McAllen Software User Manual 1.0

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1. Introduction

1.1 Purpose

This document is meant to serve as a guide to installing and using the Intel McAllen Software.

1.2 Scope

This document pertains to the Intel McAllen Windows Software Version 1.0.0.2 and McAllen Linux Software Version 1.1.6.

2. __Installation__

2.1 Installation Prerequisites

2.1.1 Linux Software

The McAllen Linux Software requires the default installation of one of the following operating systems:

1. Red Hat Enterprise Linux 5.3/5.4 Desktop (32-bit)
2. Red Hat Enterprise Linux 5.3/5.4 Server (32-bit)
3. Red Hat Enterprise Linux 5.3/5.4 Desktop (64-bit)
4. Red Hat Enterprise Linux 5.3/5.4 Server (64-bit)
5. Ubuntu Server 9.04 (Jaunty Jackalope) (32-bit)
6. Ubuntu Server 9.04 (Jaunty Jackalope) (64-bit)

The McAllen Linux Software has the following prerequisites:

1. BlueZ Bluetooth Stack, (tested with versions 3.70 and 4.53)
2. BlueZ headers and libraries, (tested with versions 3.70 and 4.53)
3. MySQL Community Server 5.1 or later
4. MySQL Connector/C 6.0

2.1.2   Windows Software

The McAllen Windows Software requires one of the following operating systems:

1. Microsoft Windows XP (SP2 or later)
2. Microsoft Windows Vista
3. Microsoft Windows 7

The McAllen Windows Software has the following prerequisites:

1. Microsoft .NET Framework Version 3.5

2.2 Installing the McAllen Linux Software

To install the McAllen Linux Software, perform the following steps in order:

1. Login to your Linux system as user `root`, if possible. If you cannot login as root, you must run all commands below prefixed by the `sudo` command.
2. Open a terminal window if one is not already open.
3. Change directory to the directory containing the installer script, McAllenSetup.sh. For example, "`cd /media/cdrom/`".
4. Run the self-extracting installer script, McAllenSetup.sh. For example, "`./McAllenSetup.sh`".

2.3 Installing the McAllen Windows Software

To install the McAllen Windows Software, perform the following steps in order:

1. Navigate to the drive or folder containing the installer, McAllen Setup.msi.
2. Double-click the installer (McAllen Setup.msi) and follow the on-screen instructions.

2.4 Uninstalling the McAllen Linux Software

To uninstall the McAllen Linux Software, perform the following steps in order:

1. Login to your Linux system as user `root`, if possible. If you cannot login as root, you must run all commands below prefixed by the `sudo` command.
2. Open a terminal window if one is not already open.
3. Change directory to the directory containing the installer script, McAllenSetup.sh. For example, "`cd /media/cdrom/`".
4. Run the self-extracting installer script, McAllenSetup.sh, with the argument "`--uninstall`". For example, "`./McAllenSetup.sh --uninstall`".

2.5 Uninstalling the McAllen Windows Software

To uninstall the McAllen Windows Software, perform the following steps in order:

1. Open Control Panel and double-click on the Add/Remove Programs (Windows XP) or Programs and Features (Windows Vista or later) applet.
2. Locate the entry in the programs list called "McAllen GUI" and click the Uninstall button.
3. Follow the on-screen instructions and click OK to uninstall the application.

3. <u>Usage</u>

3.1 Using the McAllen Linux Software

The McAllen Linux Software executable is called "`start_acquire_data`" and is installed under the folder "`/usr/local/McAllen/bin`".

The application takes the following command-line arguments at startup:

"`-all`": Pair all detected Shimmers to the adapters on the system in sequential order (fills up each adapter before moving to the next).

"`-best_case`": Pair all detected Shimmers to the adapters on the system in a balanced configuration (ensures an even split of Shimmers among the number of adapters in the system).

"`-emulation XX`": Start the application in Shimmer emulation mode, with `XX` being the number of Shimmers to emulate.

"`XXXX`": Pairs one Shimmer which has a name containing the string (e.g. `XXXX`) entered.

If there is a second command line argument, the string is used as an exclude string; the application will ignore any detected devices containing this string in the name.

Once the application is started, it will scan for Bluetooth devices in range in all modes except emulation mode. If no Shimmer devices are found during this scan, the application will report this and exit. If any Shimmer devices are found, the application will create a thread for each one and attempt to pair with it. A message is printed indicating successful pairing.

