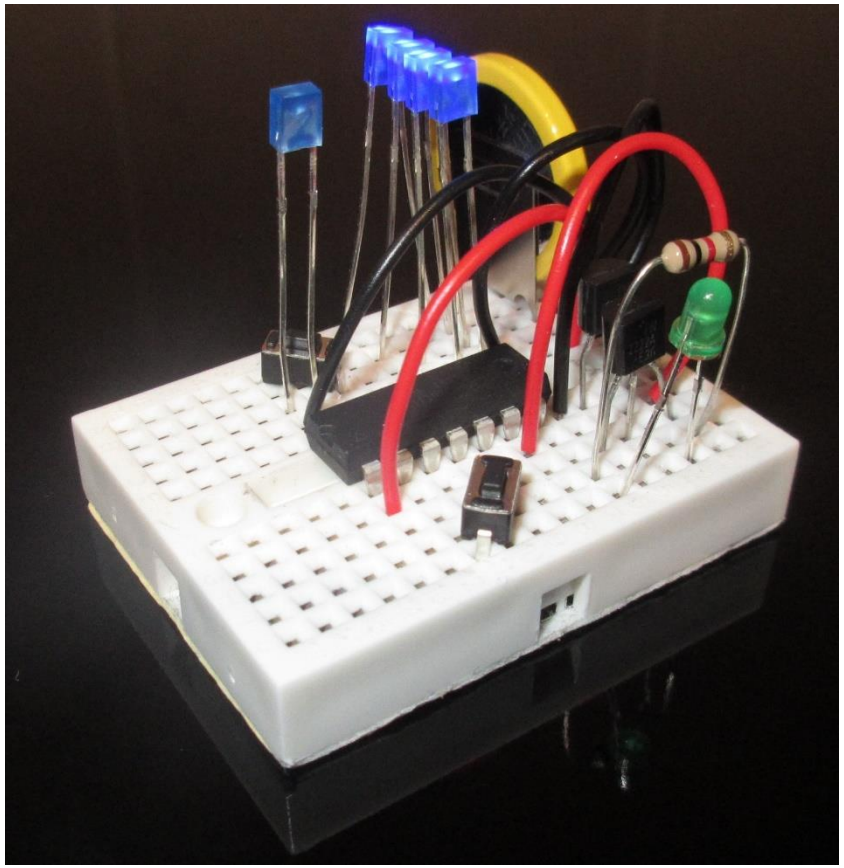
Data logger

Talk and Build

“Putting it all together”



Stephan Barnard
Noble Touch Limited

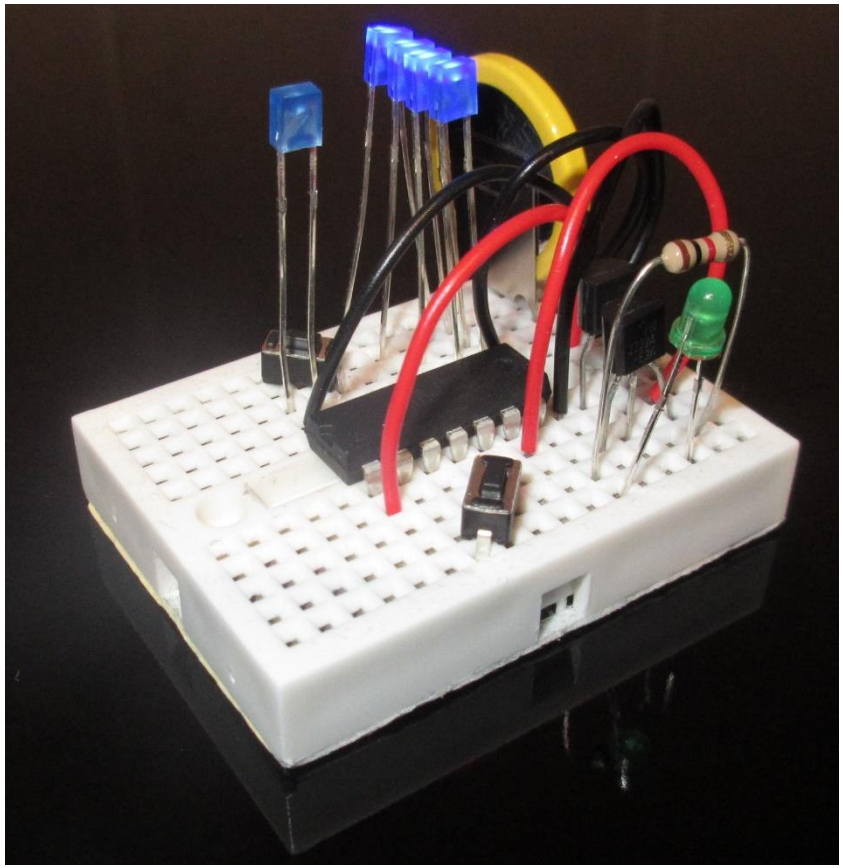
www.noblemicro.com

www.nobletouch.co.uk

WARNING!

