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1 Introduction

1.1 Hi-Gate

1.1.1 What is Hi-Gate

The Hi-Gate is an Enterprise and Modular IOT gateway. It is not only translates the protocol [RF/NON RF –To- REST/MQTT] but with TI CC3200 at its heart, which offers better computational power to run advance IOT algorithm. It has 802.11 B/G/N Radio Wi-Fi, GSM/GPRS (2G) capabilities. It also has Zig-Bee, BLE 4.0, SUB-1* as an inbound connectivity protocol. The hIOTron IOT Platform enables rapid design, development, deployment of an enterprise IOT applications using Hi-Gate.



1.1.2 Specifications

Hardware System

- ✓ Controller: ARM Cortex-M4 Core at 80 MHz
- ✓ Flash: 1MB Serial Flash Memory
- ✓ RAM: 256KB
- ✓ EEPROM: 512KB External

Interface

- ✓ Power input: 9-12V DC
- ✓ 2-GPIO Port Pins
- ✓ 2-Analog Port Pins
- ✓ RTC

WiFi Specs

- ✓ IEEE 802.11 b/g/n
- ✓ Frequency Band: 2.4 ~ 2.462 GHz
- ✓ Tx Power:
 - 11n tx power : mcs7/15: 11db mcs0 : 17db
 - 11b tx power: 18db
 - 11g 54M tx power: 12db
 - 11g 6M tx power: 18db
- ✓ Wifi Sensitivity:
 - 11g 54M: -71dbm
 - 11n 20M : -67dbm



Cellular 2G [3G (UC20)/4G (EC20) Optional]:

- ✓ Quectel M66 LTE Module
- ✓ Micro SIM Slot
- √ 2G Antenna
- ✓ Worldwide LTE, and GSM/GPRS coverage

ZigBee Specs

- ✓ Protocol: Digi XBee 802.15.4 (Proprietary 802.15.4)
- ✓ Frequency band: ISM 2.4 GHz
- ✓ Data Rate: RF 250 Kbps
- ✓ Indoor/Urban Range: 200 ft. (60m)
- ✓ Outdoor/RF Line-of Sight Range: 4000 ft. (1200m)
- ✓ Transmit Power: 3.1 mW (+5dBm)/6.3 mW (+8dBm) boot mode
- ✓ Receiver Sensitivity: -100 dBm/-102 dBm boot mode
- ✓ Encryption: 128-bit AES

BLE Bluetooth Specs

- ✓ Bluetooth 4.0 Supports (TI's BLE4.0 CC2540)
- ✓ Frequency: 2.4 GHz ISM Band
- ✓ Security: Authentication and Encryption
- ✓ RF Power: -23dbm, -6 dbm, Odbm, 6dbm can modify through AT Command AT+POWE
- √ Power: +3.3VDC 50mA
- ✓ Long Range: Open space have 100 Meters
- ✓ Power in Sleep mode 400 µA~1.5mA, Active Mode: 8.5mA
- ✓ Working Temperature: 5 ~ +65 Centigrade

1.1.3 Features

- ✓ Hi-Gate can be easily configured & managed via hIOTron IOT Platform locally/remotely
- ✓ It has dual mode of operation as a Gateway or Node
- ✓ Supports multiple wireless nodes up to 25 Hi-Nodes can be connected under single Higate (Gateway)
- ✓ It reconnects automatically to internet in case of loss of internet connectivity via, Wi-Fi or GPRS for any remote application
- ✓ Suitable for any kind of application which is purely sensor and actuator based.



1.2 Hi-Node

1.2.1 What is Hi-Node

The Hi-Node is an Enterprise Sensor Node. It can be operated with a battery (2700 MAH Li-ion) or USB optional. It is designed with a purpose of making interaction between real world and embedded devices simpler by providing multiple options of wired and wireless connectivity on single board. Hi-Node is complete package or a set of 3-Modular units such as sensing, controlling and powering.

