IBOXJT2 Edge AI
Embedded Industrial Computer

User Manual

Version: 1.2

Revision History:

No.	Version	Description	Date
1	V1.0	First release	Nov. 27, 2023
2	V1.1	Added wiring description to the I/Os	Dec. 19, 2023
3	V1.2	Updated the networking section in Ubuntu	Apr. 2, 2024

Table of Contents

Foreword

Thank you for purchasing IBOXJT2 edge AI embedded industrial computer ("the Device" or "the Product"). This manual intends to provide guidance and assistance necessary on setting up, operating or maintaining the Product. Please read this manual and make sure you understand the structure and functionality of the Product before putting it into use.

Intended Users

This manual is intended for:

- Operator of the Product

- Technical support engineers

- Other users

Copyright

Vantron Technology, Inc. ("Vantron") reserves all rights of this manual, including the right to change the content, form, product features, and specifications contained herein at any time without prior notice. An up-to-date version of this manual is available at www.vantrontech.com.

The trademarks in this manual, registered or not, are properties of their respective owners. Under no circumstances shall any part of this user manual be copied, reproduced, translated, or sold. This manual is not intended to be altered or used for other purposes unless otherwise permitted in writing by Vantron. Vantron reserves the right of all publicly released copies of this manual.

Disclaimer

While all information contained herein has been carefully checked to assure its accuracy in technical details and typography, Vantron does not assume any responsibility resulting from any error or features of this manual, nor from improper uses of this manual or the software.

It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without notice.

Technical Support and Assistance

Should you have any question about the Product that is not covered in this manual, contact your sales representative for solution. Please contain the following information in your question:

- Product name and PO number;
- Complete description of the problem;
- Error message you received, if any.

Vantron Technology, Inc.

Address: 48434 Milmont Drive, Fremont, CA 94538

Tel: (650) 422-3128

Email: sales@vantrontech.com

Regulatory Information

The Product is designed to comply with:

- CE
- FCC
- ISED
- PTCRB

Please refer to the Appendix for Regulatory Compliance Statement.

Symbology

This manual uses the following signs to prompt users to pay special attention to relevant information.

⚠	Caution for latent damage to system or harm to personnel
▷	Attention to important information or regulations

General Safety Instructions

The Product is supposed be installed by knowledgeable, skilled persons familiar with local and/or international electrical codes and regulations. For your safety and prevention of damage to the Product and other equipment connected to it, please read and observe carefully the following safety instructions prior to installation and operation. Keep this manual well for future reference.

- Do not disassemble or otherwise modify the Product. Such action may cause heat generation, ignition, electronic shock, or other damages including human injury, and may void your warranty.

- Keep the Product away from heat source, such as heater, heat dissipater, or engine casing.

- Do not insert foreign materials into any opening of the Product as it may cause the Product to malfunction or burn out.

- To ensure proper functioning and prevent overheating of the Product, do not cover or block the ventilation holes of the Product.

- Follow the installation instructions with the installation tools provided or recommended.

- The use or placement of the operation tools shall comply with the code of practice of such tools to avoid short circuit of the Product.

- Cut off the power before inspection of the Product to avoid human injury or product damage.

Precautions for Power Cables and Accessories

⚠ Use proper power source only. Make sure the supply voltage falls within the specified range. The Product is designed to use 12V~36V DC. Always check whether the Product is DC powered before applying power.

⚠ Place the cables properly at places without extrusion hazards.

⚠ Use only approved antenna(s). Non-approved antenna(s) may produce spurious or excessive RF transmitting power which may violate FCC limits.

⚠ Cleaning instructions:

- Power off before cleaning the Product

- Do not use spray detergent

- Clean with a damp cloth

- Do not try to clean exposed electronic components unless with a dust collector

⚠ Power off and contact Vantron technical support engineer in case of the following faults:

- The Product is damaged

- The temperature is excessively high

- Fault is still not solved after troubleshooting according to this manual

⚠ Do not use in combustible and explosive environment:

- Keep away from combustible and explosive environment

- Keep away from all energized circuits

- Unauthorized removal of the enclosure from the device is not allowed

- Do not replace components unless the power cable is unplugged

- In some cases, the device may still have residual voltage even if the power cable is unplugged. Therefore, it is a must to remove and fully discharge the device before replacement of the components.

CHAPTER 1 INTRODUCTION

1.1 Product Overview

IBOXJT2 is an intermediate option of Vantron edge AI embedded industrial computer family. It is powered by the NVIDIA® JetsonTM TX2 NX core module that features NVIDIA PascalTM GPU with 256 CUDA® cores, capable of delivering up to 1.33 TFLOPS compute performance—approximately 2.5 times the performance of Vantron IBOXNANO, an entry-level option powered by NVIDIA® JetsonTM Nano core module. It also supports popular AI frameworks such as TensorFlow, Keras, PyTorch, Caffe, and MXNet for flexible deployment of AI applications.

