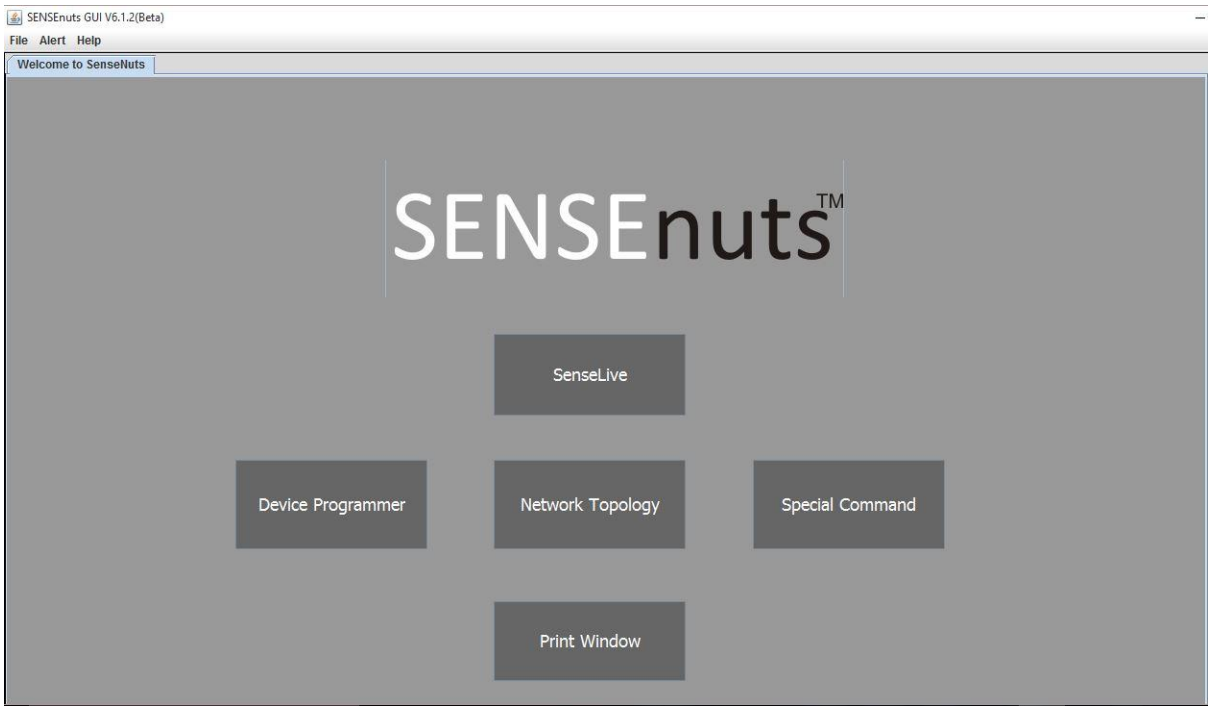
SENSEnuts GUI User Guide

Contents

1. Introduction

SENSEnuts GUI is a program that runs on Windows Operating System. It is used to program the SENSEnuts Radio Modules as well as display the data received from the network made up of sensor motes.

The GUI is a collection of programs, performing a separate function, namely Device Programmer, SenseLive, Print Window, Special Command and Network Topology. On starting the GUI, it lands up on the home screen with tiles of the programs.



GUI Home Screen

Device Programmer, as the name suggests, is a tool to program the SENSEnuts nodes according to the algorithm written in C language using Eclipse IDE. It also enables the user to read the MAC address of the node connected to the system at the USB port.

SenseLive, is a graphical environment that displays the data which it receives from the network. It features two separate sections, one to display the latest data coming from the motes and the other to create a database of all the messages received from all the motes which can be saved and analyzed.