A message is also printed indicating the TCP port the application is listening for commands on.

Once running, commands may be sent from a remote host through TCP, such as the McAllen Windows Software.

To exit the application, CTRL-C should be used.

Note that when the application is running, the receive data tables in MySQL are locked to increase write performance. To access the data in the tables, exit the application and the locks will disappear. The data is written into the database named "`McAllen`". The default user for MySQL is "`root`" with no password.

3.1.1 Command Usage

Valid commands for the system are listed in the table in Appendix A. In general, commands should only be sent when the system is not acquiring data. The only command that should be sent during data acquisition is the *Stop Acquisition (0x56)* command. The default mode of the Shimmer is a 1 KHz sample rate, with the data payload alternating from full scale to zero. To use data from the A/D converter, send the command *Enter A/D to Bluetooth Mode (0x61)*. This will select the data source to be the A/D converters on the Shimmer when data acquisition is started. To use the various built in test patterns, send the command *Enter MSP430 to Bluetooth Mode (0x63)*, followed by the desired test pattern command (e.g. *0xA6)*. This will select the MSP430 microcontroller on the Shimmer to be the source of the data being sent during acquisition.

3.2 Using the McAllen Windows Software

After installation, the McAllen Windows Software can be executed by clicking the Start Menu shortcut that is created under the Intel/McAllen folder in the Start Menu.
When the application is launched, it reads a text file called "`labelNames.txt`" which is stored in the application's installation folder, by default, "`C:\Program Files\Intel\McAllen`". This file contains a number of lines of text, which map the text displayed on each GUI control to the desired name, which is to the right of the equals sign (e.g. `graphCheckbox1 = Graph 1` will cause the text next to the first checkbox to read "Graph 1").

Once the application is running, you can send commands to the Linux application through TCP. The IP Address and Port numbers should match those of the machine you wish to connect to (these are also configurable with the "`labelNames.txt`" file).

Expanding the Quick Commands box allows you to send Start and Stop Acquisition commands without entering any commands in the Command text box. Alternatively, you can enter any command in the box and click Send to send it. Any single byte command in ASCII hexadecimal format can be sent through this text box (e.g. 5A, 5a, 0x5A, or 0x5a). A list of valid commands can be found in Appendix A.

Below the command box you will see 7 checkboxes which control the visibility of the graph at that position on the page; these apply to all tabs.

Below the checkboxes are two radio buttons which control the source of input data. If the first radio button is selected (called "Shimmer Data" by default), the system assumes there is a remote system running the Linux software and will send/receive commands and data to it. If the second radio button is selected (called "Captured Data" by default), the system will assume there is no remote system and will not attempt to send commands via TCP. When a start command is issued, it will be handled internally and the data stored in the CSV file "`inputData.txt`" will be looped through and displayed.

Note: If the McAllen Linux Software is acquiring data, but the Windows application is restarted, there is no mechanism to report this to the McAllen Windows Software. However, another Start command may be sent to resume display of the data without causing any problems.

4. <u>Revision History</u>

<u>REVISION</u>	<u>DATE</u>	<u>NAME</u>	<u>DESCRIPTION OF CHANGE</u>
1.0	9/29/2009	Chris Bradley	Completed review with modifications

5. Appendix A: Command List

Command	Name	Description
0x5a	Start Acquisition	Start acquiring data and send to the remote client.
0x56	Stop Acquisition	Stop data acquisition.
0x57	Start sending sensor data from database	Start sending data from the DB to the remote client.
0x58	Stop sending sensor data from database	Stop sending data from the DB to the remote client.
0x60	Go to Idle Mode	Put all Shimmer devices in Idle Mode.
0x61	Enter A/D to Bluetooth Mode	Select the A/D converter as the data source for acquisition for each Shimmer.
0x62	Enter SPI to Bluetooth Mode	Select the SPI bus as the data source for acquisition for each Shimmer.
0x63	Enter MSP430 to Bluetooth Mode	Select the MSP430 as the data source for acquisition for each Shimmer.
0x64	Enter MSP430 to SPI Mode	Route MSP430 data output to the SPI bus for each Shimmer.
0x65	Enter A/D to SPI mode	Route A/D converter data to the SPI bus for each Shimmer.
0x66	Enter MSP430 Flash to Bluetooth	Select the Flash as the data source for acquisition for each Shimmer.
0xa1	Send sequence: walking 1's inside 16 bit payload to Bluetooth	Set the data pattern generated by the MSP430 on each Shimmer.
0xa2	Send sequence: walking 0's inside 16 bit payload to Bluetooth	Set the data pattern generated by the MSP430 on each Shimmer.
0xa3	Send sequence: walking '0110's inside payload to Bluetooth	Set the data pattern generated by the MSP430 on each Shimmer.
0xa4	Send sequence: walking '1001's inside payload to Bluetooth	Set the data pattern generated by the MSP430 on each Shimmer.
0xa5	Send sequence: walking '01101001's inside payload to Bluetooth	Set the data pattern generated by the MSP430 on each Shimmer.
0xa6	Continuous sequence from 0 to 0xfff incremented by 1 inside payload to Bluetooth	Set the data pattern generated by the MSP430 on each Shimmer.