IBOXJT2 provides dual gigabit Ethernet jacks, Wi-Fi 6, Bluetooth 5.0, along with 4G and optional 5G cellular connectivity to ensure stable and reliable interfacing with sensors, cameras, and other edge devices. Its edge computing feature enables data to be processed and analyzed at the network edge where data is generated before being transmitted to the data center. This significantly relieves the network congestion and reduces data latency. IBOXJT2 features rich interfaces, such as USB, RS232/RS485, CAN, GPIO, DI, DO for flexible user expansions. Its built-in ARM Trustzone technology, TPM module, SHA/AES algorithms ensure data protection and secure operation in edge deployments. Typical application of IBOXJT2 includes smart home, smart city, remote diagnosis, autonomous driving, etc.

1.2 Product Feature

- NVIDIA Jetson TX2 core module

- Multi-standard video decoder & encoder

- Support for 4K UHD (3840 x 2160) HDMI video output

- Gigabit Ethernet, Wi-Fi 6, BT 5.0, 4G/5G connectivity

- Rich interfaces for flexible expansion

- Support for popular AI frameworks

- Support for edge computing

- Compact size for flexible deployment

1.3   Terminology/Acronym

Please refer to the table below for acronyms or terminologies used in this document, especially for those included in the pinout description of the device.

Terminology/Acronym	Description
NC	No connection
VCC	Voltage common collector
GND	Ground
P (+)	Positive difference signal
N (-)	Negative difference signal
SCL	Serial clock
SDA	Serial data
I	Input
O	Output
I/O	Input/output
P	Power
RX	Receive data
TX	Transmit data
PCIe	PCI express signal
MDI	Media dependent interface
MISO	Master in slave out
MOSI	Master out slave in

1.4   Unpacking

The Product has been carefully packed with special attention to quality. However, should you find any component damaged or missing, please contact your sales representative in due time.

Standard accessories:

- IBOXJT2 edge AI embedded industrial computer

- 2 x Wi-Fi & BT antenna (robber)

- 2 x 4G LTE antenna (magnetic sucker)

- 1 x Qualified certificate

Optional accessories:

- 1 x 12V 3A power adapter

- 1 x Power cord

- 1 x DC power connector

- 4 x 5G antenna (magnetic sucker)

▷ *Actual accessories might vary slightly from the list above as the customer order might be different from the standard configuration options.*

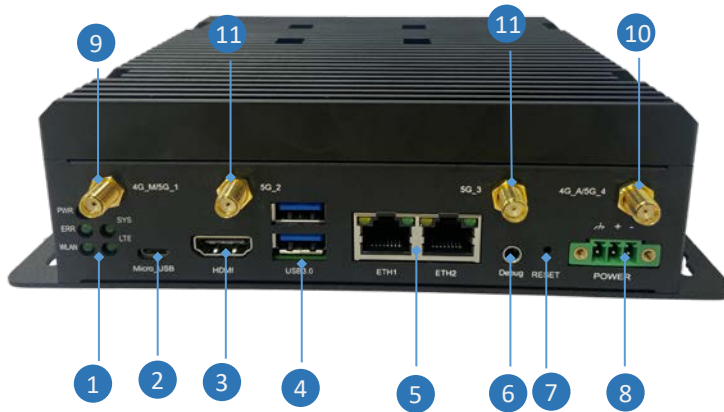## 1.5 Specifications

IBOXJT2			
System	CPU	NVIDIA Jetson TX2 NX, Dual-core NVIDIA Denver 2 64-bit processor (2GHz) + Quad-core Arm Cortex-A57 MPCore processor (2GHz)	
	AI performance	1.33 TFLOPS	
	GPU	NVIDIA Pascal GPU with 256 CUDA cores	
	Memory	4GB 128-bit LPDDR4	
	Storage	16GB eMMC 5.1	1 x Micro SD slot
Communication	Ethernet	2 x RJ45, 1000Mbps	
	Wi-Fi & Bluetooth	Wi-Fi 6 & BT 5.0	
	Cellular	4G LTE (Optional: 5G)	
I/Os	Serial port	2 x RS232/RS485, isolated (2 x 3 x 3.81mm, baud rate: 115200)	
	USB	2 x USB 3.0 Type-A	1 x Micro USB (USB 2.0 OTG)
	Video output	1 x HDMI 2.0, 3840 x 2160 @60Hz	
	DI/DO	4 x DI	4 x DO
	Expansion	1 x CAN	
		1 x I^{2}C	
		6 x GPIO	
	Debug	1 x 3.5mm Audio jack	
	SIM slot	1 x Micro SIM slot	
	Antenna	1 x Wi-Fi + 1 x Wi-Fi & BT SMA connectors 4 x 5G SMA connector / 2 x 4G SMA connector	
	RTC	Supported	
	WDT	Supported	
System Control	LED indicator	1 x Power indicator 1 x System indicator 1 x Error indicator	1 x Cellular connectivity indicator 1 x Wi-Fi connectivity indicator
	Button	1 x Reset button	
Power	Input	12V~36V DC	1 x Power terminal (1 x 3 x 3.81mm)
Software	Operating system	Ubuntu 18.04	
	Video encode	1x 4K @60 (HEVC) 4x 1080p @60 (HEVC)	8x 1080p @30 (HEVC)
	Video decode	2x 4K @60 (HEVC) 4x 4K @30 (HEVC)	7x 1080p @60 (HEVC) 14x 1080p @30 (HEVC)
	AI framework	TensorFlow, Keras, PyTorch, Caffe, MXNet	
	Security	ARM Trustzone, TPM, SHA, AES	
Mechanical	Dimensions	190mm × 140mm × 50.7mm (with mounting brackets)	
	Installation	Wall mount (Optional: DIN rail mount)	
	IP rating	IP40	
	Cooling mode	Fanless	
Environment Condition	Temperature	Operating: -20°C ~ 60°C	Storage: -40°C ~ 85°C
	Humidity	Operating: 5%~95% RH (Non-condensing)	
	EMC	EMC level 3	
	Certification	FCC, CE, ISED, PTCRB	