flashing lights

Adult supervision required

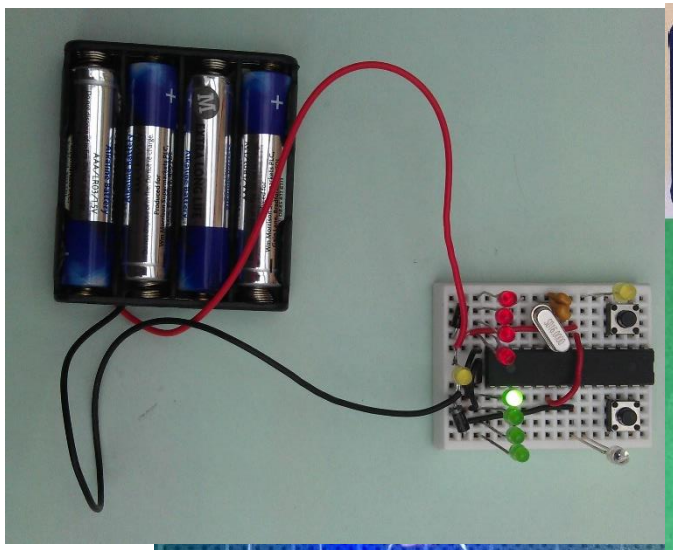


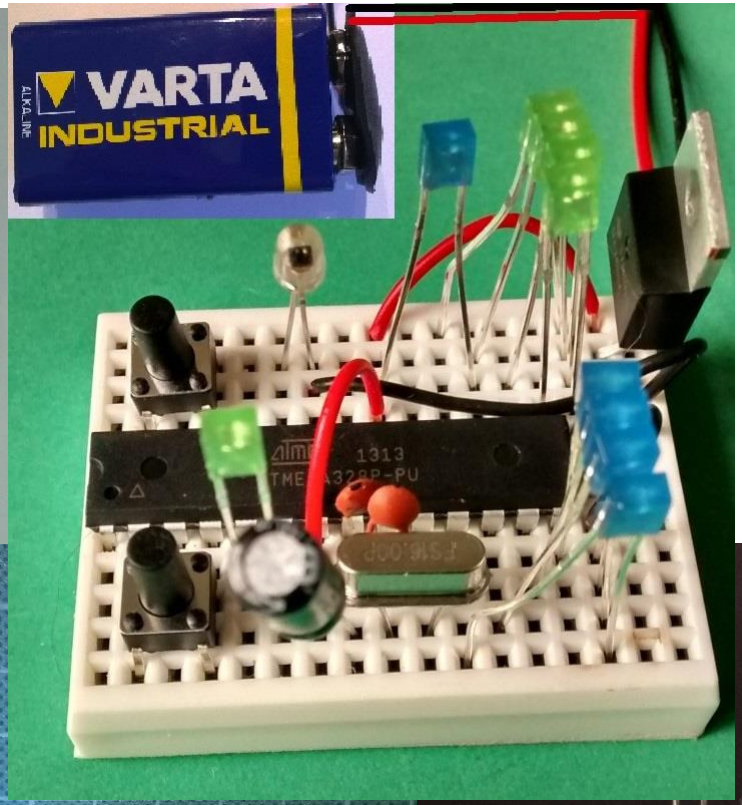
Contains **small and sharp parts.**

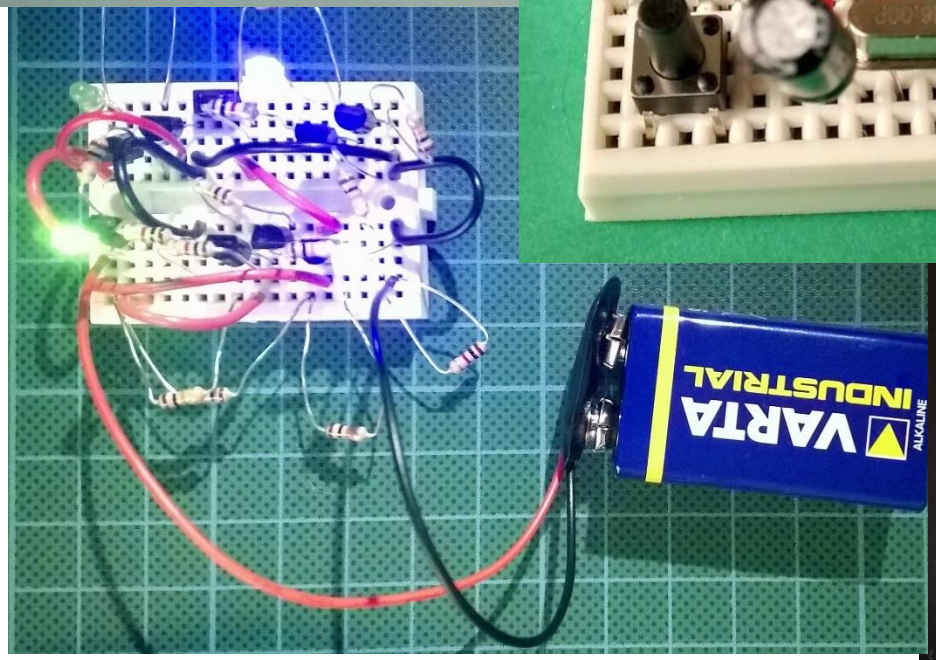
Warning bright lights
Do not look directly at the LEDs

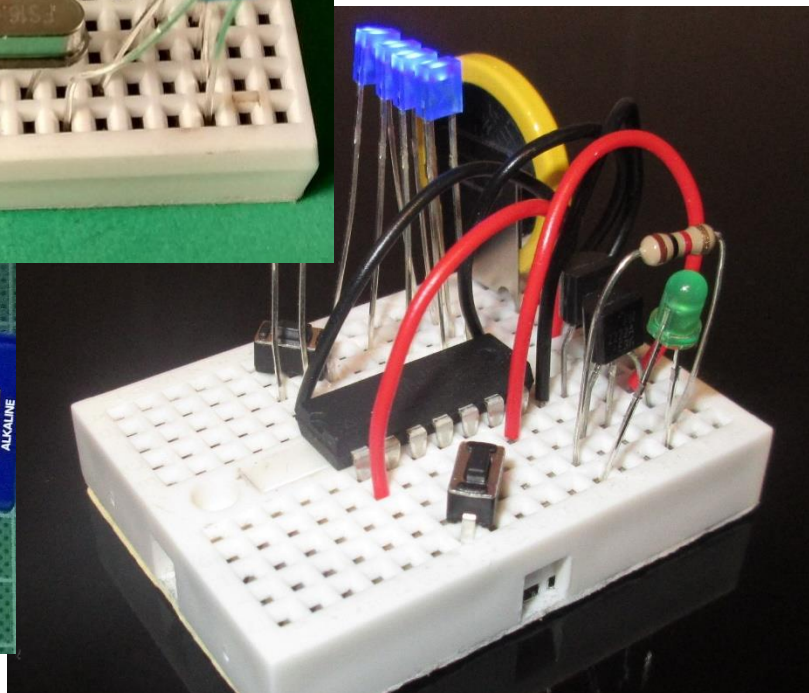
Components are as shipped from manufacturers and intended for training engineers only.