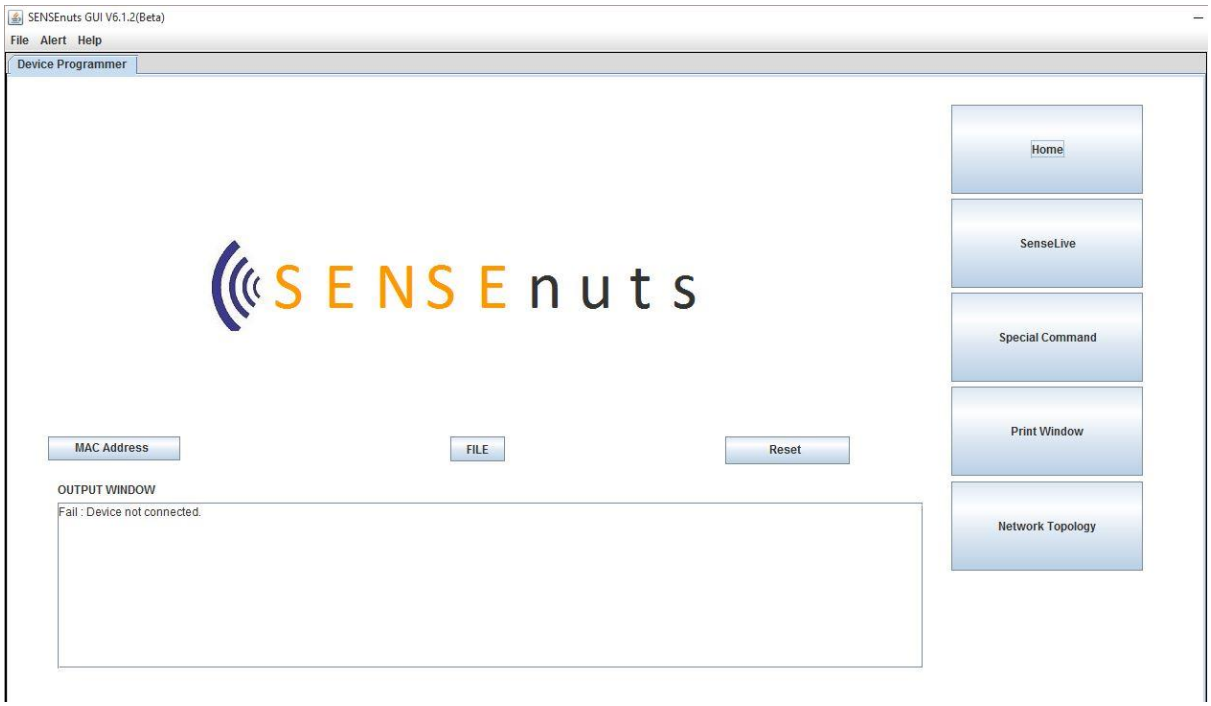
Print Window, allows the motes to display some custom messages on the GUI.

Special Command, to send command to a node connected to the computer.

Network Topology, to display the topology of the network.

2. Device Programmer

Device programmer is a tool to program the motes. When a code written to implement an algorithm or an application on SENSEnuts platform is compiled, it generates a binary (.bin) file. Device Programmer uses this .bin file to flash the motes. The tool also enables the user to view the MAC address of the device connected with the PC. The options available on the GUI are explained in the next few sections.



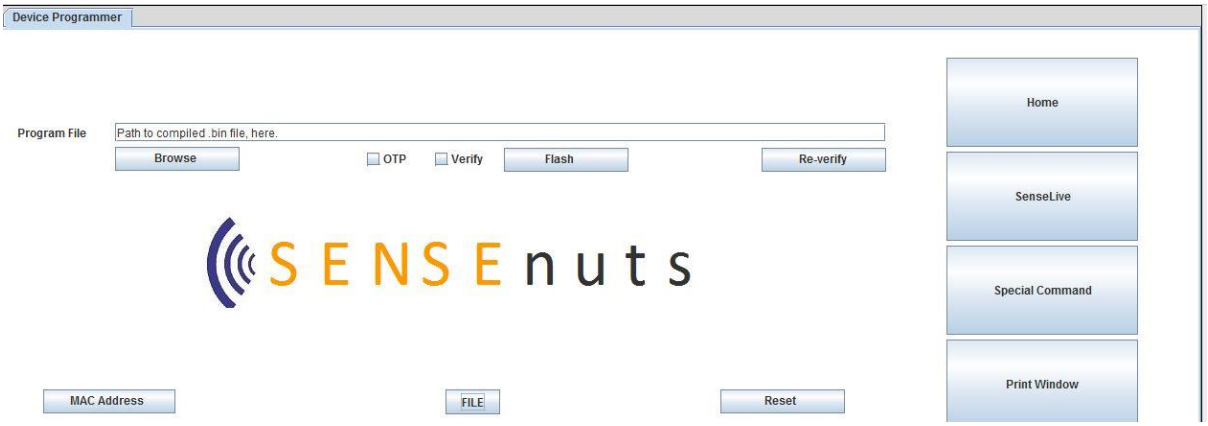
Device Programmer

2.1 Mac Address

This option, when clicked, prints the MAC address of the mote attached with the PC with a USB cable and the SENSEnuts Gateway