1.6   Product Layout

1.6.1   Front view

I/O description:

No.	Name	Description	
1	5 x LED indicator	PWR	Turns on when the device is powered on
		ERR	Blinks when the device experiences a fault
		WLAN	Turns on after the device starts, indicating the Wi-Fi module is functioning properly
		SYS	Turns on after the device starts, indicating the system is running properly. Otherwise, there is an error
		LTE	Turns on after the device starts, indicating the cellular module is functioning properly
2	Micro USB	USB 2.0 OTG supported (For image flashing, etc.)	
3	HDMI	HDMI 2.0, resolution up to 3840 x 2160 @60Hz	
4	2 x USB 3.0 Type-A	For connecting peripherals	
5	2 x RJ45	Ethernet jack, rating 10M/100M/1000Mbps, working in WAN area by default (customizable)	

| No.	Name	Description
6	Audio jack	3.5mm audio jack for device debugging
7	Reset button	< 3s: Restart the device; 3s~10s: factory reset
8	Power terminal	3-pin x 3.81mm, for connecting 12V~36V DC power source
9	4G antenna	Primary 4G antenna
10	4G antenna	Auxiliary 4G antenna
11	5G antenna	9, 10, 11 are used for 5G network connectivity

1.6.2 Back view
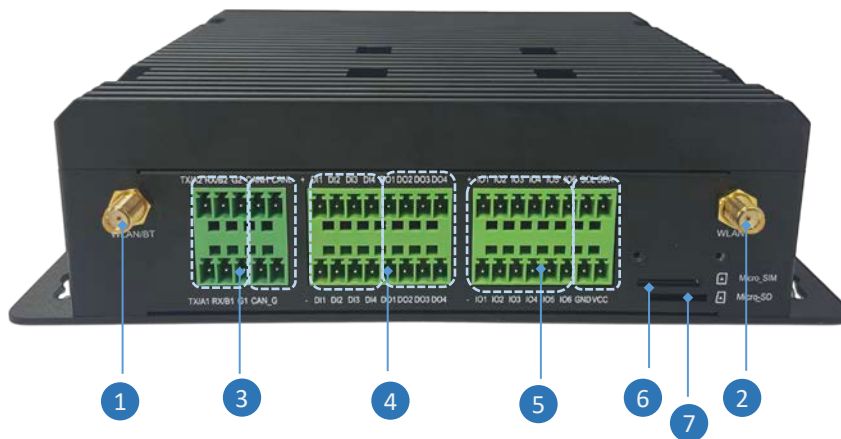
I/O description:

No.	Name	Description
1	Wi-Fi & BT antenna	Wi-Fi & BT antenna
2	Wi-Fi antenna	Auxiliary Wi-Fi antenna
3	2 x RS232/RS485 + CAN	For serial communication
4	4 x DI & 4 x DO	For digital data input and output
5	GPIO & I^{2}C	For interfacing with peripherals and transferring data
6	Miscro SIM slot	For holding a Micro SIM card
7	Micro SD slot	For storage expansion

1.7   Operating System

IBOXJT2 is running Ubuntu 18.04 operating system.

1.8   Mechanical Dimensions

- 190mm × 140mm × 50.7mm (With mounting brackets)
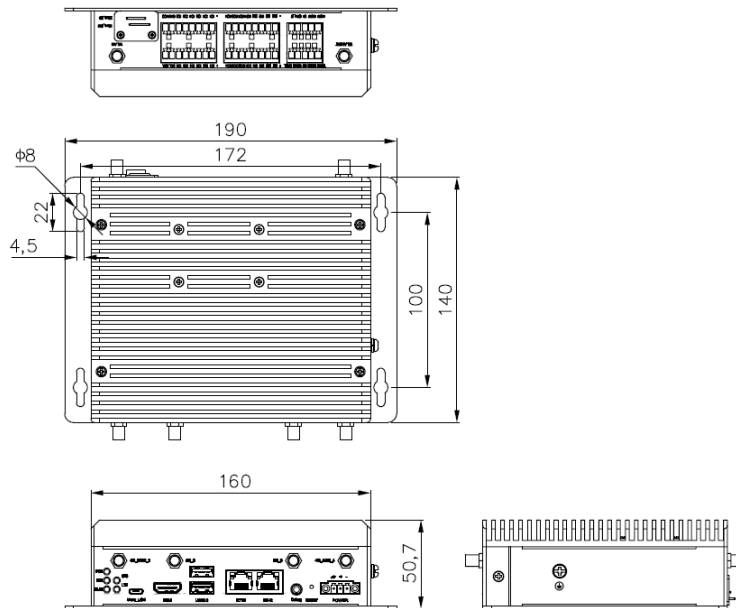
1.9   Power Supply

IBOXJT2 is designed to work with 12V ~ 36V DC power input via the power terminal on the front of the device.

