SOLUTIONS

NOTE: There many possible solutions!

1. Data Monitoring

```c
void checkspeed()
{
    if (PINB >= 100) PORTD |= 0b00010000; /* Switch on light (bit 4) */
    else PORTD &= 0b11101111; /* Switch off light (bit 4) */
}
```

You could also say: PORTD = 0b10000; and PORTD = 0; respectively, but this would set all other bits in PORTD to zero. The solution given above will not change any bits except bit 4.

2. Temperature Control

```c
void tempControl()
{
    int temperature;
    int *temp_pointer = (int *) 0x400;

    DDRD = 0x11; /* bit4 and bit0 output, rest input */
    while (1)
    {
        temperature = *(temp_pointer); /* read in the temperature */
        if (temperature < 20)
        {
            PORTD |= 0b00000001; /* turn on heater (bit 0) */
            PORTD &= 0b11101111; /* turn off aircon (bit 4) */
        }
        else if (temperature > 24)
        {
            PORTD |= 0b00010000; /* turn on aircon (bit 4) */
            PORTD &= 0b11111110; /* turn off heater (bit 0) */
        }
        else PORTD &= 0b11101110; /* turn off heater and aircon*/
    } /* end while */
}
```
3. Sensor Connection

```c
char ReadCompass ()
{
    DDRD = 0;  /* Set PORTD as input */
    DDRB = 0x80;  /* Set B7 output, B6 input */

    PORTB = PORTB | 0x80;  /* Generate a start pulse */
    PORTB = PORTB & 0x7F;

    while (!(PINB & 0x40)) ;  /* Wait for Ready signal to go high */

    return PIND;  /* Read compass data from PIND */
}
```