1.2.2 Specifications

Hardware System

✓ Controller: ATmega328P

✓ Flash: 32KB✓ SRAM: 2KB✓ EEPROM: 1KB

Interface

✓ Power input: 9-24V DC

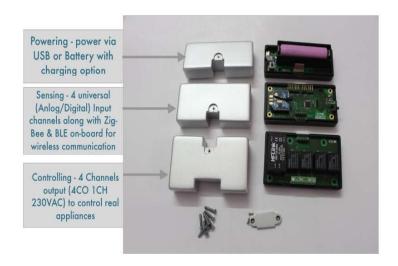
✓ Sensing: supports 4 Universal (Analog/Digital Input)

✓ Controlling: support 4-Channels output (4CO 1CH 230VAC) to control

✓ ZigBee and BLE 4.0 on board for wireless connectivity

1.2.3 Features

- \checkmark Hi-Node can be easily configured & managed via hIOTron IOT Platform locally/remotely
- ✓ Battery operated with USB optional
- ✓ It has ZigBee, BLE 4.0 wireless connectivity
- ✓ Suitable for any kind of applications which are purely sensors and actuator based.







1.3 hIOTron IOT Platform

hIOTron IOT Platform is fully code-less & enterprise IOT platform which is designed to help you to build project for any IOT application. It supports 5 major D's such as **Device connectivity**, **Device management**, **Data Analytics**, **Data Storage**, **Dashboard and Application Enablement**. This will help you for mass deployment and better option of enterprise IOT applications in future at production stage. In later part of this User Manual We will explore each feature of hIOTron IOT Platform.



hIOTron Platform, Dashboard, Mobile App



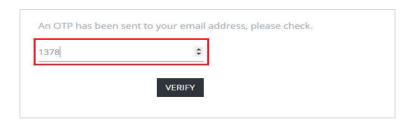
2 Account Registration

If this is your first time using hIOTron Platform site, you will need to create a new account. If you already have created an account you can skip to the Sign In section. The following instructions will guide you through the account creation process.

- 1. In a web browser, navigate to https://platform.hiotron.com
- 2. Click the "Create Account" button to setup user account



- 3. Follow the on-screen instructions to enter your account and contact information.
- 4. After entering details click on **Submit** button, you will be prompted to new screen where you will have to insert **4-digit OTP** number. And click on **Verify** button.



5. This will prompt you Login page which will show you message **Registration Successful**. Now we will be ready to login and access hIOTron IOT Platform.



6. After Sign in process. You will be presented with full featured hIOTron IOT Platfrom where you can setup your devices in order to build any IOT Application. Now we're done with setup and registration in next few sections we will explore how to add devices Hi-Gate and Hi-Node.



3 Device Setup

Let's see how easy it is to add and configure Hi-Gate/Hi-Node in order to use them into the project. The setup process of Hi-Gate involves Adding Hi-Gate to dashboard, setup WiFi on Hi-Gate and finally configure. Likewise for Hi-Node we will have to Add Hi-Node to dashboard and then configure.

3.1 Hi-Gate

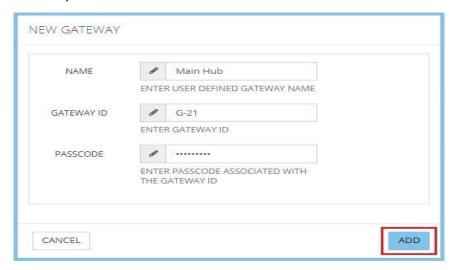
3.1.1 Add Hi-Gate

The first step is to power on Hi-Gate using Micro USB Cable. When we connect USB cable to Hi-Gate for power-up. We will see continuous blinking of Blue LED. This means device is powered but not in network. To connect Hi-Gate to internet, we must need to add Hi-Gate to Dashboard.

To get start the process, first login to hIOTron IOT Platform. Then on main dashboard browse Device Manager → ADD GATEWAY



To add new gateway to our dashboard we must provide information about Name, Gateway ID and Passcode. Now in this case: Name: Main Hub, Gateway ID: G-1, Passcode: "your password". Now we're ready to hit ADD.