1.10   Environmental Parameters

IBOXJT2works at a temperature ranging from -20℃ to +60℃ and at relative humidity of 5% to 95% for non-condensing purpose. It is designed to be stored at a temperature ranging from -40℃ to +85℃

CHAPTER 2 GETTING STARTED

2.1 Device Installation

Before you proceed with the configuration of IBOXJT2, follow the steps below to finish hardware connection.

1. Make sure the mounting surface is flat, for instance, a wall or a desktop;

2. Place the device on the mounting surface in the desired location;

3. Align the screws (M4 x 6 / M4 x 8 recommended) with the screw holes reserved on the mounting brackets, and mark the position of the screws on the mounting surface;
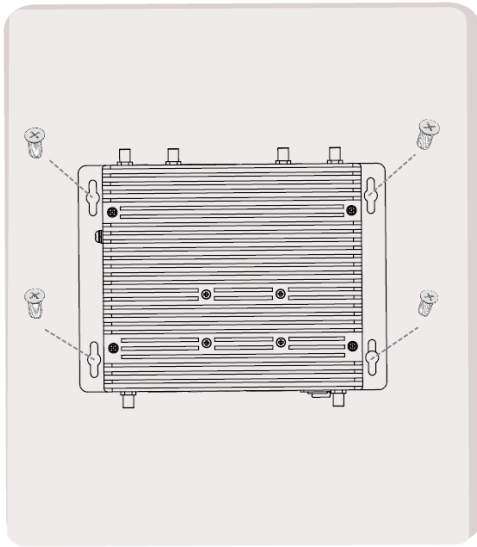

4. Place a screw into a marked position and use a drill to fasten it;

5. Tighten all screws likewise to secure the device, and adjust the position of the brackets, if needed;
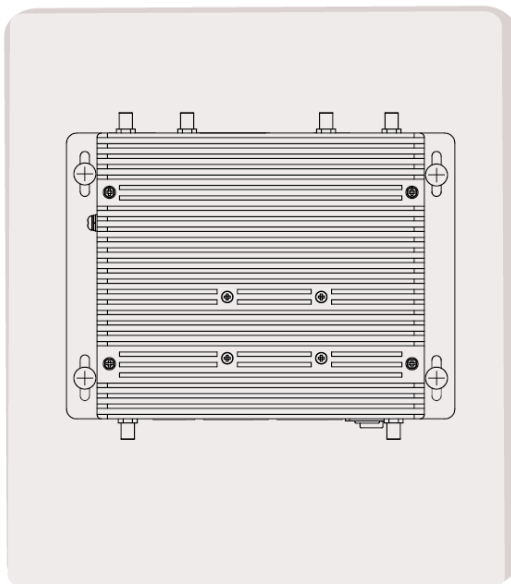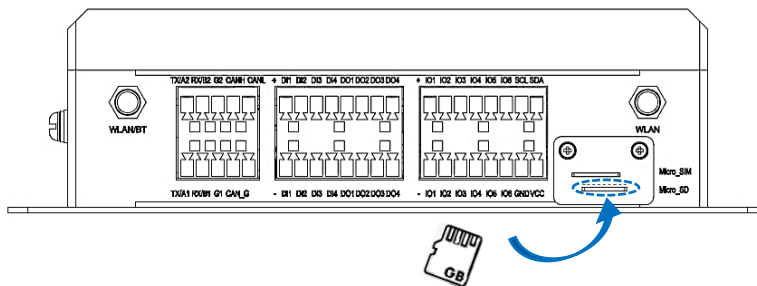
6. Unscrew the cover plate for the Micro SIM slot and the Micro SD slot;
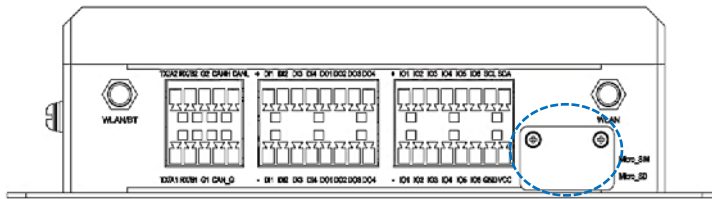
7. Insert an activated Micro SIM card into the Micro SIM slot with the gold-colored contacts facing down and the cut-off corner facing in;
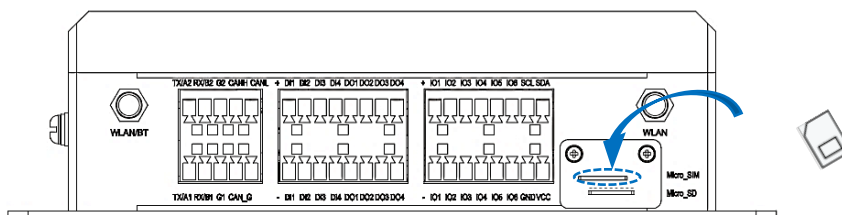