BCS Kit talk and build events

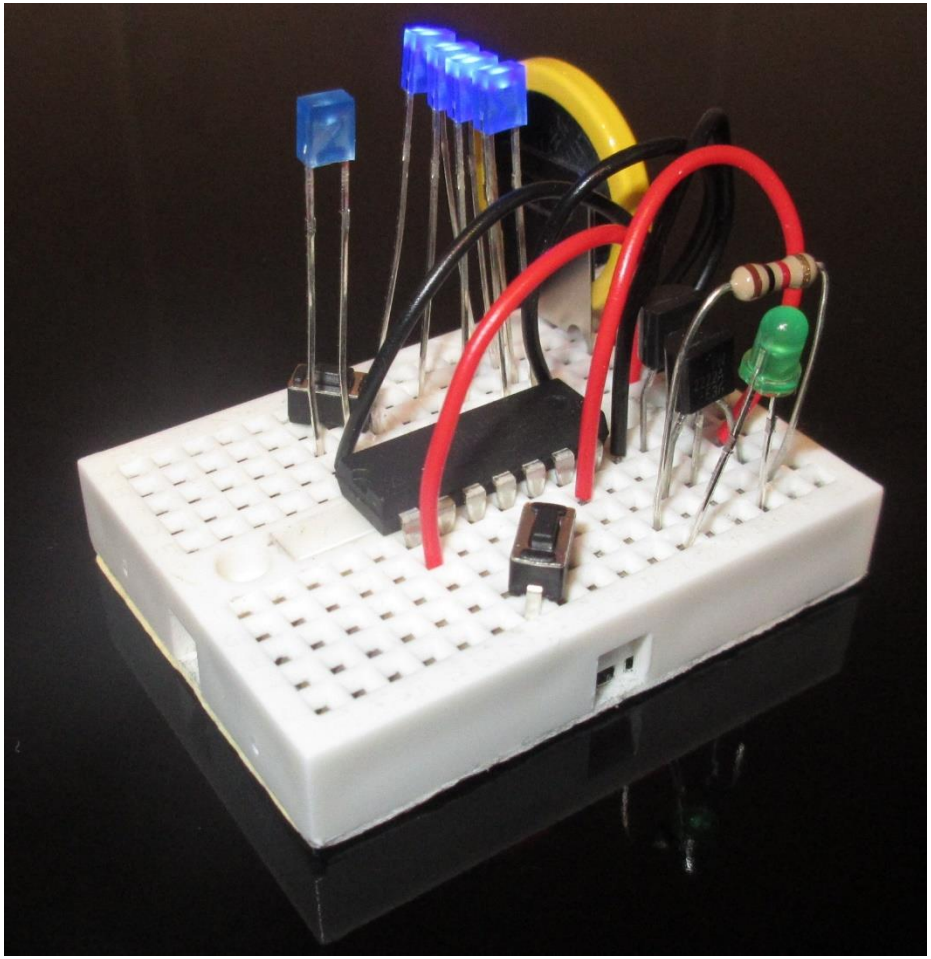








Putting it all together



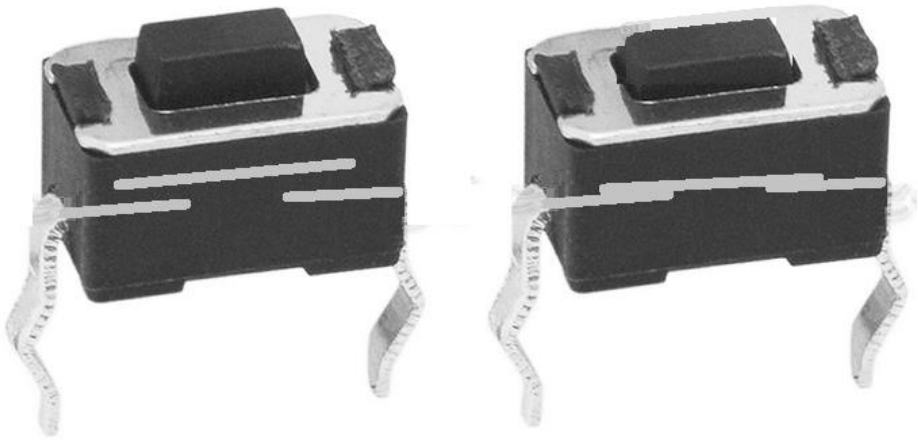
Suggested Build Order

1. Align breadboard
2. Wires
3. Switches
4. Transistors & Resistor
5. LEDs
6. Lithium cell & Power up

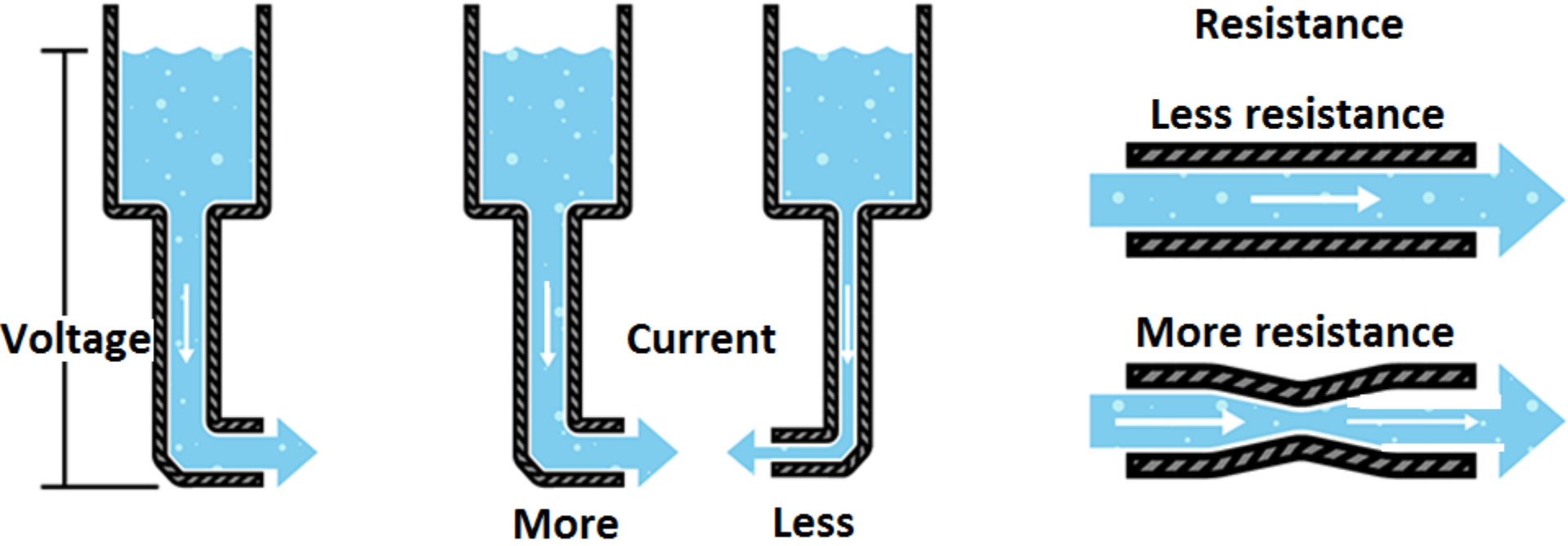
www.noblemicro.com

Breadboard Connected in rows of 5

Flow of electrons

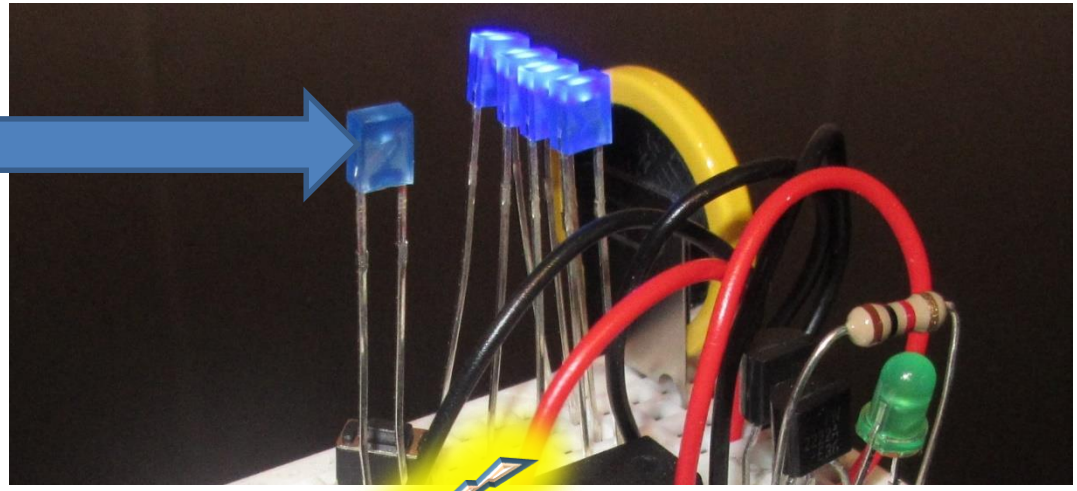


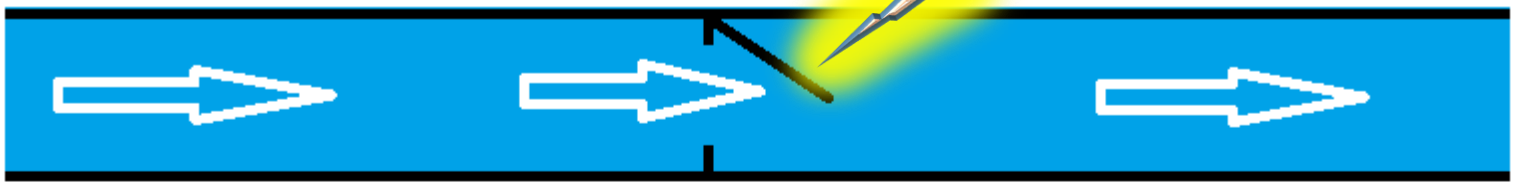
Water analogy of electric current



Light Emitting Diodes (LEDs)