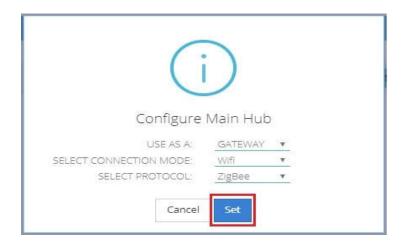


Once gateway added successfully, we must configure gateway. The next step is to simply hit configure button. And we will be presented with new popup box.





This configuration pop-up will allow user to set the configuration for Main Hub. Since we want to make Main Hub as a Gateway, we must choose **USE AS A**: GATEWAY, **CONNECTION MODE**: Wifi, **PROTOCOL**: ZigBee. Once it is done Click on **SET** button followed by **OK**.



After pressing **Set** button, popup will appear on screen by saying **Scheduled for Success**. Just press **Ok** and proceed further.



This is how we can register and configure gateway to user dashboard. In next section, we will explore how to configure network in order to connect Hi-Gate with Internet.

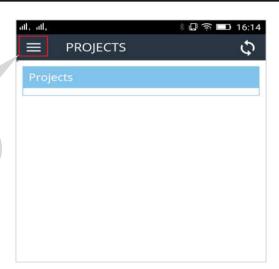
3.1.2 Setup WiFi

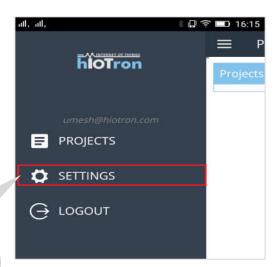
To connect Hi-Gate to an Internet we will have to download hIOTron **Generic Mobile App** from Google Play Store. Then login to your account using same login credentials of hIOTron IOT Platform (web dashboard).

Once we logged in we will find same dashboard into mobile view. We will have to click on upper left menu bar in Mobile App. This allows us to navigate Settings menu.



Main **Menu** bar to Navigate Settings





Click on **Settings** to Navigate
Network Settings



Click on Network
Settings



Click on **Scan** in order to scan available Network



Click on network SSID and Hit on Yes button





Enter Password of network SSID and click on **OK**



If everything goes well then you will find **BLUE LED** on Hi-Gate gets stable. This confirms Hi-Gate is now connected to Internet. The next step could be configure Gateway as a Node and run a small test to remotely control 2- output channels or monitor data from 2-analog input channel



3.1.3 Configure

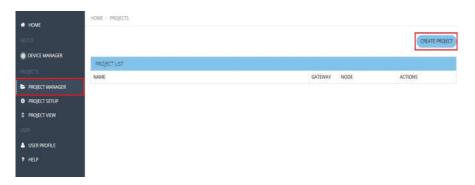
To run a quick test, we will have to configure Gateway as a Node. This can be done very easily. First let's browse **Device Manager** and then click on **Configure** menu. As show in picture below:



The popup will appear and we will have to select **USE AS A: NODE**. Since we want to run a test we will make Gateway as a Node. Then we must use this Gateway and create a Project. This will confirm connectivity across gateway and internet network.



Let's create a small project to run quick test. We must browse **Project Manager** and click on **Create Project** from user dashboard.



The popup will appear on screen. There we can configure project. The first thing is to give name in this case **Test**, select a Gateway here in this case **G-21**, then NODE here since we will be using gateway as a node we will keep it to **Gateway as Node**. Make sure to select CUSTOMIZATION option as "Build your own IOT Project" and simply click on **Create**.

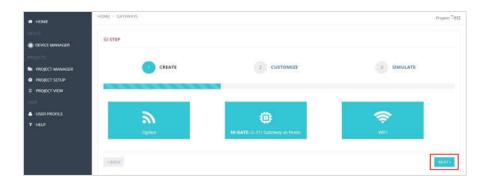




This will take us back to **Project Manager** and in the list now we can see our project "**Test**". Let's click on **Setting option (Gear Icon)**.



The new window will take us to project options. There by default protocol should be ZigBee. Then hit **Next** and proceed further.



The next step is to customize project. This will allows us to setup two outputs and two input channels. Lets enable them to control and monitor data from user dashboard. After setting those options just click **Next**.