8. Push the card in until it clicks into place;

9. Insert a Micro SD card into the Micro SD slot with the gold-colored pins facing up;


10. Push the card in until it clicks into place;

11. Install the robber antennas to the WLAN/BT antenna connector (primary) and the WLAN antenna connector (auxiliary) respectively, then tighten the connectors;
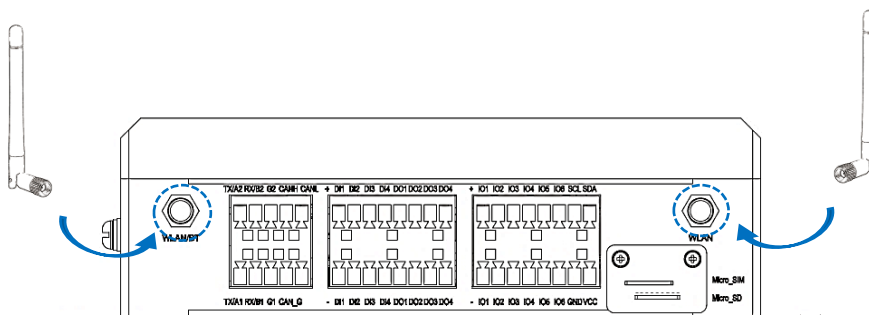
12. For enhanced 4G network connectivity, connect the magnetic sucker antennas to the primary and auxiliary 4G antenna connectors; for enhanced 5G network connectivity, connect the magnetic sucker antennas to all 4 antenna connectors;
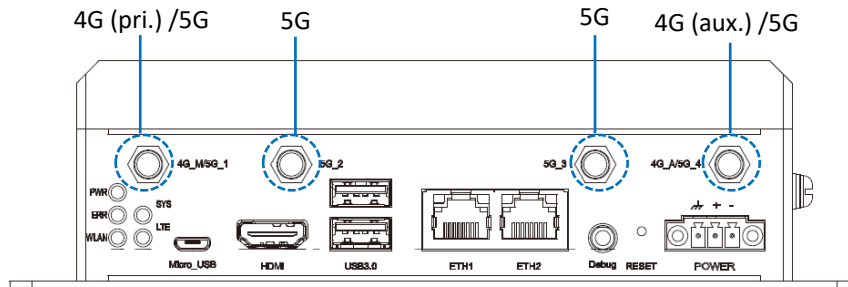
13. When necessary, plug one end of an Ethernet cable into an Ethernet jack of the device and the other to a live Ethernet port;
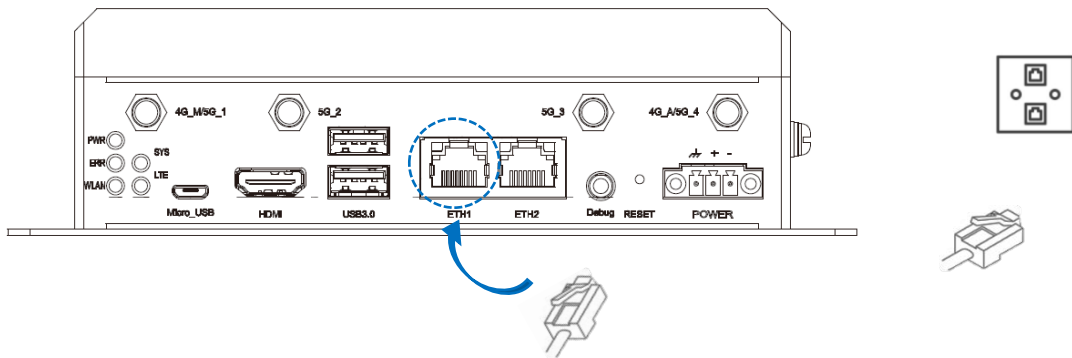
> *The Ethernet jacks are customizable (WAN/LAN) based on needs.*

14. Insert the terminal end of the female DC power connector into the power terminal of the device and the other end into a 12V/24V DC power adapter;
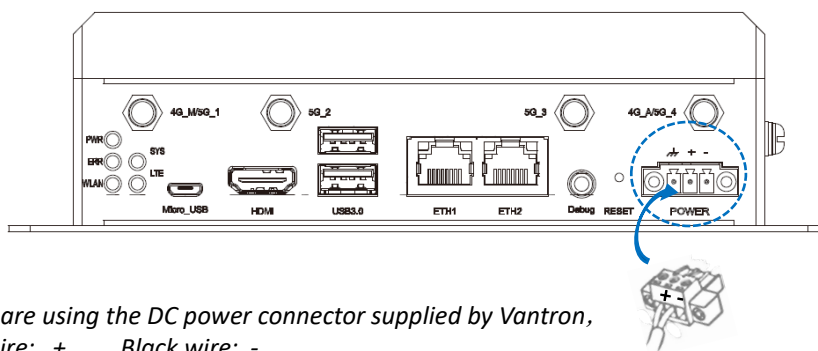
> *If you are using the DC power connector supplied by Vantron,*
> *Red wire: +   Black wire: -*

15. Power on the device, and the power indicator will turn solid green.

2.2 Using the Device

IBOXJT2 is running Ubuntu system. To access the GUI of the device, follow the steps below to connect it to a mouse, keyboard and monitor.

