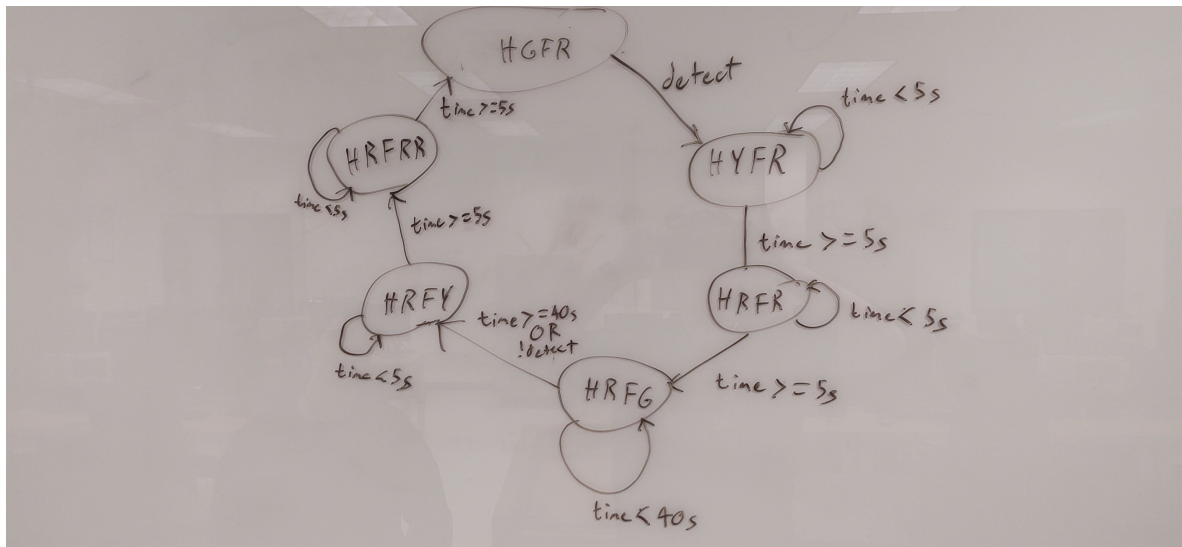3.


```
1   enum{HGFR, HYFR, HRFR, HRFG, HRFY, HRFRR, HRRFRR};
2   bool detect = false;
3   int state = HRFRR, prevState = !state;
4   float stateTimer = 0;
5   boolean isNewState;
6   void setup(){
7       DDRD |= 0xFC; //setting light pins to output
8       DDRB &= ~(0x01); //set detect pin to input
9       PORTB |= 0x01; //turn on detect pin pullup
10  }
11
12  void loop(){
13      detect = (PINB & 0x01);
14      isNewState = (state != prevState);
15      prevState = state;
16      switch(state){
17          case HGFR:
18              if(isNewState){
19                  PORTD &= ~(0x80);
20                  PORTD |= 0x30;
21              }
22              if(detect) state = HYFR;
23              break;
24
25          case HYFR:
26              if(isNewState){
27                  PORTD &= ~(0x20);
28                  PORTD |= 0x40;
29                  stateTimer=0;
30              }
31              if(!(isNewState)){
32                  stateTimer++;
33              }
34              if(stateTimer >= 5000)state = HRFR;
35              break;
36
```

```
37          case HRFR:
38              if(isNewState){
39                  PORTD &= ~(0x40);
40                  PORTD |= 0x80;
41                  stateTimer=0;
42              }
43              if(!(isNewState)){
44                  stateTimer++;
45              }
46              if(stateTimer >= 5000)state = HRFR;
47              break;
48
49          case HRFG:
50              if(isNewState){
51                  PORTD &= ~(0x10);
52                  PORTD |= 0x04;
53                  stateTimer=0;
54              }
55              if(!(isNewState)){
56                  stateTimer++;
57              }
58              if((stateTimer >= 40000) || !(detect)) state = HRFY;
59              break;
60
61          case HRFY:
62              if(isNewState){
63                  PORTD &= ~(0x04);
64                  PORTD |= 0x08;
65                  stateTimer=0;
66              }
67              if(!(isNewState)){
68                  stateTimer++;
69              }
70              if(stateTimer >= 5000)state = HRFRR;
71              break;
72
73          case HRFRR:
74              if(isNewState){
75                  PORTD &= ~(0x08);
76                  PORTD |= 0x10;
77                  stateTimer=0;
78              }
79              if(!(isNewState)){
