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 here.

Items Needed:

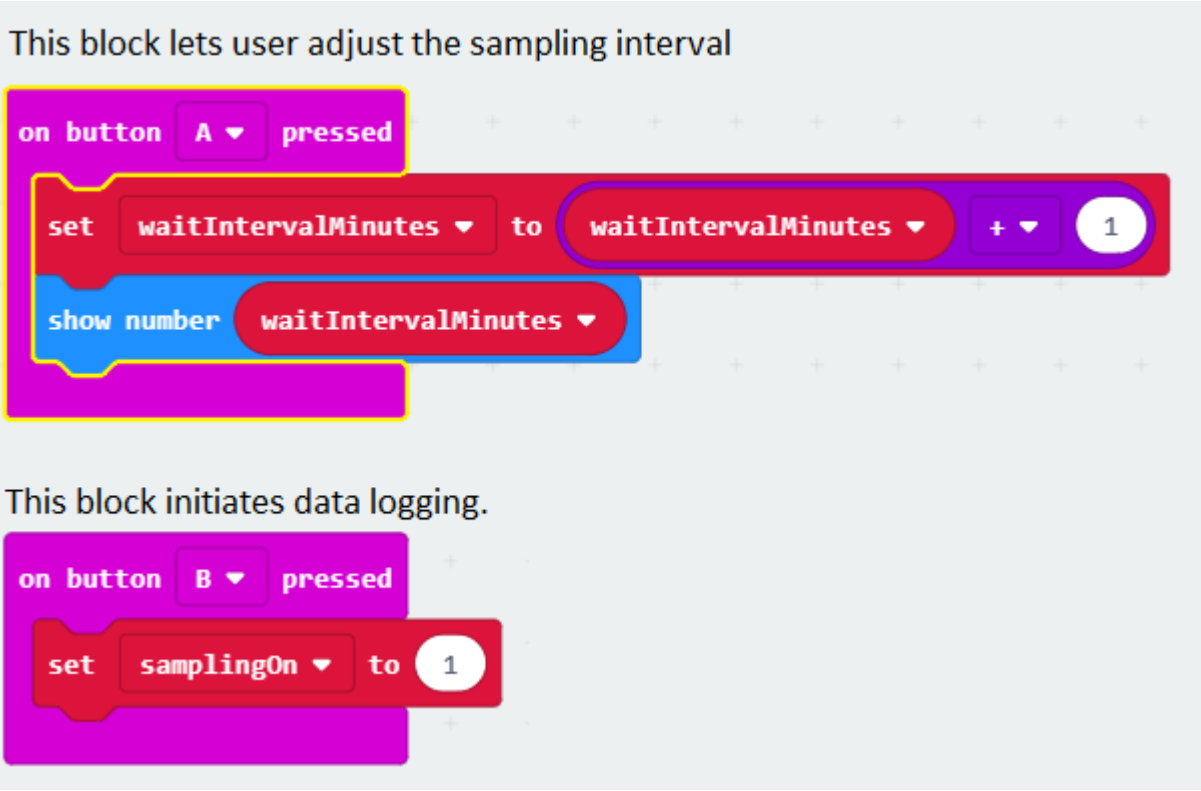
- BBC micro:bit microcontroller
- Tera Term terminal emulation software
- micro:bit Developer USB driver
- Some kind of sensor package for the data you wish to collect.