1. Insert one end of an HDMI cable to the corresponsive interface of the device and the other end to a monitor;
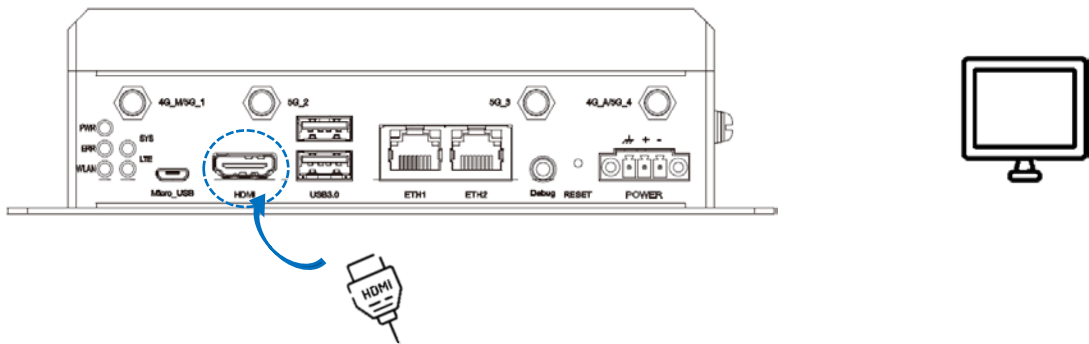
2. Connect a mouse and keyboard to the USB ports on the device;
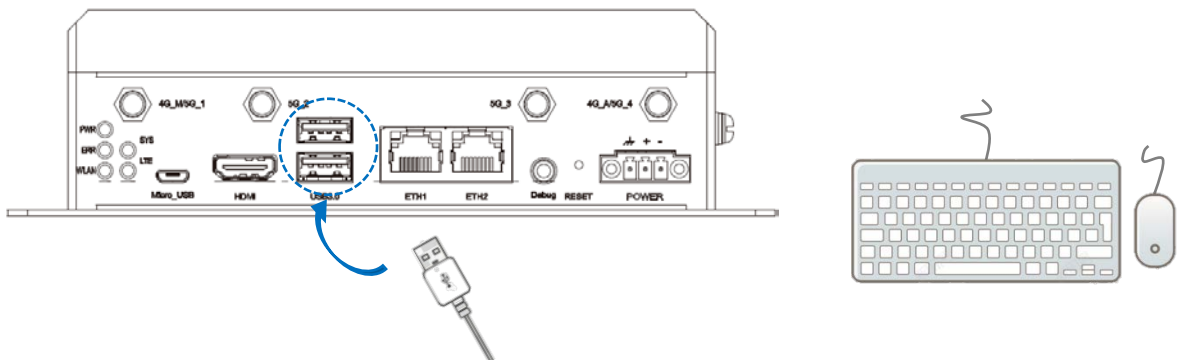
3. To debug the device, use a DB9 male to 3.5mm serial adapter cable to connect the audio jack of the device to a USB to RS232 female adapter cable, which is then connected to the host computer;

4. Power on the device and the monitor respectively using appropriate power adapters.

CHAPTER 3 HARWARE DESCRIPTION

This section briefs on the hardware definition and connector/interface description.

3.1   Power Input

IBOXJT2 is designed to work with 12V~36V DC power input with OVP/OCP protection.

Specification of the power connector: 1 x 3-pin, 3.81mm
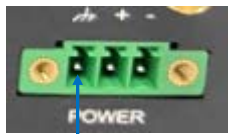
Pin 1

Pinout description:

Pin	Signal	Description
1	GND	Ground
2	+VDC	Power input +
3	-VDC	Power input -

3.2   USB 3.0 Type-A

IBOXJT2 implements two stacked USB 3.0 Type-A ports, ideally for connecting USB peripherals such as a keyboard, mouse, scanner, etc.

3.3   Ethernet Jacks

IBOXJT2 offers two RJ45 Ethernet jacks (Ethernet controller: Microchip LAN7430), supporting a data speed of 10M/100M/1000Mbps. The Ethernet jacks work in WAN area by default, and is customizable based on needs.

Each Ethernet jack has two LED indicators to indicate the link/activity and speed of the network.

Indicator	Color	Status
Left (speed)	Off	10Mbps or no link
	Blinking amber	100Mbps
	Solid amber	1Gbps
Right (link/act)	Off	No link
	Solid green	Link and activity

3.4   HDMI

IBOXJT2 offers an HDMI 2.0 port (Type-A) with resolution up to 3840 x 2160 @60Hz for delivering high-definition video and high-resolution audio.

3.5   Reset Button

The reset button is designed to restart the device upon a short press of less than 3 seconds, and factory reset the device upon a long press between 3 seconds and 10 seconds.

3.6   Debug Hole

The debug hole is a 3.5mm audio jack, and users can debug the device by connecting it to a host computer using a DB9 male to 3.5mm serial adapter cable and a USB to RS232 female adapter cable as shown in 2.2.

3.7   LED Indicators

There are five LED indicators on the front panel with functions separately described as follows.

Indicator name	Description
Power indicator (PWR)	Turns on when the device is powered on.
Error indicator (ERR)	Blinks when the device experiences a fault.
Wireless indicator (WLAN)	Turns on after the device starts, indicating the Wi-Fi module is functioning properly.
System indicator (SYS)	Turns on after the device starts, indicating the system is running properly. Otherwise, there is an error.
LTE indicator (LTE)	Turns on after the device starts, indicating the cellular module is functioning properly.

