Real Time Data Logging with BBC micro:bit

The BBC micro:bit is a very capable microcontroller. It can be used to record live data from various sensors. A video demo is <u>here</u>.

Items Needed:

- BBC micro:bit microcontroller
- Tera Term terminal emulation software
- micro:bit Developer USB driver
- Some kind of sensor package for the data you wish to collect.

The micro:Bit makeCode

You need to write a micro:bit program that can collect sensor data and then write it out through the serial port to the terminal emulation application (ex. Tera Term).

The following example uses the SparkFun weather:bit weather station to collect temperature and relative humidity readings and then send them to Tera Term via the serial port. It samples the sensors every one minute, but you can change the sampling rate to suit your needs.

Go to makecode.org and create a new micro:bit project.

This block lets user adjust the sampling interval on button pressed Α 🔻 waitIntervalMinutes 💌 waitIntervalMinutes 💌 set to show number waitIntervalMinutes 💌 This block initiates data logging. on button R 🛡 pressed samplingOn 🔻 to set

on sta	rt + + + +
set	samplingOn - to O Variable to control when sampling starts
set	waitIntervalMinutes v to 1
set	xCol to
set	numCols to 5 off of pixels in the countdown grid.
set	numRows - to 3 + +
set	yRow - to 0 + + +
start	t weather monitoring This activates the sensors that are sampled.
set	SampleCount to 1 This is the sample counter for the data record
show	<pre>string "Minutes=""""""""""""""""""""""""""""""""""""</pre>
show	number waitIntervalMinutes -
seria	al redirect to USB Set the serial output to the USB port.
	+ + + +



fore	ver	+ +										
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do	call funct	ion TimeD	elay 🔻 🛛 🛛	Vait for th	e selec	ted sam	ple in	terva	al			
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Upload this program to your micro:bit.

Download the Tera Term emulator.

The link is: <u>https://tera-term.en.lo4d.com/</u>

Install this program on your computer.

micro:bit Developer USB Driver

The Developer USB driver is required to communicate with Tera Term.

The link is: https://os.mbed.com/docs/latest/tutorials/windows-serial-driver.html

Download this driver and install it on your computer.

Receiving Sensor Data in the Terminal Emulator

With the micro:bit connected to your computer via the USB port, launch Tera Term.

You will see this dialog:

Tera Term: New connection						
() тсруір	Host: myhost.example.com History Service: O Telnet SSH OSH Other Protocol: UNS 	 ✓ 22 H2 ✓ SPEC ✓ 				
Serial	Port: COM11: mbed Serial Port (COM OK Cancel Help	11) v				

Choose the 'Serial' option and pick the comm port for the micro:bit. Click 'OK'.

From the 'Setup' menu select the 'Serial Port' option.

Tera Term: Serial port setup							
Port:	СОМ11 ч	ОК					
Speed:	115200 🗸						
Data:	8 bit 🗸	Cancel					
Parity:	none v						
Stop bits:	1 bit 🗸	Help					
Flow control:	none v	•					
Transmit delay O msec/char O msec/line							

Set the 'Speed' to '115200' and click 'OK'.

Your data will start showing up in the terminal window.

M			·					COM11 - Tera Term VT
File	Edit	Setup	Control	Window	Help			
69, 70, 71, 72,	19. 19. 19. 19.	3099 3099 3099 32,3	999999 999999 999999 6.950	999999 999999 999999 999999 999999 919531	8,36 8,36 8,36 2499	.98242 .91601 .82812 998	1875 5624 4999	999998 999998

In this example, the first item is the sample number, the second is the temperature in degrees Celsius and the third is the relative humidity. The values are separated by commas.

Logging Data

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B Gord I This PC I Libraries I Network			File folder
👩 Google Chrome		3 KB	Shortcut 🗸
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File name: teratem.lo	pg		Save
Save as type: All(*.*)		~	Cancel
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Option Binary	Append	✓ Plain text	
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	Local Time	~	

To start logging (ie. recording) the data, go to the 'File' menu and select 'Log...'

Specify the file name(it is 'teraterm.log' by default). The 'Append' option means that each time you turn the logging on, data will be added to the already existing log file. If you want to start with an empty file each time, uncheck the 'Append' option.

Click 'Save'. The data received from the micro:bit will now be logged in the log file.

To finish logging, go to the 'File' menu and select 'Exit'.

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Fi	le name:		v Tools ▼	All Files (*.*) Open	Cancel	► .::

Launch Excel (or any spreadsheet) and select 'Open' from the 'File' menu.

Pick the 'All Files (*.*)' option in the lower right corner of the dialog. This will let you select the data file ('teraterm.log' in this example). Click 'Open'.

Choose the 'Delimited' option and click 'Next'.

Uncheck 'Tab' and check 'Comma'. Click 'Finish'.

The data is now in Excel.

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2	1	22.73	28.92969				
3	2	22.73	28.96289				
4	3	33.46	22.5459				
5	4	42.9	12.73828				
6	5	48.76	8.296875				
7	6	54.45	5.729492				
8	7	58.98	3.727539				
9	8	63.48	2.111328				
10	9	64.13	1.616211				
11	10	56.88	3.638672				

In this example ,column A is the sample number, column B is the temperature in Celsius and column C is the percent relative humidity.

You may now graph and/or manipulate this data as you wish using the spreadsheet's graphing and other features.

Good luck with your micro:bit data logging!

(Gord Payne, Newmarket High School, YRDSB TLLP Robotics Project, December 2018)