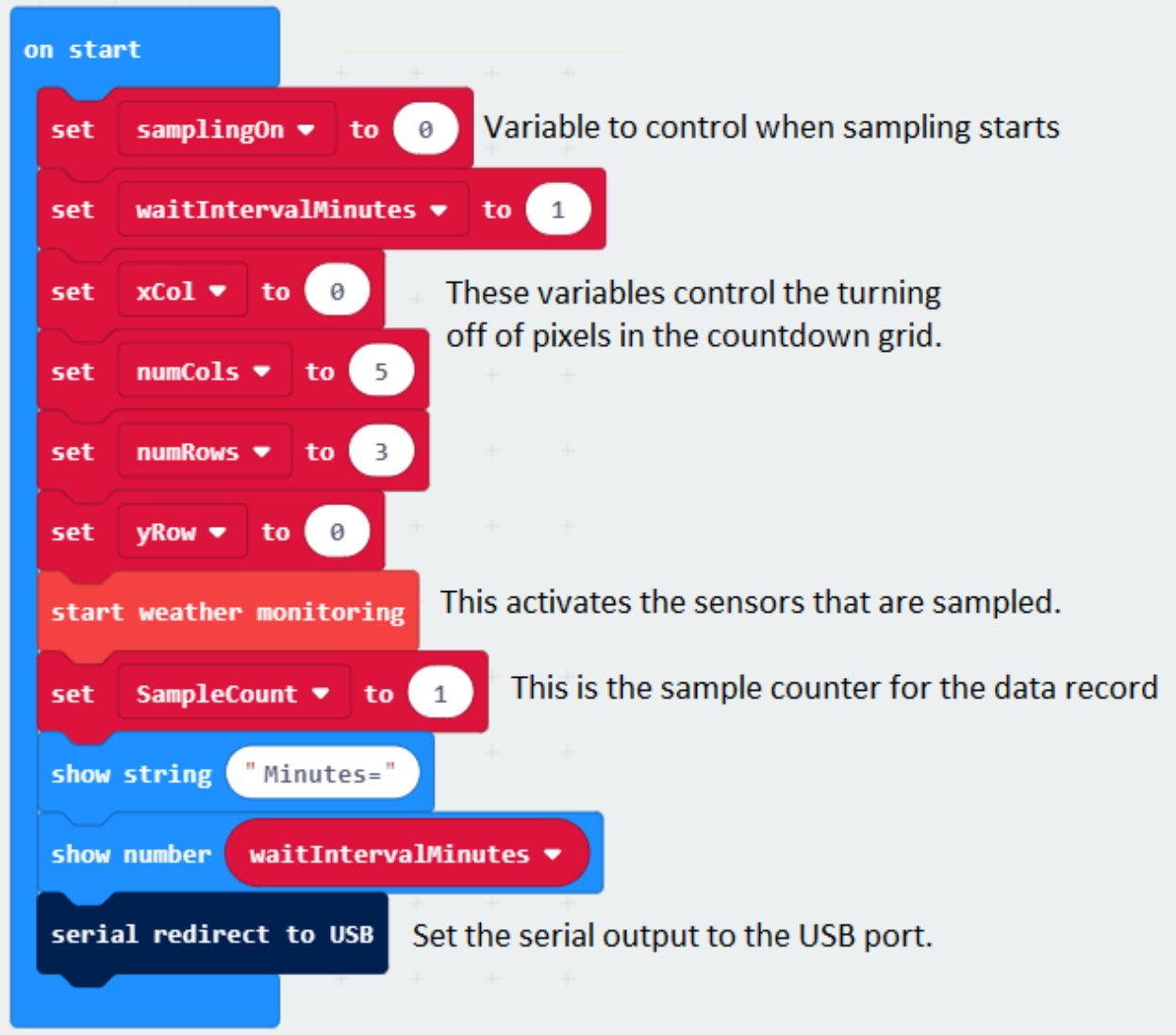
The micro:Bit makeCode

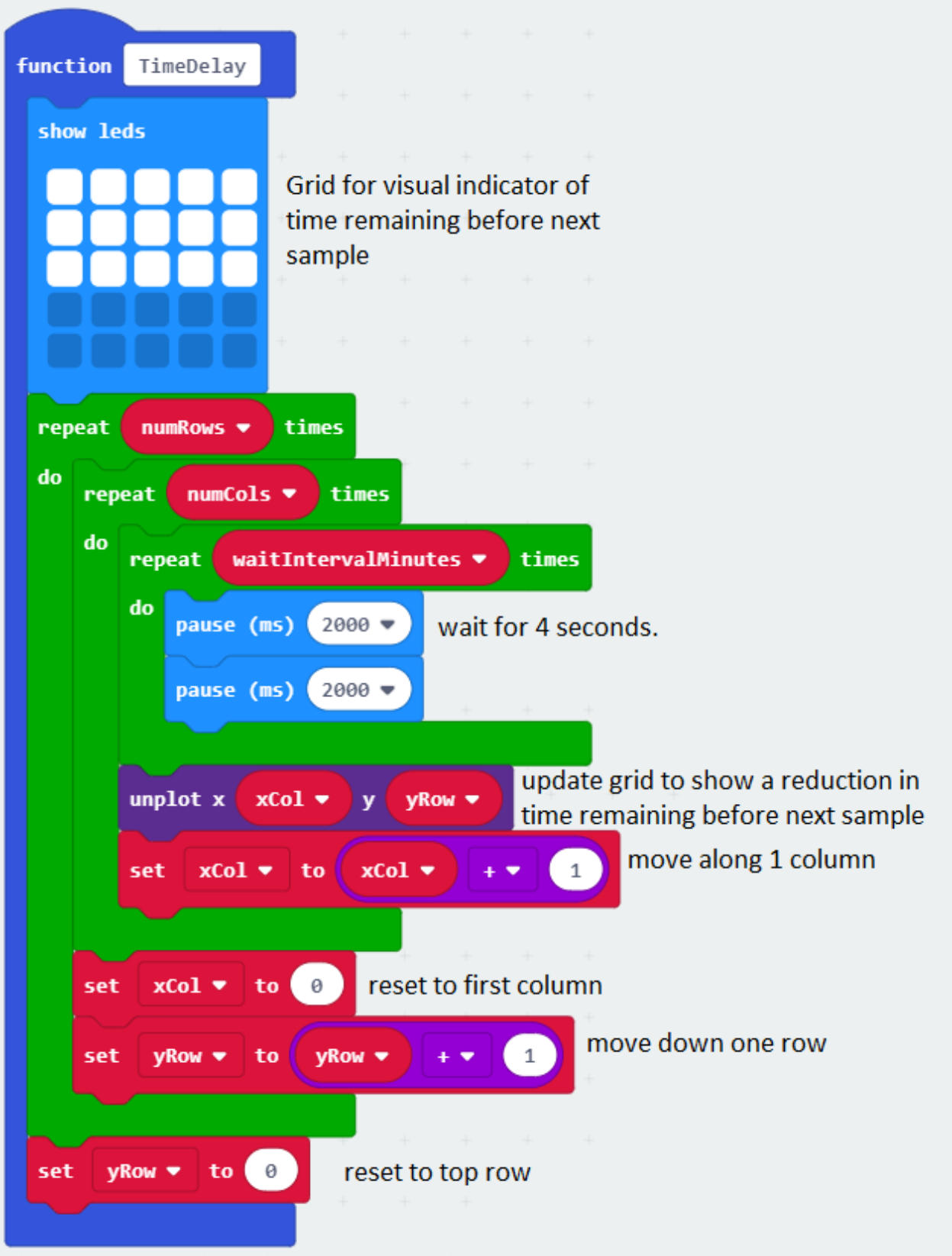
You need to write a micro:bit program that can collect sensor data and then write it out through the serial port to the terminal emulation application (ex. Tera Term).