3.8   Grounding Screw

The grounding screw on the right side of the device allows users to attach a ground wire to it to protect the device from potential electrical damage.

3.9   Micro USB

The Micro USB port supports USB 2.0 OTG. Users can flash images of the device via this port.

3.10   RS232/RS485 & CAN

The device integrates two isolated RS232/RS485 connectors and a CAN bus on one terminal, with a pitch of 3.81mm.

Pinout description:

Pin name		Description
UART1	TX1/A1	RS232_1 transmit data/RS485_1 A
	RX1/B1	RS232_1 receive data/RS485_1 B
	G1	Isolated grounding
UART2	TX2/A2	RS232_2 transmit data/RS485_2 A
	RX2/B2	RS232_2 receive data/RS485_2 B
	G2	Isolated grounding
CAN	CANH	CAN_High level
	CANL	CAN_Low level
	CAN_G (2 pins)	CAN_Ground

3.11   DI & DO

The device integrates four digital input (DI) and digital output (DO) channels respectively on one terminal. The DI channels are used for receiving external switch quantity or digital signals and the DO channels are used for controlling the field devices.
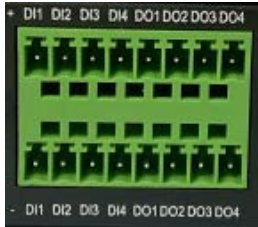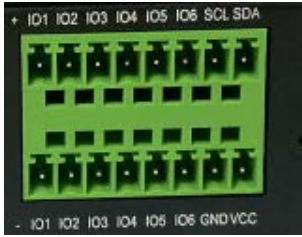

Pinout description:

Pin name		Description	Level
DI1	DI1+	Digital input channel 1 positive	0~10V
	DI1-	Digital input channel 1 negative	0~10V
DI2	DI2+	Digital input channel 2 positive	0~10V
	DI2-	Digital input channel 2 negative	0~10V
DI3	DI3+	Digital input channel 3 positive	0~10V
	DI3-	Digital input channel 3 negative	0~10V
DI4	DI4+	Digital input channel 4 positive	0~10V
	DI4-	Digital input channel 4 negative	0~10V
DO1	DO1+	Digital output channel 1 positive	0~10V
	DO1-	Digital output channel 1 negative	0~10V
DO2	DO2+	Digital output channel 2 positive	0~10V
	DO2-	Digital output channel 2 negative	0~10V
DO3	DO3+	Digital output channel 3 positive	0~10V
	DO3-	Digital output channel 3 negative	0~10V
DO4	DO4+	Digital output channel 4 positive	0~10V
	DO4-	Digital output channel 4 negative	0~10V

3.12   GPIO & I²C

The device integrates 6 GPIOs and an I²C bus on one terminal, for interfacing with peripherals and transferring data.

Pinout description:

Pin name		Description
GPIO1	IO1+	General-purpose input/output 1 positive
	IO1-	General-purpose input/output 1 negative
GPIO2	IO2+	General-purpose input/output 2 positive
	IO2-	General-purpose input/output 2 negative
GPIO3	IO3+	General-purpose input/output 3 positive
	IO3-	General-purpose input/output 3 negative
GPIO4	IO4+	General-purpose input/output 4 positive
	IO4-	General-purpose input/output 4 negative
GPIO5	IO5+	General-purpose input/output 5 positive
	IO5-	General-purpose input/output 5 negative
GPIO6	IO6+	General-purpose input/output 6 positive
	IO6-	General-purpose input/output 6 negative
I²C	SCL	I2C serial clock (3.3V by default, 5V optional)
	SDA	I2C serial data (3.3V by default, 5V optional)
	GND	Reference ground (3.3V by default, 5V optional)
	VCC	Power supply (3.3V by default, 5V optional)

CHAPTER 4 SOFTWARE SETUP

This chapter is mainly about the first-use debugging of the interfaces and software applications. The device is running Ubuntu 18.04 operating system. Please connect a mouse, keyboard, and monitor to the device for easier operation.
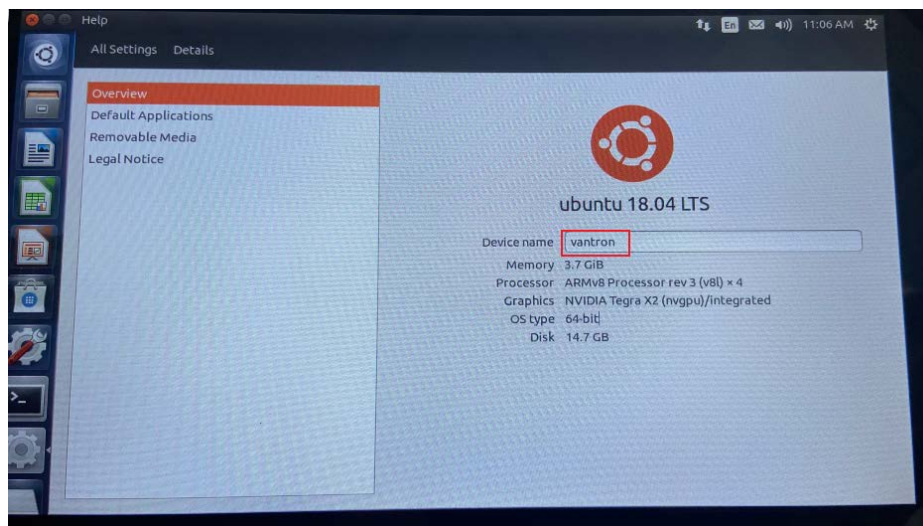
Default user: vantron

Password: 123456

Use "Ctrl" + "Alt" + "T" to open a terminal for inputting the commands.