LED

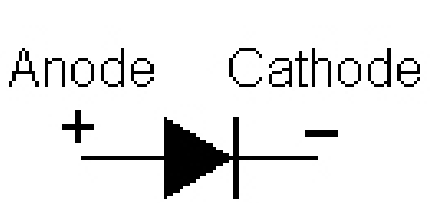


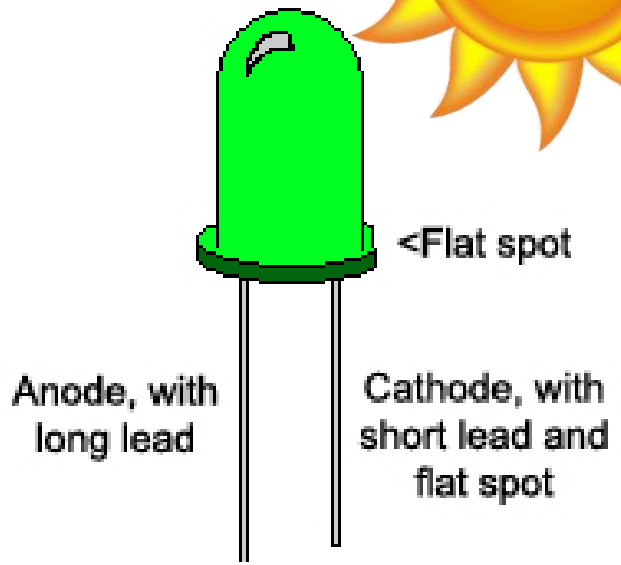


+ forward bias -

- reverse bias +

Detector LED





+ forward bias -

- reverse bias +

NPN Transistor

PN2222ATA Bipolar (BJT)

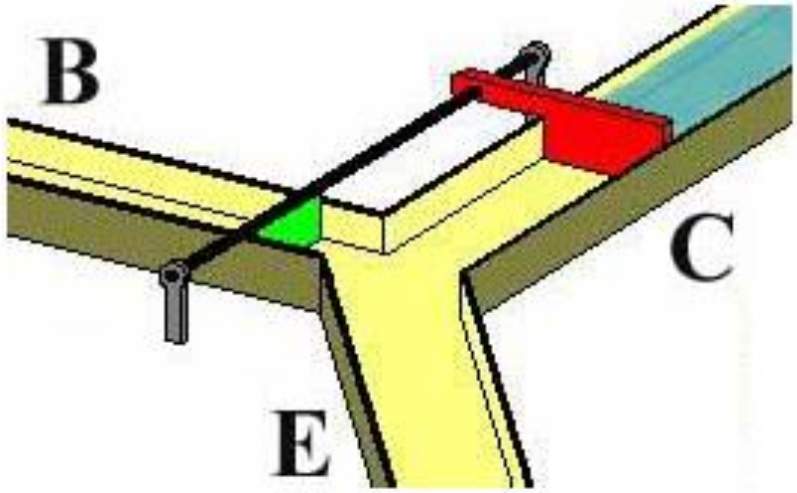
Emitter

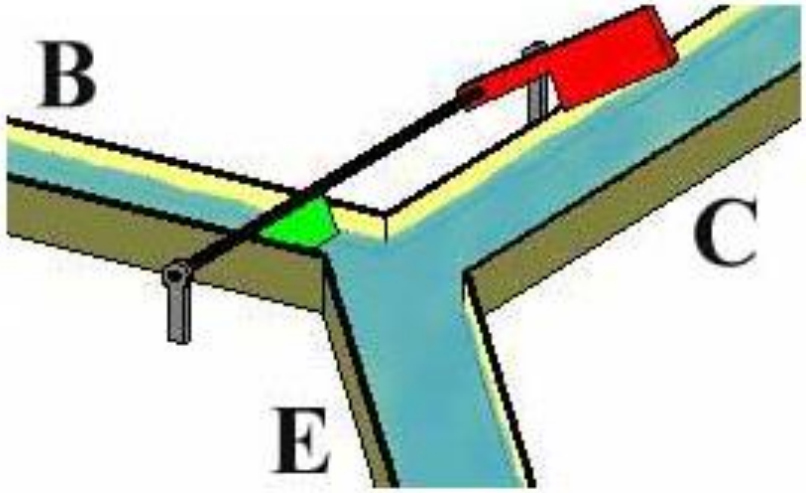
Collector

Base

NPN Transistor

PN2222ATA Bipolar (BJT)