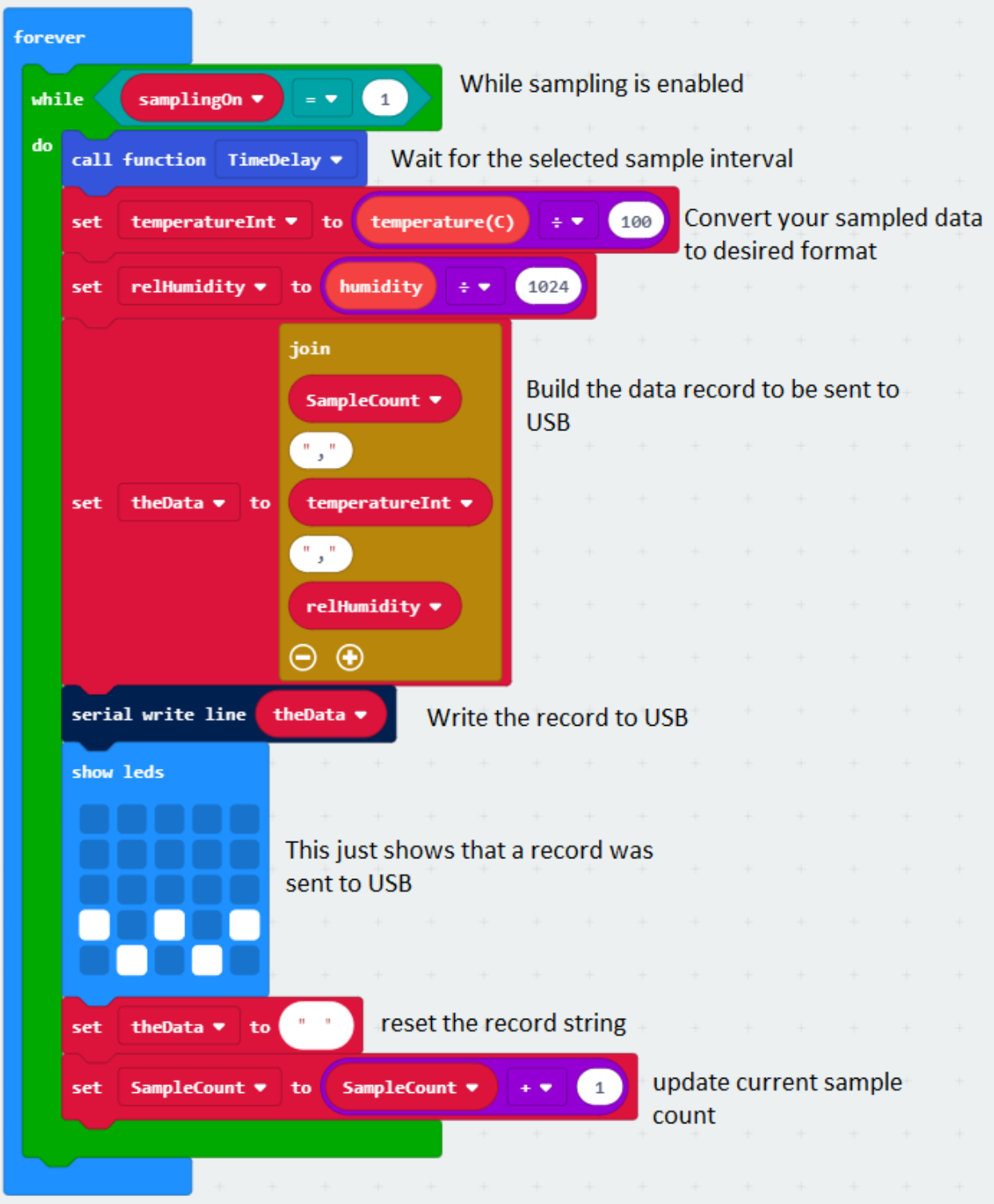
The following example uses the SparkFun weather:bit weather station to collect temperature and relative humidity readings and then send them to Tera Term via the serial port. It samples the sensors every one minute, but you can change the sampling rate to suit your needs.

