// PROJECT  :TrafficLight

// PURPOSE  :Basic demonstration of inline assembly code

// DEVICE   :Arduino

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// DATE     :2018 11 29

// uC       :328

// COURSE   :ICS4U

// STATUS   :Working

// REFERENCE:
// [http://darcy.rsgc.on.ca/ACES/TEI4M/1819/AssemblyTasks.html#TrafficLight](http://darcy.rsgc.on.ca/ACES/TEI4M/1819/AssemblyTasks.html%23TrafficLight)

//    <http://darcy.rsgc.on.ca/ACES/TEI4M/AVRdelay.html>

// NOTES    :Schaffer Traffic Light: seated in digital pins 11:8(ground)

void setup() {

  asm (

    "ldi  r16,0b00001111      \n" //declare PB3:0 (D11:8) for output

    "out  0x04,r16            \n" //declare 'em: aka pinMode(11:8,OUTPUT);

    "clr  r16                 \n" //prepare to ground 'em all on setup

    "out  0x05,r16            \n" //clear 'em: aka digitalWrite(13:8,LOW);

    "ldi  r16,0b00000010      \n" //start with only PB1 (D8) HIGH (green)

  );

}

void loop() {

  asm("out    0x05,r16        \n" //**GREEN!**

      "rcall  delay1s         \n" //wait 1s

      "rcall  delay1s         \n" //wait 1s

      "rcall  delay1s         \n" //wait 1s

      "lsl    r16             \n" //prepare to set only PB2 (D9) HIGH (amber)

      "out    0x05,r16        \n" //**AMBER!**

      "rcall  delay1s         \n" //wait 1s

      "lsl    r16             \n" //prepare to set only PB3 (D10) HIGH (red)

      "out    0x05,r16        \n" //**RED!**

      "rcall  delay1s         \n" //wait 1s

      "rcall  delay1s         \n" //wait 1s

      "rcall  delay1s         \n" //wait 1s

      "lsr     r16            \n" //prepare to set only PB1 (D8) HIGH (green)

      "lsr     r16            \n" //with logical shift right (twice)

      "rjmp cya               \n" //outta here...

//http://darcy.rsgc.on.ca/ACES/TEI4M/AVRdelay.html

"**delay1s**:                     \n"

      "ldi  r18, 82           \n" //kills 16 000 000 clock cycles

      "ldi  r19, 43           \n"

      "ldi  r20, 0            \n"

"1:    dec  r20               \n"

      "brne 1b                \n" //conditional branch back to label 1:

      "dec  r19               \n"

      "brne 1b                \n" //conditional branch back to label 1:

      "dec  r18               \n"

      "brne 1b                \n" //conditional branch back to label 1:

      "lpm                    \n"

      "nop                    \n"

      "ret                    \n"

"cya:                    \n"

     );

}