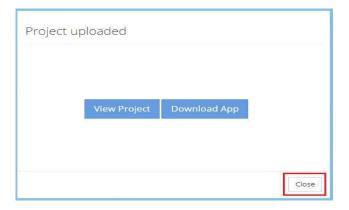




In a customization options, we would have to **enable Input and output channels**. In the right side of dashboard we will find Mobile view.



At this point just click on Finish.

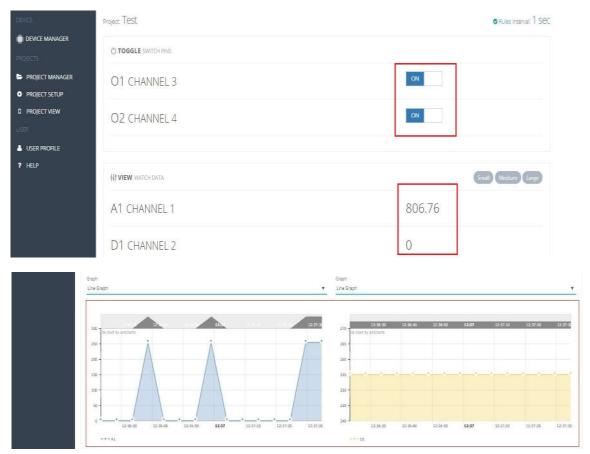


We can now ready to run a quick test with the help of project we built. Let's find this project under **Project View** and then select a project in this case **Test (G-21)**.





We will see dashboard which can allows us to control 2-Output Pins and Monitor 2-Analog Input channels.



Note: Setup update interval to 1 **Sec**. This option can be found on upper right corner of project view section of user dashboard. We can also monitor same data and control pins from Mobile App.

3.1.4 Edit/Rename

We can edit/rename gateway under dashboard at any point in time. In order to rename Gateway we will have to browse **Device Manager**. Here under "Registered Gateway List", click on **Edit** icon. This will present a popup to insert new name to the existing gateway.







Here type new name into the field. And then click on **Rename** button.

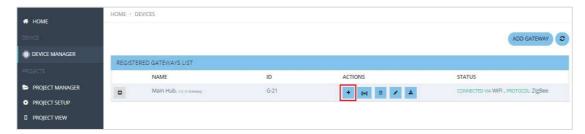


3.2 Hi-Node

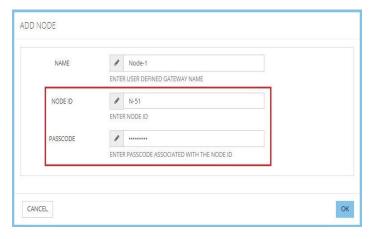
3.2.1 Add Hi-Node

To add node we have to make sure that Hi-Gate is configured as a Gateway. In previous chapter we have seen how gateway could itself act as node. The remaining process required to follow some simple steps.

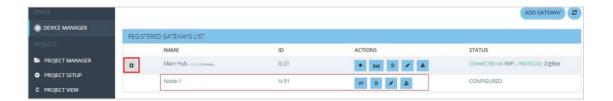
To get start we have to browse **Device Manager** from dashboard. Then under the Registered Gateway List, find gateway to which we wish to add Hi-Node. Click on **Add Node** button.



This will popup new window on screen where we will have to insert node credentials. These credentials include NAME, NODE ID and PASSCODE. In this case, name could be any name Node-1, NODE ID will be N-51 (NODE ID will provided along with Hi-Node).



This is all we need to do in order to add/register node under Gateway. Now if we revisit **Device Manager** and **expand** Gateway G-21, we will find node which we have added just now.

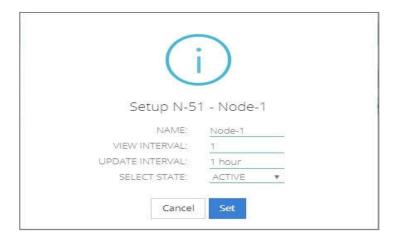




3.2.2 Edit/Rename/Delete

We can edit Node settings at any point in time. To explore these options we will have to again browse **Device Manager** under which, need to expand Gateway. And click on **Edit** button. There we can find several parameters user may want to edit. As and when needed.

.