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




on start
set samplingOn to 0
Variable to control when sampling starts
set waitIntervalMinutes to 1
set xCol to 0
These variables control the turning off of pixels in the countdown grid.
set numCols to 5
set numRows to 3
set yRow to 0
start weather monitoring
This activates the sensors that are sampled.
set SampleCount to 1
This is the sample counter for the data record
show string " Minutes="
show number waitIntervalMinutes
serial redirect to USB
Set the serial output to the USB port.


function TimeDelay
show leds
Grid for visual indicator of time remaining before next sample
repeat numRows times
do
repeat numCols times
do
repeat waitIntervalMinutes times
do
pause (ms) 2000
wait for 4 seconds.
pause (ms) 2000
unplot x xCol y yRow
update grid to show a reduction in time remaining before next sample
set xCol to xCol + 1
move along 1 column
set xCol to 0
reset to first column
set yRow to yRow + 1
move down one row
set yRow to 0
reset to top row



Upload this program to your micro:bit.

Tera Term Terminal Emulator

Download the Tera Term emulator.

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

Install this program on your computer.

micro:bit Developer USB Driver

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

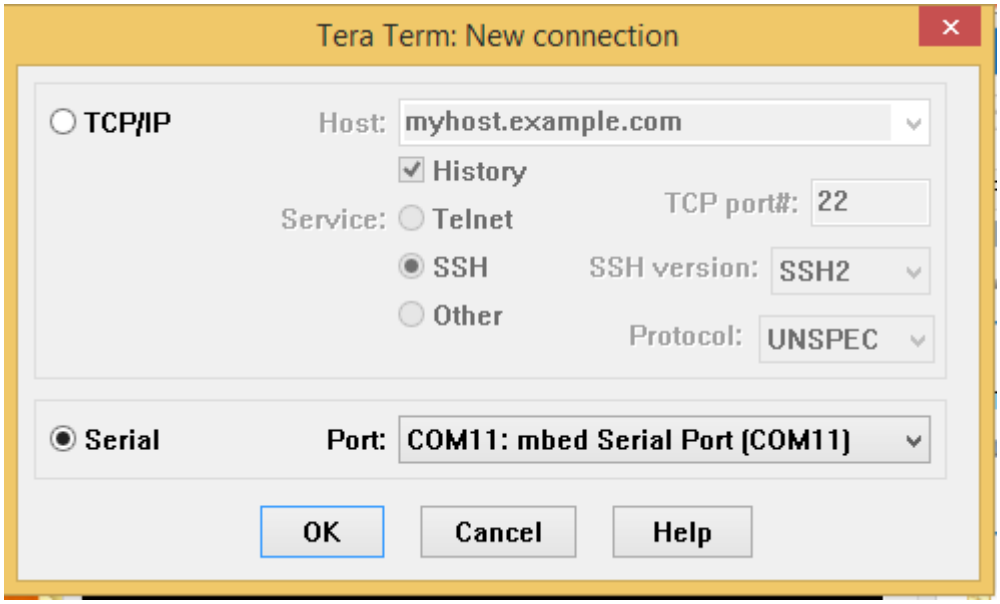
The link is: https://os.mbed.com/docs/latest/tutorials/windows-serial-driver.html

Download this driver and install it on your computer.