80                  stateTimer++;
81              }
82              if(stateTimer >= 5000)state = HGFR;
83              break;
84
85          case HRRFRR:
86              if(isNewState){
87                  PORTD &= ~(0x08);
88                  PORTD |= 0x10;
89                  stateTimer=0;
90              }
91              break;
92
93          default: state = HRRFRR;
94      }
```
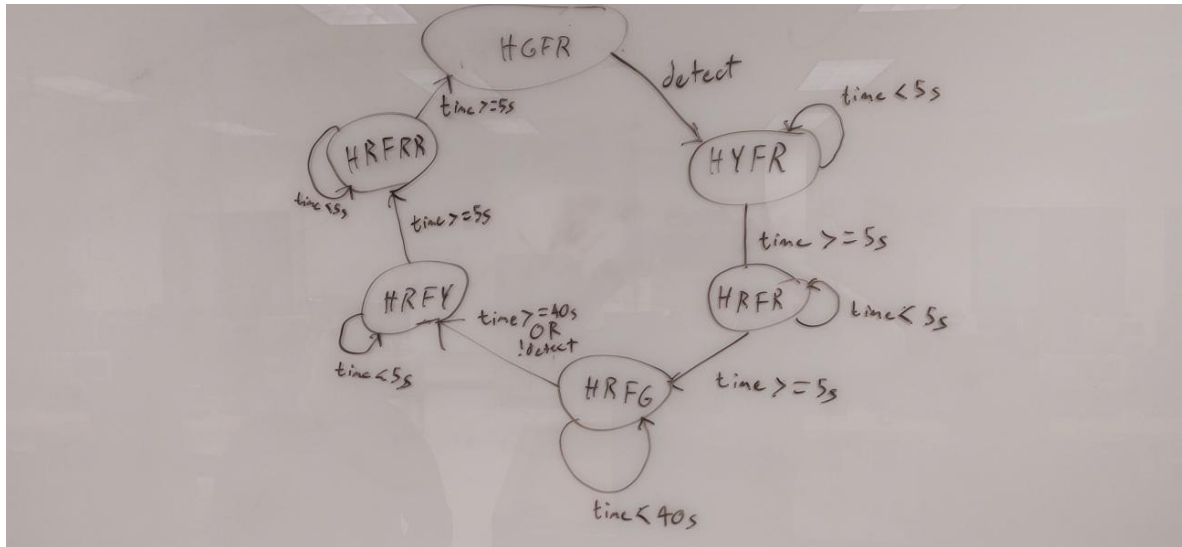
```
95        delay(1);
96  }
97
```

4.


```
1   enum{fwd, backr, backl, turnr, turnl, stop};
2   bool rs = false, ls = false;
3   int state = fwd, prevState = !fwd;
4   int stateTimer = 0;
5   #define forward  0xC0
6   #define rightTurn  0x40
7   #define leftTurn  0x80
8   boolean isNewState;
9   void setup(){
10      DDRD |= 0xC0; DDRD &= ~(0x03); //setting input/output pins
11      PORTD |= 0x03; //setting pushbutton pullups
12  }
13
14  void loop(){
15      rs = !(PIND & 0x02);
16      ls = !(PIND & 0x01);
17      isNewState = (state != prevState);
18      prevState = state;
19      switch(state){
20          case fwd:
21              if(isNewState){
22                  PORTD |= forward;
23              }
24              if(rs) state = backr;
25              else if(ls) state = backl;
26              break;
27
28          case backr:
29              if(isNewState){
30                  PORTD &= ~(forward);
31                  stateTimer=0;
32              }
33              if(!(isNewState)){
34                  stateTimer++;
```

```
                }
            if (stateTimer >= 500) state = turnr;
            break;

        case turnr:
            if(isNewState){
                PORTD |= rightTurn;
            }
            if (stateTimer >= 500) state = fwd;
            break;

        case backl:
            if(isNewState){
                PORTD &= ~(forward);
                stateTimer=0;
            }
            if(!(isNewState)){
                stateTimer++;
            }
            if (stateTimer >= 500) state = turnl;
            break;

        case turnl:
            if(isNewState){
                PORTD |= leftTurn;
            }
            if (stateTimer >= 500) state = fwd;
            break;

        case stop:
            if(isNewState){
                PORTD &= ~(forward);
            }
            break;

        default: state = stop;
    }
    delay(1);
}
```