Name: Rename Hi-Node with any name

View Interval: Time interval in Seconds to view data on dashboard

Update Interval: Time for Heartbeat Interval used to monitor the availability of resource.

Select State: Active Mode and Sleep Mode

These are the few parameters user can edit under the listed Node.

Now if we add more than one node and for any reason we want to delete that Node. Then we will have to browse **Device Manager** under registered Gateway list and in-front of Node just click on **Delete** button. This will simply remove that particular node from selected gateway.





4 Build Project

In this section, we will be creating a fresh new project. Since, we know how to add Hi-Gate and Hi-Node to hIOTron IOT Platform. We now can build simple project. Then on the top of that we will be going to explore advance features of hIOTron IOT platform.

4.1 Create

Let's click on **Project Manager** from the left pan of the dashboard. And click on **Create Project**. This will present new popup on the screen. Now insert all the details relevant to our project. In this case as shown below:



Here in our case, the Project Name given as *Home Automation*. Since we already have Gateway and Node added we will be going to use same Gateway G-21 and Node N-51 respectively. We also have to click on **Build your Own IOT project** under customization option. And finally click on **Create** and we are done.

4.2 Customize

Now we have already project listed in our dashboard. This project can be found under **Project Manager** Section in the dashboard.

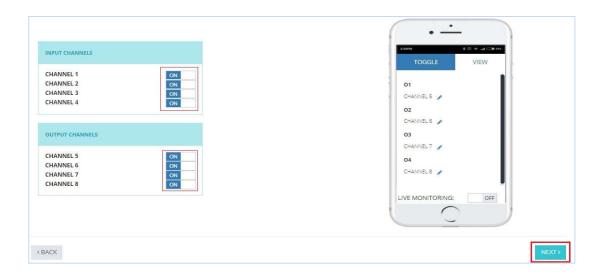


Let's customize this project, so that we will be able to control 4-Input and 4-Output channels of the Node. Just click on **Gear Icon** as shown in picture. This will open new window with advance customization options.





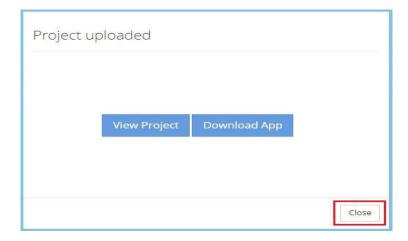
Click Next and proceed further



We will have to turn ON all INPUT and OUTPUT Channels. As soon as we add more and more input-output channels, we can see real-time customization in Mobile App view on dashboard. Let's press **Next**.







At this step Click on **Close** and we are done. Next step is just control/monitor Hi-Gate and Hi-Node from hIOTron IOT Platform. Let's test our Home Automation Project which we built jut now.

4.3 Run on Real Hardware

Now open a project, browse **Project View** in left pan and select your Project. This will take us to new screen where we can see real time data in our dashboard. Also we will be having some button through which we can toggle 4-Output Channels of Hi-Node.







5 Advance Features

In this section we will explore advance customization features of hIOTron IOT Platform.

5.1 Configure each Sensor Pin

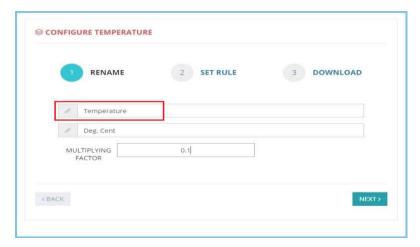
In previous sections we have seen how easy it is to control INPUT and OUTPUT pins on HI-Gate or Hi-Node. Now to provide fine control, dashboard allows us to configure each sensor pin. This will open possibilities such as getting most accurate data from sensor, set rules/action and also to export data. Let's see how to use these features.

5.1.1 Rename

Rename feature allows you to give user defined name to particular pin/channel on our dashboard. Let's suppose we want to change the name of Channel A2 to Temperature. Since, we will be going to connect analog Temperature Sensor LM35 to Pin A2. To do that we must browse **Project Setup** \rightarrow Select project **Home Automation (N-51)**. \rightarrow Under **Customization**, click on **View** tab and in the listed channels press **Gear Icon** next to the channel we wish to rename. In this case Channel A2.