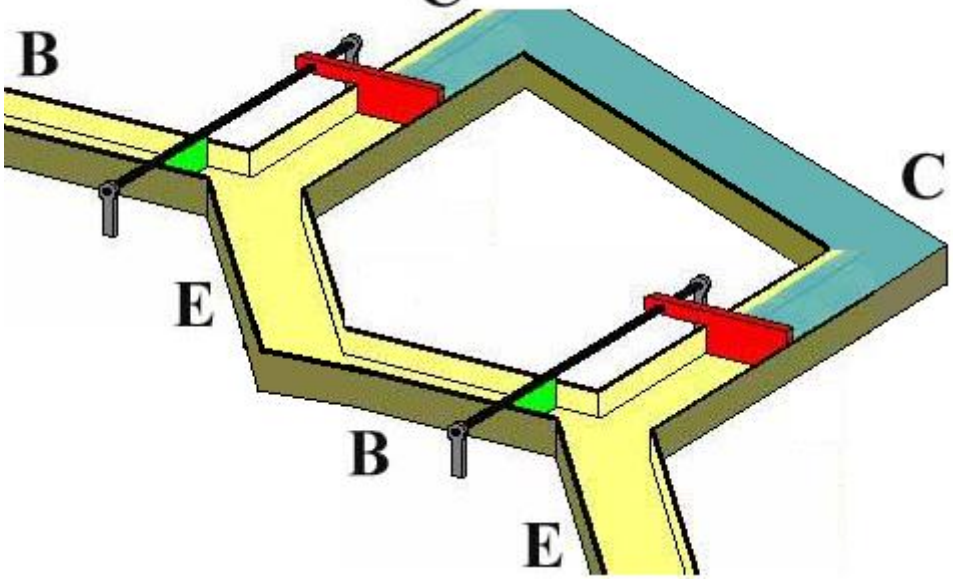




Darlington pair

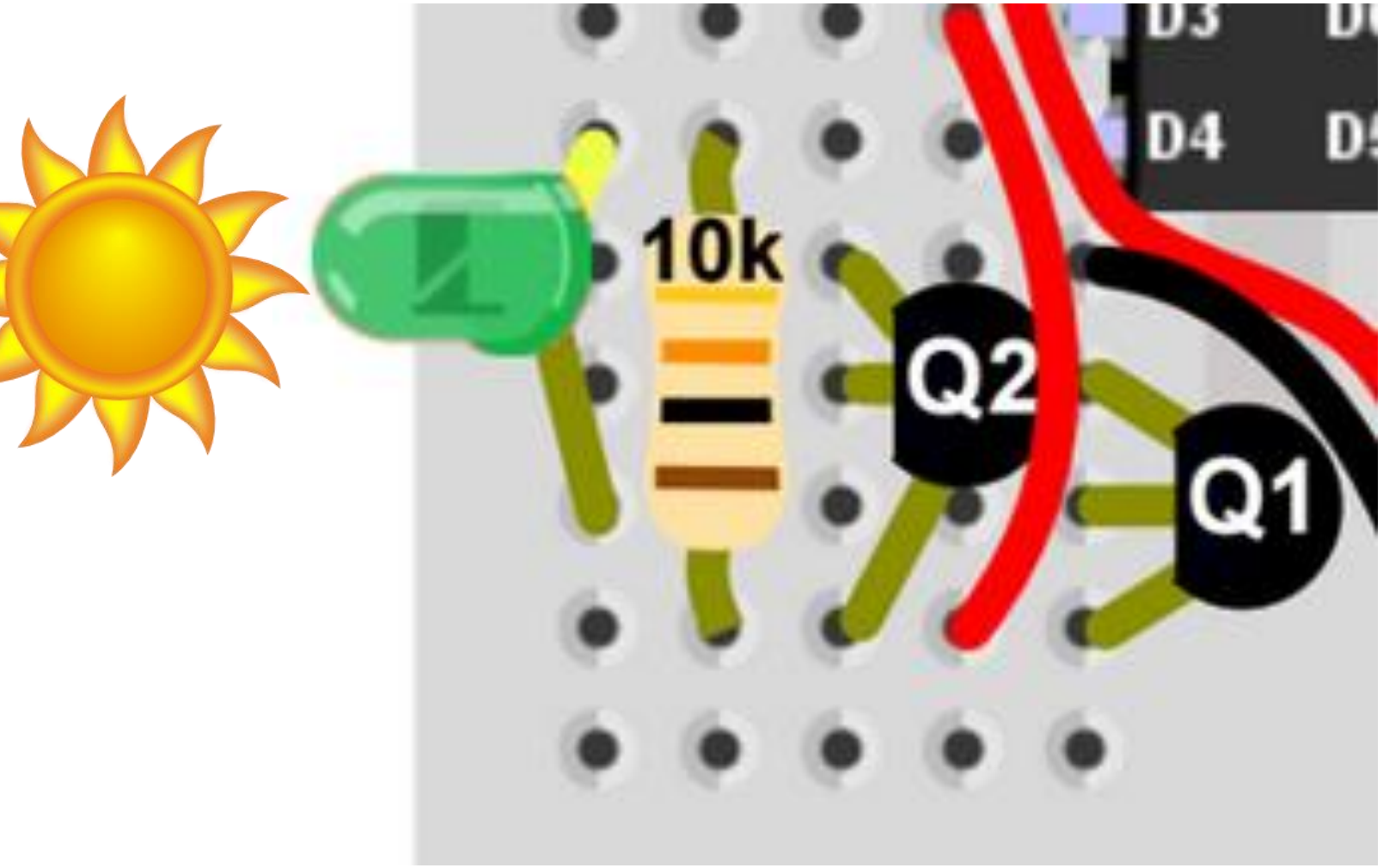
Collector

Base



Emitter

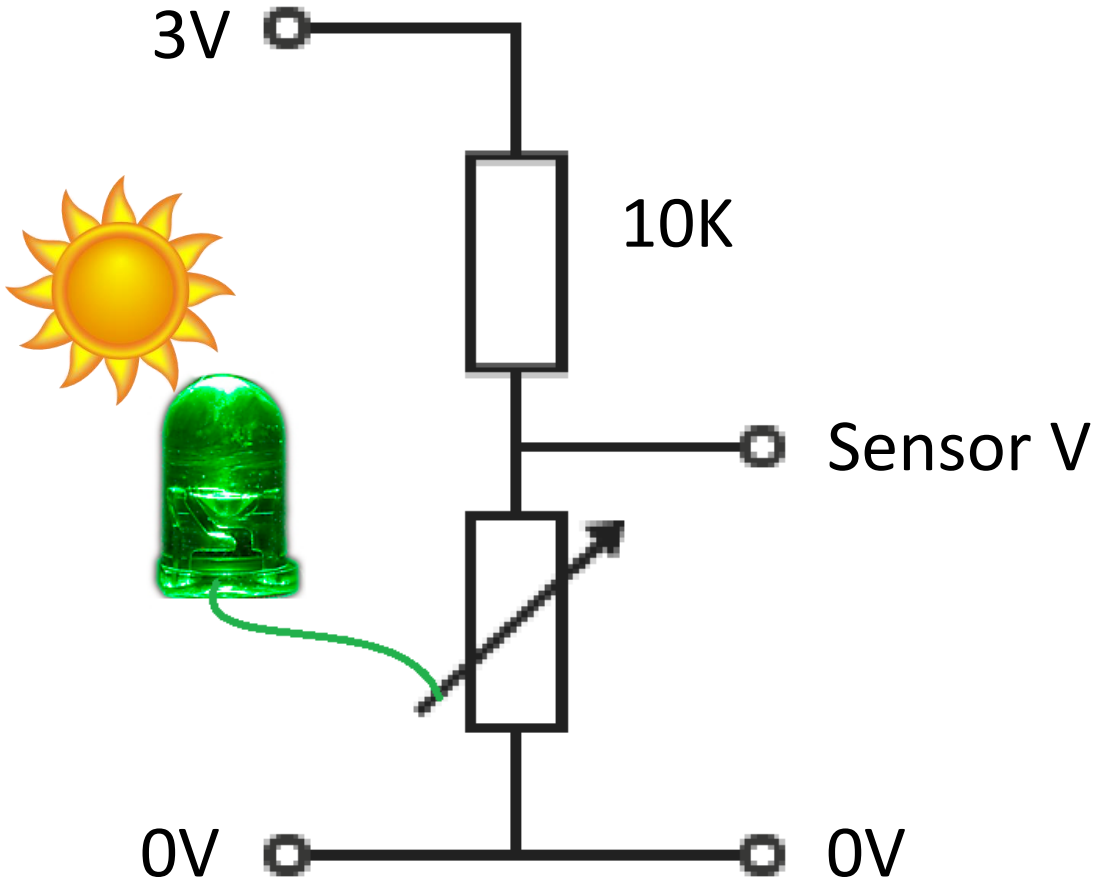
LED Light Sensor Circuit