2.2 File

This option opens the window to select the .bin file with which the Radio Module has to be programmed.



a) *Browse* enables the user to locate and select the .bin file to be programmed saved on the hard disk.
b) *Flash* initiates the flashing of the mote connected with the computer with the help of USB cable and SENSEnuts Gateway
c) *Verify,* when selected, compares the file flashed on the device and the file present on the hard disk and verifies if the flashing operation went through without any error.
d) *Re-Verify* allows the user to compare the .bin file already present on the mote and the file selected using "Browse" button. This particular option can be used to check if the mote at hand is programmed according to the algorithm written.

2.3 Reset

This option resets the Radio Module connected with the system if any point of time, manual reset is required.

2.4 Output Window

This section is used for debug messages, for example, if the device connected with the system is being detected by the Device Programmer or not.

3. SenseLive

SenseLive is a GUI which displays the data received from the network in an intuitive way. It displays the latest data received from all the motes in the network and creates a database of all the data received from the network. It also allows the user to create a new custom interface to receive the data from a custom sensor which is not a part of the SENSEnuts platform.

This section supports the reception of data from all the modules included in SENSEnuts platform. The are present in the form of tabs. The available options to select are Sensor_TL, Sensor_HTP and Sensor_GAP

3.1 GUI Options

3.1.1 All Data

This section records all of the data received from all the motes in the network. It displays the Node ID, the temperature (in case of Sensor_TL) in "degree Celsius" and the light

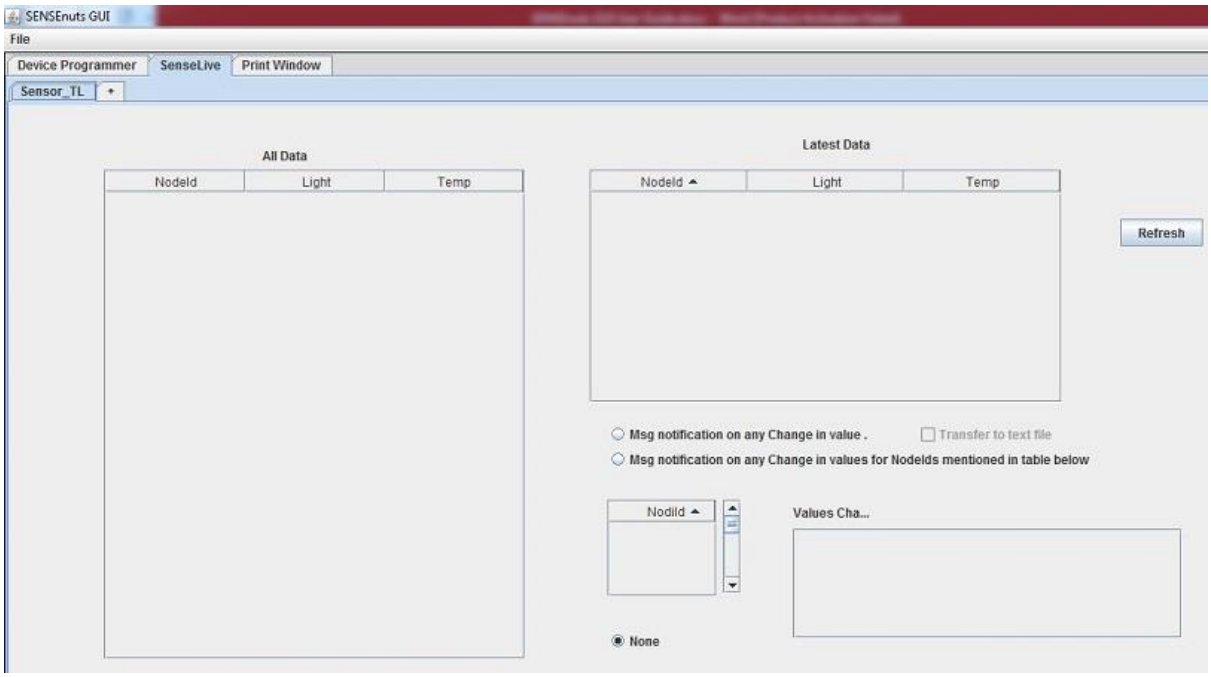
intensity (in case of Sensor_TL) in “lux”. This part of the window saves the data in SQL format. Hence the data can be analyzed later with the help of SQL queries.