0xa7	Continuous sequence from 0xfff to 0 decremented by 1 inside payload to Bluetooth	Set the data pattern generated by the MSP430 on each Shimmer.
0xa8	Send Y data defined in command 0xcY to the SPI port	N/A
0xa9	Send data defined by 0xa1 to SPI port continuously	N/A
0xaa	Send data defined by 0xa2 to SPI port continuously	N/A
0xbY	Send filled value represented by 3 copies of the Y nibble - 0000yyyyyyyyyyyy to SPI bus continuously	N/A
0xcY	Send filled value represented by 3 copies of the Y nibble - 0000yyyyyyyyyyyy to Bluetooth	N/A
0xfa	Go to Idle Mode	Set all shimmers to Idle Mode (startup state).
0xd0	Send first 2048 bytes from the Diagnostic Data Table (DDT) located in the MSP 430 Flash memory.	N/A
0xd1	Send second 2048 bytes from Diagnostic Data Table (DDT) located in the MSP 430 Flash memory.	N/A
0xd2	Send third 2048 bytes from Diagnostic Data Table (DDT) located in the MSP 430 Flash memory	N/A
0xd3	Send fourth 2048 bytes from Diagnostic Data Table (DDT) located in the MSP 430 Flash memory	N/A
0xd4	Send fifth 2048 bytes from Diagnostic Data Table (DDT) located in the MSP 430 Flash memory	N/A
0xd5	Send sixth 2048 bytes from Diagnostic Data Table (DDT) located in the MSP 430 Flash memory	N/A
0xd6	Send seventh 2048 bytes from Diagnostic Data Table (DDT) located in the MSP 430 Flash memory.	N/A

0xd7	Send eighth 2048 bytes from Diagnostic Data Table (DDT) located in the MSP 430 Flash memory.	N/A
0xe0	Set digitized A/D sampling rate to 1000 samples/sec.	Set the sample rate of all Shimmers to 1000 Hz.
0xe1	Set digitized A/D sampling rate to 500 samples/sec.	Set the sample rate of all Shimmers to 500 Hz.
0xe2	Set digitized A/D sampling rate to 250 samples/sec.	Set the sample rate of all Shimmers to 250 Hz.
0xe3	Set digitized A/D sampling rate to 100 samples/sec.	Set the sample rate of all Shimmers to 100 Hz.
0xe4	Set digitized A/D sampling rate to 50 samples/sec.	Set the sample rate of all Shimmers to 50 Hz.
0xe5	Set digitized A/D sampling rate to 25 samples/sec.	Set the sample rate of all Shimmers to 25 Hz.
0xe6	Set digitized A/D sampling rate to 10 samples/sec.	Set the sample rate of all Shimmers to 10 Hz.
0xe7	Set digitized A/D sampling rate to 5 samples/sec.	Set the sample rate of all Shimmers to 5 Hz.
0xe8	Set digitized A/D sampling rate to 1 sample/sec.	Set the sample rate of all Shimmers to 1 Hz.
0xf0	Return to default mode (database active, real Shimmer data)	Returns the Linux software to default mode.
0xf1	Activate database bypass mode	Bypasses writing incoming data to the database.
0xf2	Activate Shimmer emulation mode	Instruct the Linux software to switch from reading data from Bluetooth to using text files as a source for each Shimmer already paired.
0xf3	Kill remote application	Kills the main process of the Linux software.