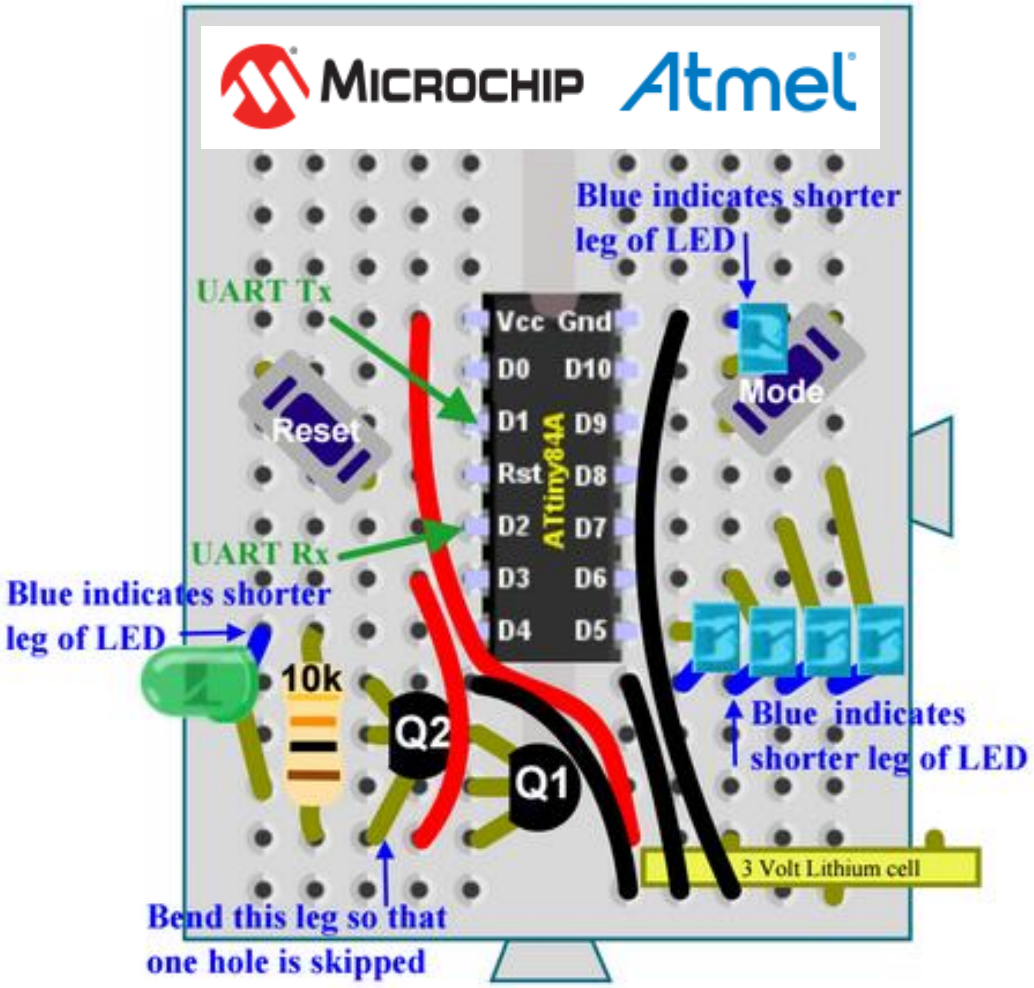
LED Light Sensor Circuit

$$I = \frac{V}{R}$$

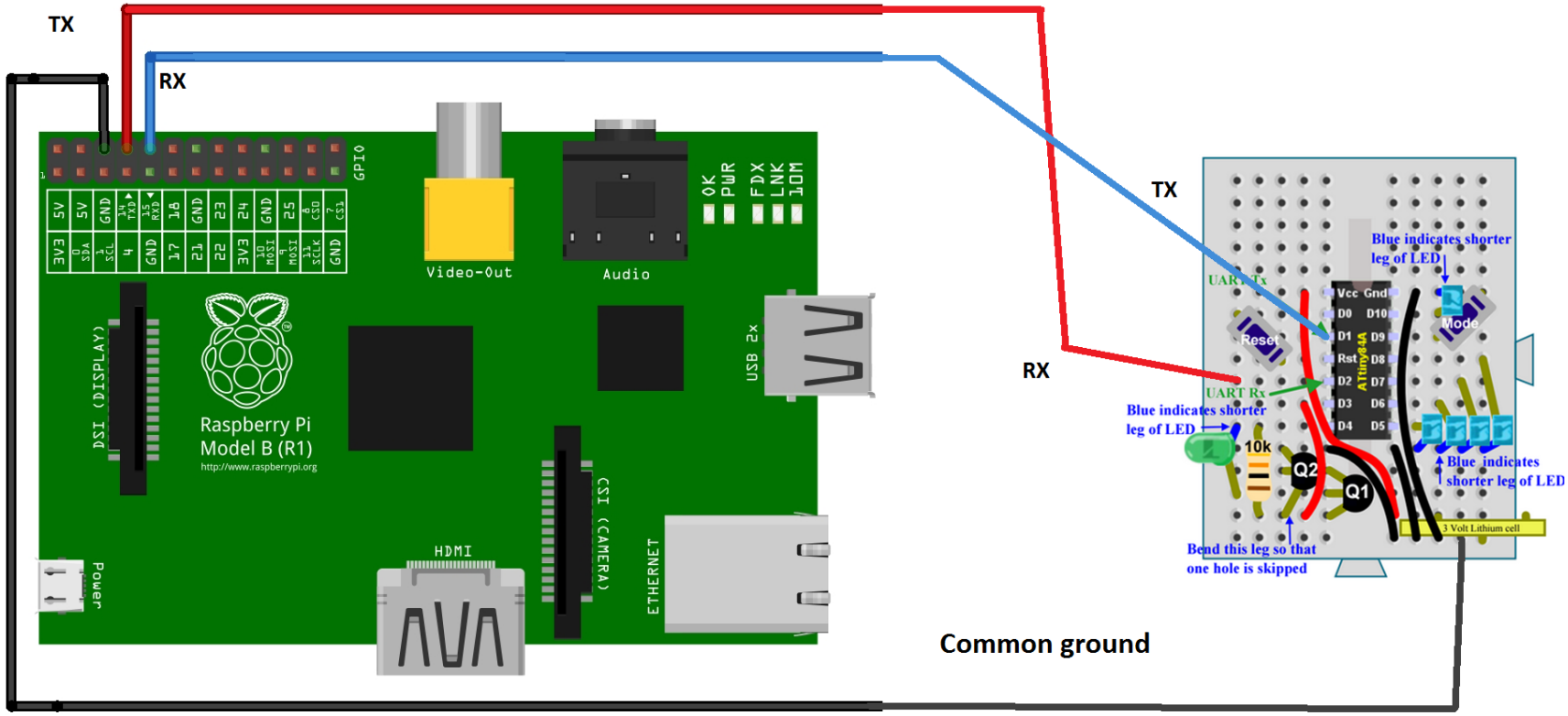
Sensor voltage = Vcc - ((R1 / (R1 + VR1)) * Vcc)