3.1.2 *Latest Data*

This section displays the latest information received from the motes in the network. The format of the data displayed is same as the “All Data” section but this part does not create a database.

3.1.3 Refresh

This button clears the “All Data” and “Latest Data” from the GUI. Note that this operation just clears the section and has no effect on the database being created by the “All Data” section.



Sensor_TL Window

3.1.4 Msg notification on any Change in value

This is a radio button which when selected prints the value in “Value Change” window on the receipt of a packet from any mote in the network.

3.1.5 Msg notification on any Change in values for Node IDs mentioned in table below

This is again a radio button which when selected prints the value in “Value Change” window whenever there is a packet received from the node mentioned in “NodeID” table.

3.1.6 None

This is a radio button which, when selected, stops printing the messages in the “Value Change” window.

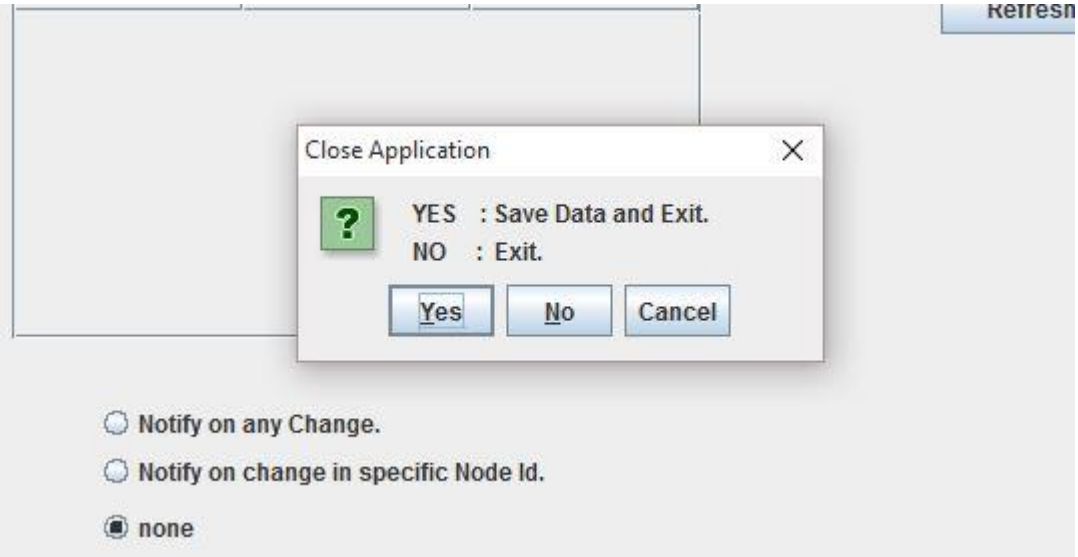
3.1.7 Transfer to text file

This is a checkbox option which, when selected transfers the contents of “Value Change” section into a text file.

3.1.8 Saving the database in text

When SENSEnuts GUI is closed, it will prompt the user to save the data from a table in a text file. If the data has to be saved, the user must click on “Yes”. If it is not needed to save the data, user can click on “No”. In order to cancel the command, user can click on “Cancel”.

If the user choose to save the data by clicking on “Yes”, the GUI will prompt the user to enter the name of the table to be saved. To save Sensor_TL, for example, user should enter sensor_tl to save the contents in a text file.



Exiting SENSEnuts GUI

3.2 Creating a New Table

Sometimes there might be a requirement to create a new table to display some special data, for example, data from a custom sensor which is not a part of SENSEnuts platform. SENSEnuts provides a way in which data from the new sensor can be displayed on the GUI without a need of writing a program to create new custom GUI. Following are the steps to create a new table in SenseLive:

i. Click on “+” adjacent to “Sensor_TL”

ii. Enter the Table Name to give the name to the new table. For example, *my_table*

iii. Choose the number of columns to be present in the table. For example there are two columns in Sensor_TL section (excluding Node ID column which has not to be specified here as well). Let there be two data columns needed from two sensors which has to be displayed on *my_table*, then the number of columns will be two.

iv. Mention the “Message Type” which the table is supposed to receive. It must be same which the mote connected with the PC would define the header of the packet. Let it be 0x60 for *my_table*

.