Receiving Sensor Data in the Terminal Emulator

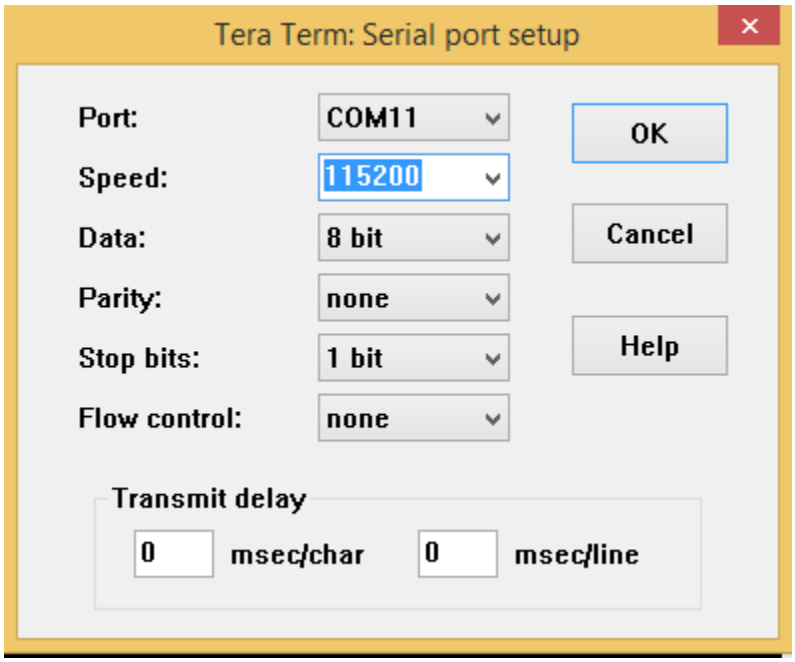
With the micro:bit connected to your computer via the USB port, launch Tera Term.

You will see this dialog:



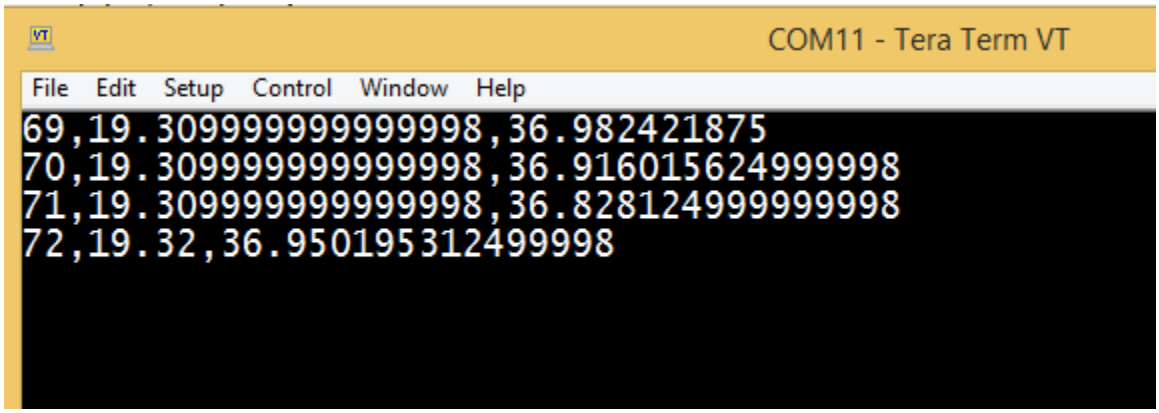
Choose the 'Serial' option and pick the comm port for the micro:bit. Click 'OK'.

From the ‘Setup’ menu select the ‘Serial Port’ option.



Set the ‘Speed’ to ‘115200’ and click ‘OK’.