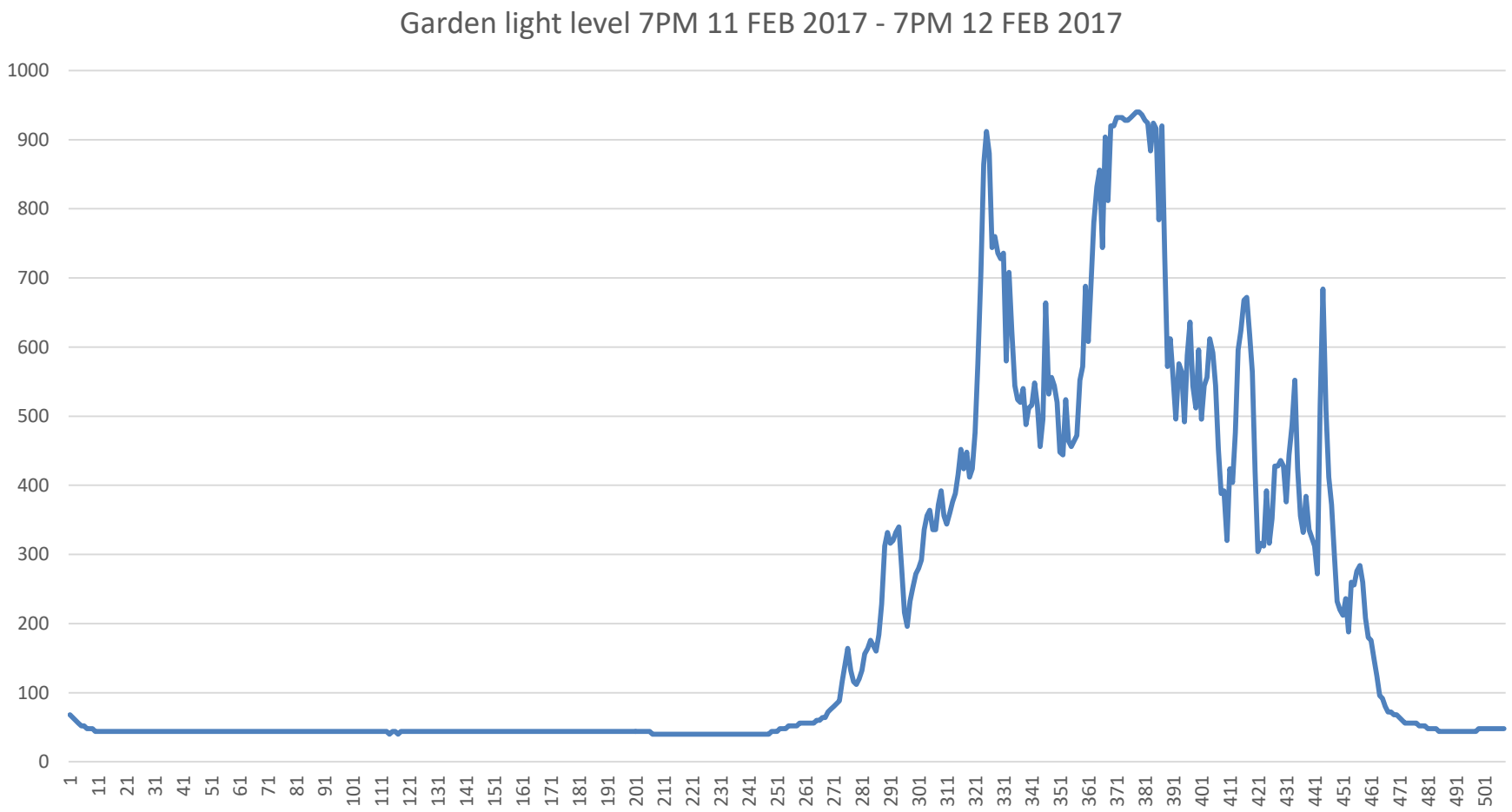
Data Logger


MICROCHIP
Atmel
Blue indicates shorter leg of LED
UART Tx
Vcc Gnd
D0 D10
D1 D9
Rst D8
D2 D7
D3 D6
D4 D5
ATtiny84A
Reset
Mode
UART Rx
Blue indicates shorter leg of LED
10k
Q2
Q1
Blue indicates shorter leg of LED
3 Volt Lithium cell
Bend this leg so that one hole is skipped

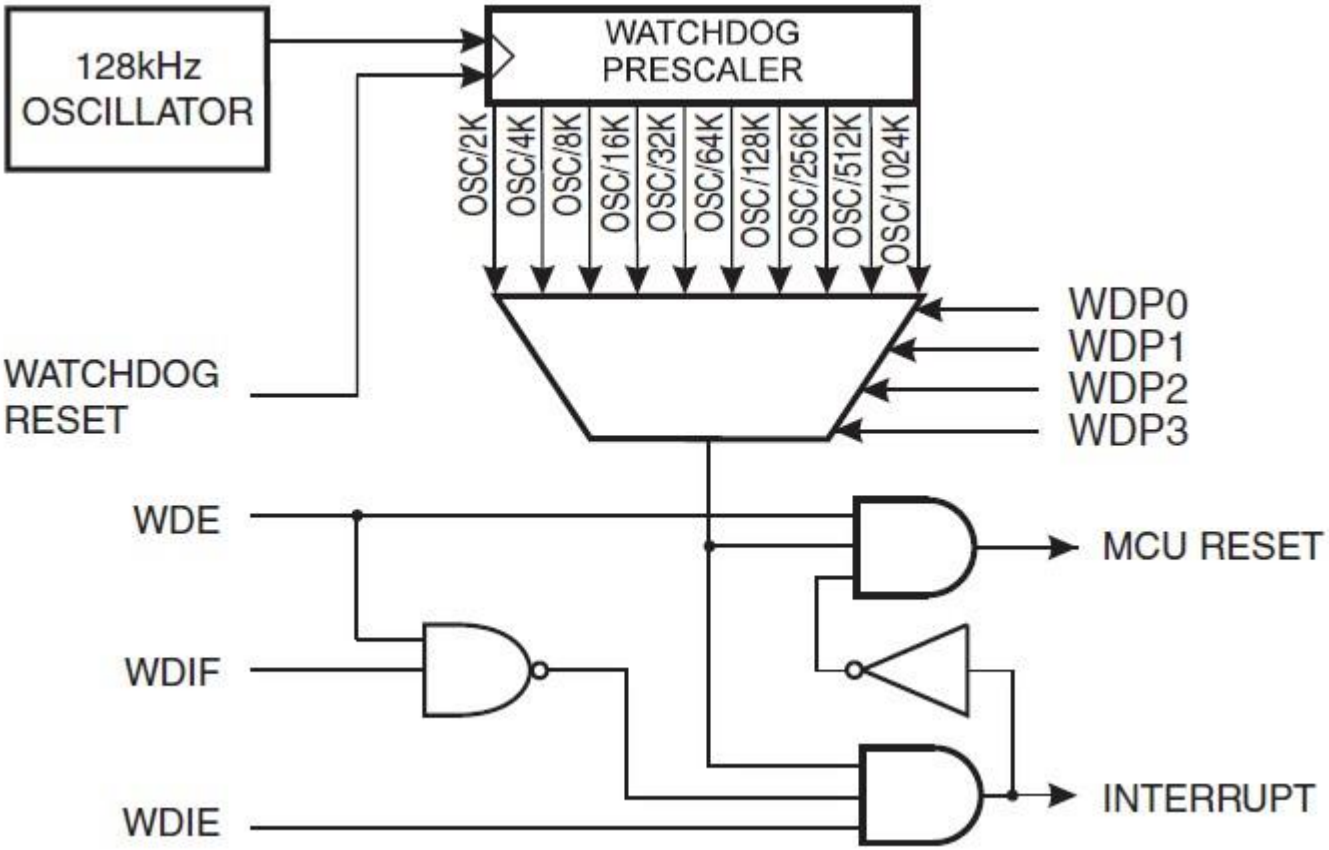
Data Logger


TX
RX
GPIO
Video-Out
Audio
OK
PWR
FDX
LNK
10M
DSI (DISPLAY)
Raspberry Pi
Model B (R1)
http://www.raspberrypi.org
USB 2x
CSI (CAMERA)
HDMI
ETHERNET
Power
TX
RX
Blue indicates shorter leg of LED
UART Tx
Reset
Mode
UART Rx
Blue indicates shorter leg of LED
10k
Q2
Q1
Blue indicates shorter leg of LED
3 Volt Lithium cell
Bend this leg so that one hole is skipped
Common ground