Entering details to create a new table

v. Mention the name of the columns and select the data type that they will receive from the mote. In this example, the columns are named data1 and data2 with corresponding data types as INT and FLOAT. Set the formula to be applied on the column on the data entering into that column. Clicking on “Submit” will create a new tab with the name as specified in “Table Name” entry. In this case, a table with the name *my_table* is created as shown in the image.

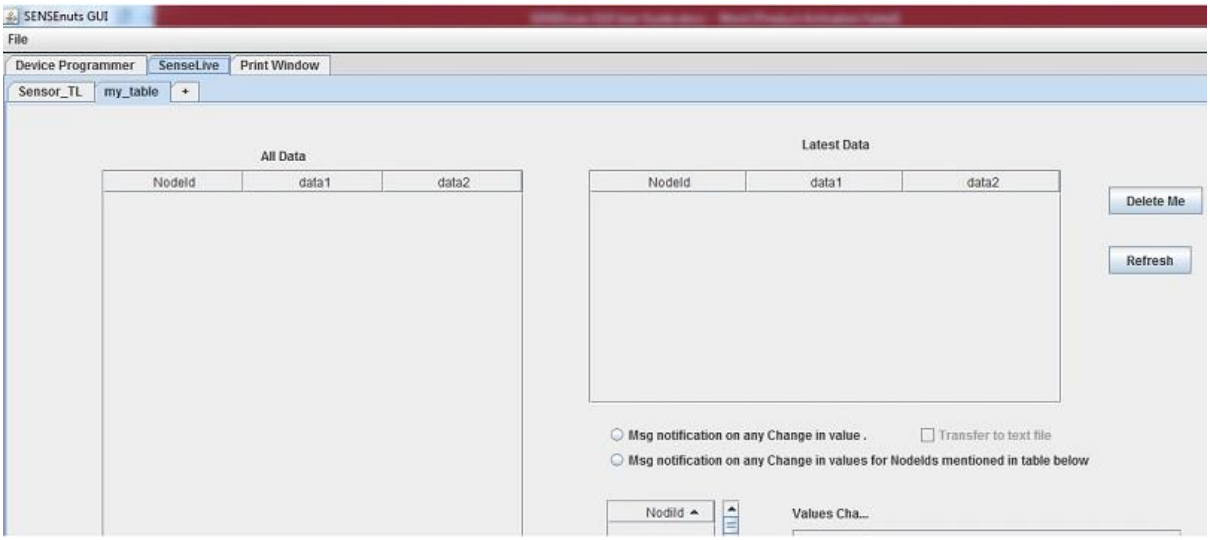
vi. It is worth noting that the data from a STL module is directed to Sensor_TL window. The header of a packet arriving from STL module is **0x45.** So a packet with the same format as of STL module and header of **0x45** will be directed to Sensor_TL window.

vii. While creating table, user needs to add message type. It must be chosen with caution because some of the values are used by SENSEnuts platform for inter communication between GUI and Sensor Modules. The values used by SENSEnuts platform are as under:

Msg types :
0x00 - 0x33: Reserved
0x39: Alerts, email/popup
0x40: print window
0x45: Sensor-TL default temp and light
0x46: Sensor-HTP
0x47: Reserved
0x48: tree
0x49: charts

0x50: Special command to device.
0x51: device to special window
0x52: GPS interface

It is advised to use a value above 0x70 so as to leave a room for future upgradations and new features to be added into GUI by SENSEnuts team



adding new table

4. Print Window

Print Window is the section where the print messages sent by the motes are printed. These can be used for debugging purpose. The options available in the Tool are explained in further sections.

4.1 Text Area

This is the section where the messages are printed.

4.2 Refresh

This will clear all the text in the “Text Area”.

4.3 hex/ASCII format selector

Clicking on Hex will print the data in Hex and selecting ASCII will print the data in ASCII format. If “Specific Data Type” is checked, a user can print the data in the specific format as shown in the image.

Print Window

5. Special Command Window

This window allows the user to send a command to the node connected with the PC. This window also prints the reply from the node in response of the command sent by PC.

Special Command Window

Network Topology

This window displays the network topology on the screen for some specific routing protocols. To enable this feature, nodes have to be programmed to inculcate this feature

Revision History

Version	Date	Comments
6.1.2	09/20/2015	First Release

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