWrite(11,LOW);digitalWrite(12,LOW);delay(3000);

  Serial.println(1);
  digitalWrite(10,LOW);digitalWrite(11,LOW);digitalWrite(12,HIGH);delay(3000);

  Serial.println(2);
  digitalWrite(10,LOW);digitalWrite(11,HIGH);digitalWrite(12,LOW);delay(3000);

  Serial.println(3);
  digitalWrite(10,LOW);digitalWrite(11,HIGH);digitalWrite(12,HIGH);delay(3000);

  Serial.println(4);
  digitalWrite(10,HIGH);digitalWrite(11,LOW);digitalWrite(12,LOW);delay(3000);

  Serial.println(5);
  digitalWrite(10,HIGH);digitalWrite(11,LOW);digitalWrite(12,HIGH);delay(3000);

  Serial.println(6);
  digitalWrite(10,HIGH);digitalWrite(11,HIGH);digitalWrite(12,LOW);delay(3000);
}
```

Thank You

BY TEAM SDES