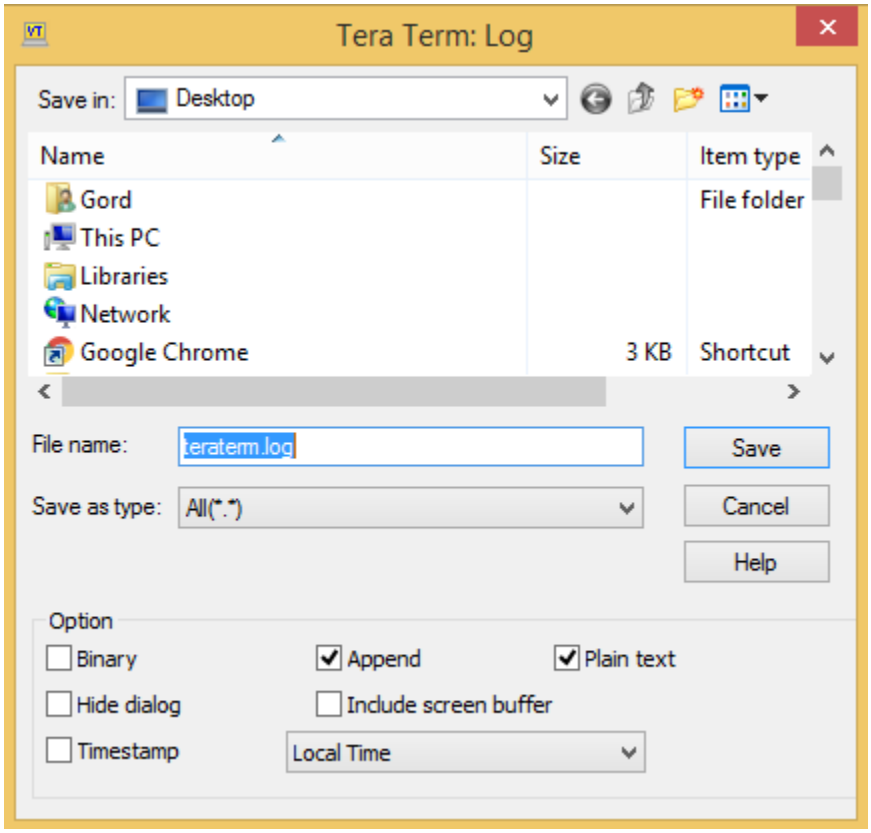
Your data will start showing up in the terminal window.



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

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



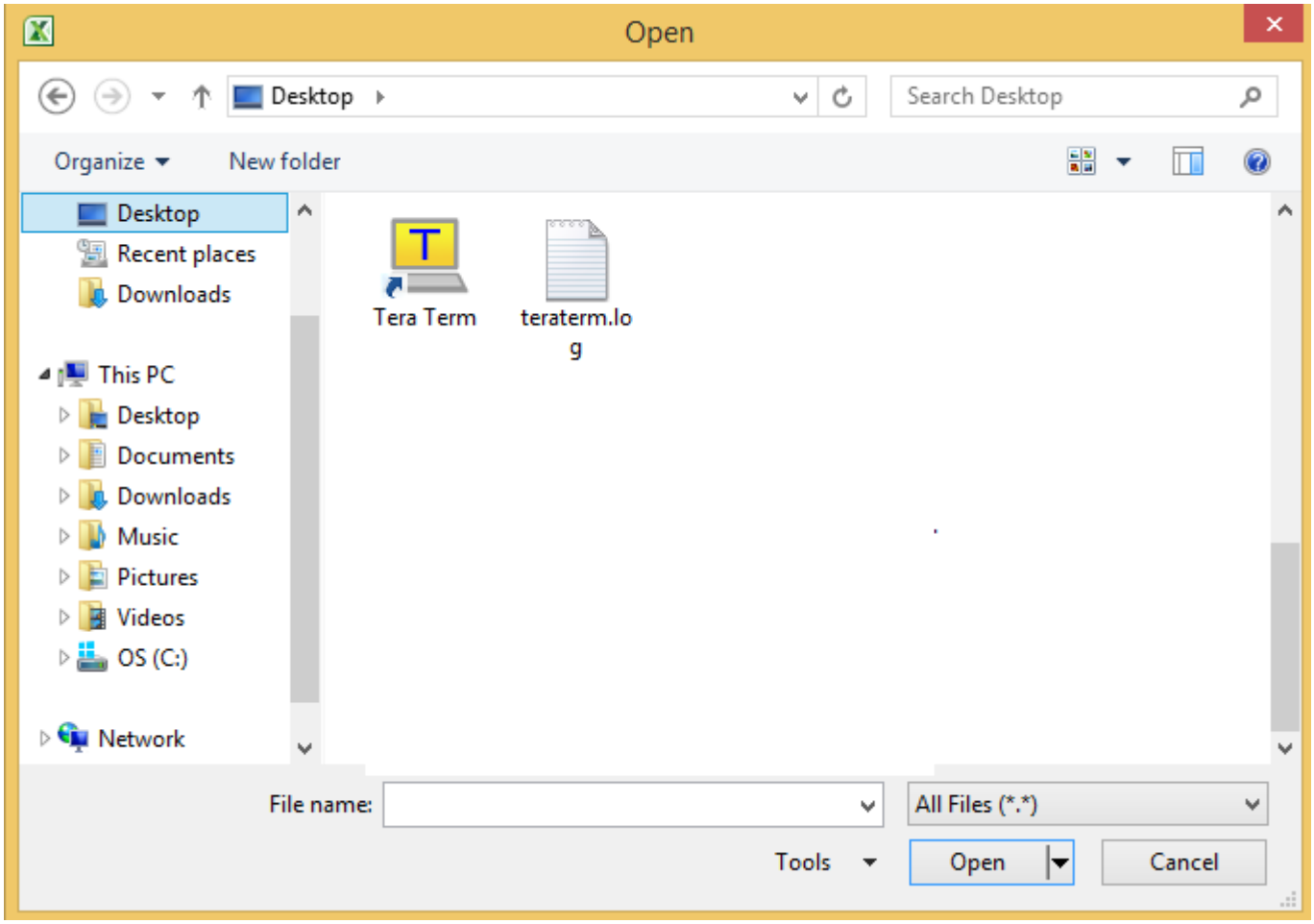
Specify the file name(it is ‘teraterm.log’ by default). The ‘Append’ option means that each time you turn the logging on, data will be added to the already existing log file. If you want to start with an empty file each time, uncheck the ‘Append’ option.