Data

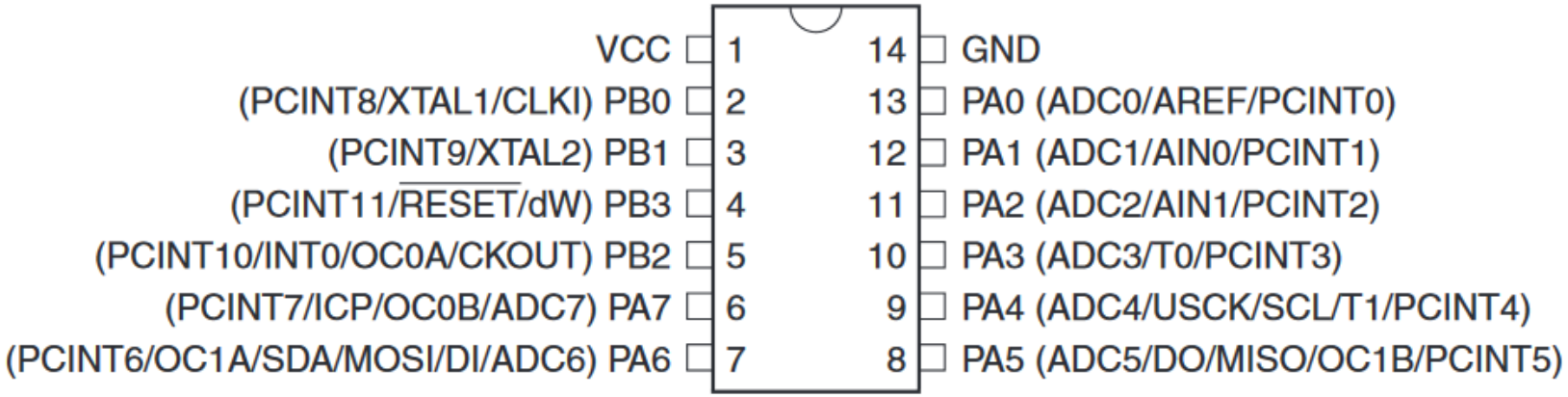

Garden light level 7PM 11 FEB 2017 - 7PM 12 FEB 2017
1000
900
800
700
600
500
400
300
200
100
0
1
11
21
31
41
51
61
71
81
91
101
111
121
131
141
151
161
171
181
191
201
211
221
231
241
251
261
271
281
291
301
311
321
331
341
351
361
371
381
391
401
411
421
431
441
451
461
471
481
491
501

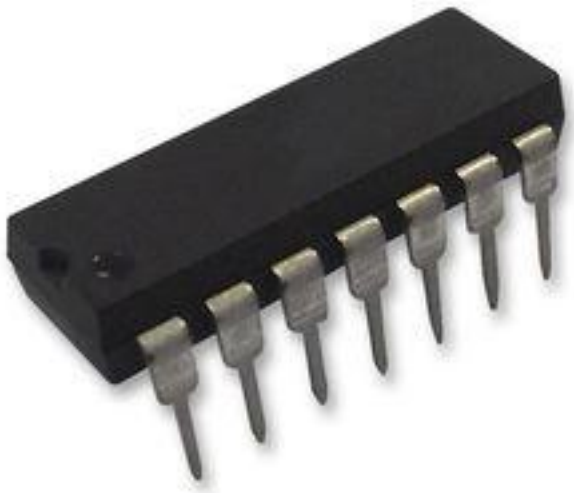
Watchdog Timer



ATMEL ATTINY84A-PU

PDIP/SOIC





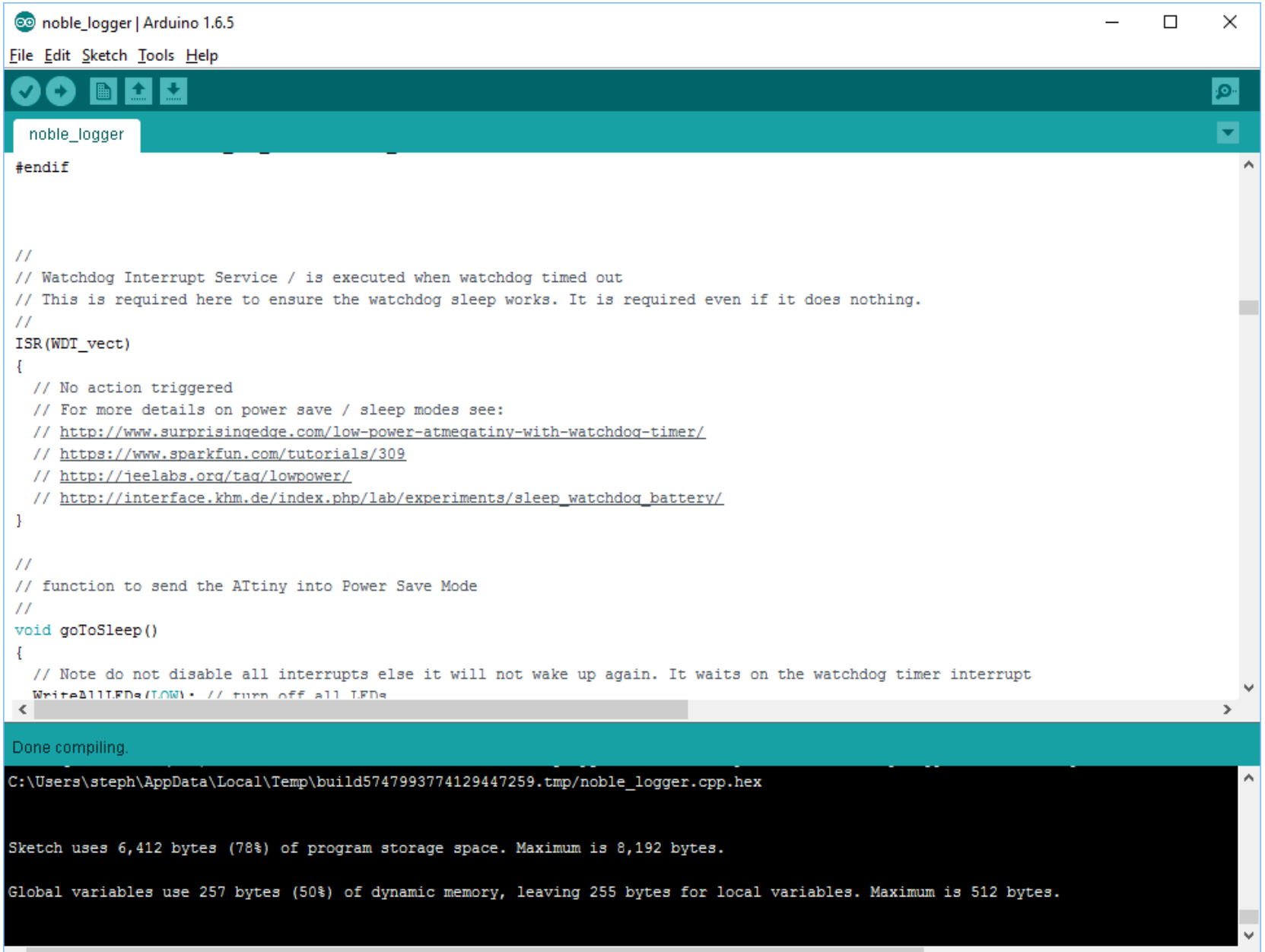
ATtiny 8 Bit Micro-controller

8 KB Program store

512 Bytes RAM - dynamic memory

512 Bytes persistent data store

WELCOME TO ARDUINO!



Arduino Starter Kit with UNO Board

Low Power Techniques

Sleep when you can
Power off external circuit when you can
Direct battery / No regulator
Low clock speed

Sleep power consumption
0.0000042 Amps
at 3V

Power source

Data logger manual

Mode	Action
Mode 1	Fast detector mode
Mode 2	Slow detector mode (24 hours)
Mode 3	Play Back (Plays back recorded data)
Mode 4	Memory status (Show how full the memory is)
Reset	**Action**
In Mode 1,2, & 4	resets the memory so a new data recordings can be taken
In Mode 3	replays the recorded data

Kit production team

Question time