Now we will be presented with a new window named **Configure Channel 2** and **Rename** option. There we can give any meaningful name to represent the pin functionality, unit and multiplying factor. Just hit **Next**.





Multiplying Factor: This value scales reading from particular channel. If we don't keep multiplying factor then data from temperature sensor could be just an raw analog adc counts. But this information must be converted into °C and this can be done by adding multiplying factor. Say for example: In this case, when we will connect LM35 Temperature Sensor to A2 Channels. We will get temperature data in the form of ADC counts. By adding multiplying factor 0.1. We will covert that adc value in to °C which will be more useful.

5.1.2 Set Rules

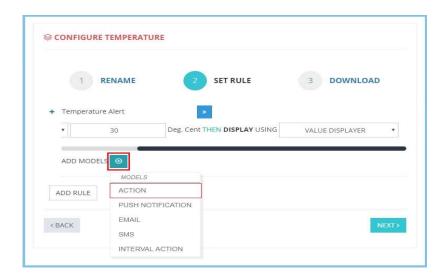
Rules give your devices the ability to interact with hIOTron IOT Platform. With just few clicks we can add rules to particular pin and perform conditional operation without even writing single line of code. Let's add rule to existing channel **Temperature** from previous section.



Now click on **Add Rule** and we will be presented with a new window to configure rule on same channel. The first step could be to rename rule then click on + button. This will enable us to setup condition and act upon it so as to trigger alert messages.



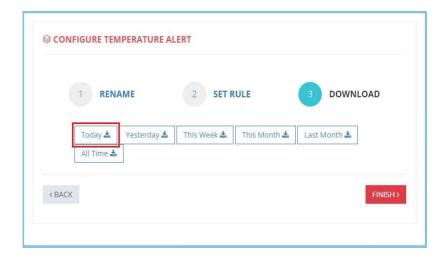




We can test condition when Temperature is greater than 30°C. Then turn- ON the Pin O1 for 1 Minute. There are several Models available through which we can customize rule to one which suits to an application. We can even configure more than one model for single pin/channel. In the Models we can generate Action, Push Notification, Email, SMS Alert and Interval Action.

5.1.1 Export Data

Now, when it comes to storing and managing data from different channels. Export Data is a fully managed service. We can create database tables that can store and retrieve any amount of data, and serve any level of request traffic. We will be easily scale up or scale down your tables. The Export Data option allows us to export/download data into CSV format. This data can then be ported to any other platform from analytics to almost anything.



Let's hit on any data we are interested. This will download .csv file onto our computer. This is an easiest and quickest way to remotely export data.



5.2 Switching Nodes

We can add multiple Nodes under single Gateway or even multiple Gateways. Please refer, Section 3.2.1 to learn more about how to add Node and Section 3.1.1 for adding Gateway. If user want to switch Nodes from one Gateway to other it can be done with few simple steps. As we can see we have two Gateways and two Nodes on the dashboard as shown below:



Let's suppose we have two Gateways from different applications. And we wish to switch Node-1 from Gateway "Main Hub" (G-21) to Gateway "Second Hub" (G-22). To do this we must first click Swap Node option as shown in the picture above. This will present new popup where we must select Gateway under whom we wish to switch Node-1.



Once Gateway selection done, click on **Switch** button. And press **OK** then please do not forget to **Refresh the Page** once. After this step's we will find Node-1 will be listed under Gateway **G-22** "Second Hub".





FUTURE UPDATES (Included in Firmware Version 3.1): Coming Soon*

Reset over Cloud
Auto Remote Connectivity
Priority based WiFi to GSM or GSM to WiFi
Time based Report (.xls, .csv]/Graph [line, bar]
Platform Advanced Pattern based Analytics Features

Take a Test Drive with following credentials:

Platform URL: https://platform.hiotron.com/login.html

User Name: <u>umesh@hiotron.com</u>

Password: demohiotron

For More Information & Support:

Contact Details: +91 8007770636/9975551455 Write Us: support@hiotron.com / info@hiotron.com

Website: www.hiotron.com | Platform: https://platform.hiotron.com/login.html