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’.

Importing Data into Excel

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

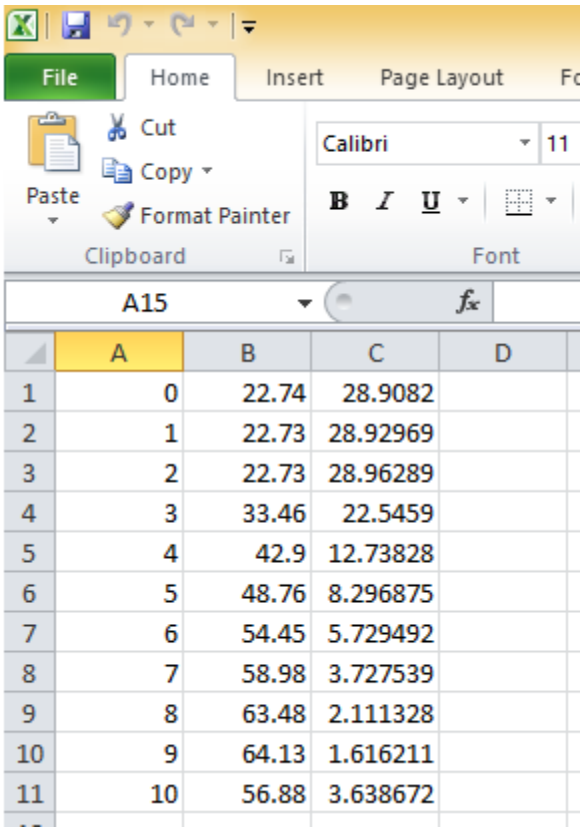


Pick the ‘All Files (*.*)’ option in the lower right corner of the dialog. This will let you select the data file (‘teraterm.log’ in this example). Click ‘Open’.

Choose the ‘Delimited’ option and click ‘Next’.

Uncheck ‘Tab’ and check ‘Comma’. Click ‘Finish’.

The data is now in Excel.



	A	B	C	D
1	0	22.74	28.9082	
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)