4.1 Device Information

To check the device information:

1. Tap on the cog icon on the top right corner of the screen (⚙);

2. Select the "About This Computer" option;

3. The general information of the device is displayed as follows, with "vantron" as the default device name;
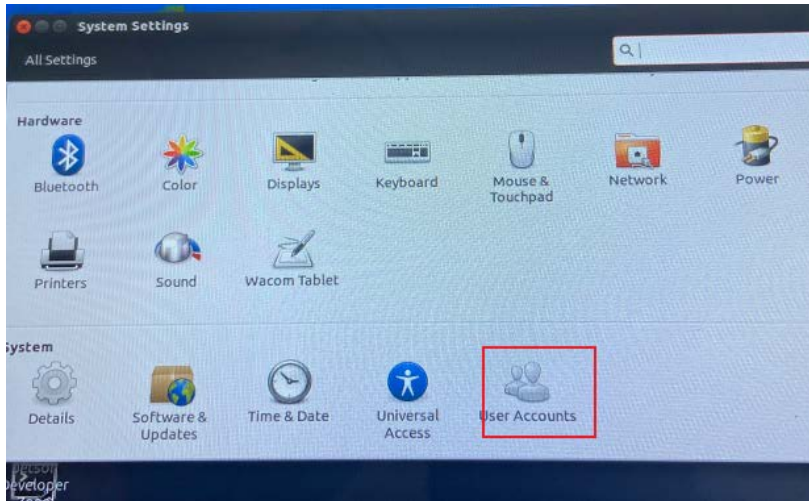

4. You can replace the device name with your own, which will take effect immediately after the change.

4.2 Default User

To check the default user information:

1. Tap on the cog icon on the top right corner of the screen (⚙);

2. Select the **System Settings** option;

3. Scroll down to the bottom and tap on the **User Accounts** option;

4. The default user is "vantron", you can add new users using the **+** button on the bottom left or delete an existing user using the **-** button. The **History** button allows you to check the login history of the user.
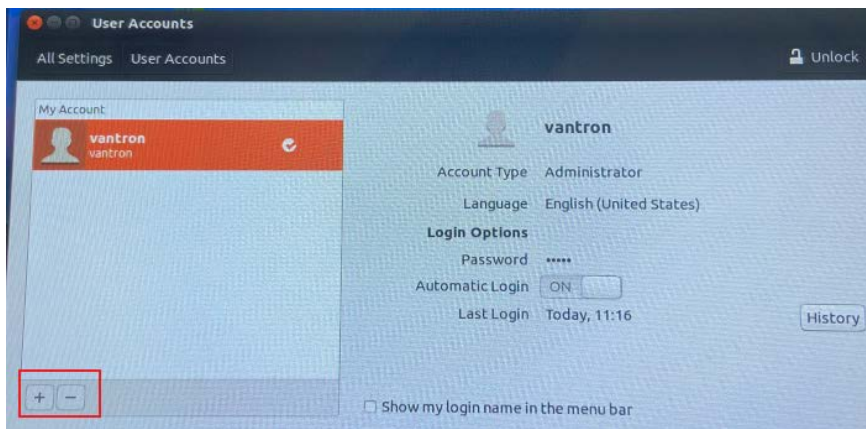
4.3 RS232/RS485

The device offers two isolated RS232/RS485 connectors, mapped as /dev/ttyTHS2 (uart1) and /dev/ttyXRM0 (uart2), respectively.

Parameters of the connectors:

Baud rate	Data bit	Polarity	Stop bit
115200	8	None	1

A serial communication program named as "uart_test" is included in the release package of the device provided by Vantron (directory: /tools). Please copy this tool to the filesystem (e.g., in the current directory: /home/vantron) for the serial port debugging.

Wiring	RS232	RS485
	TX-RX, RX-TX, G-G	A-A, B-B, G-G

RS232 mode

Commands for UART1:

echo 1 > /sys/class/leds/uart1_switch/brightness

./uart_test -d /dev/ttyTHS2 -b 115200 -s

Commands for UART2:

echo 1 > /sys/class/leds/uart2_switch/brightness

./uart_test -d /dev/ttyXRM0 -b 115200 -s

RS485 mode

Commands for UART1:

echo 0 > /sys/class/leds/uart1_switch/brightness

./uart_test -d /dev/ttyTHS2 -b 115200 -s

Commands for UART2:

echo 0 > /sys/class/leds/uart2_switch/brightness

./uart_test -d /dev/ttyXRM0 -b 115200 -s

4.4 USB

Insert a USB flash drive to any of the USB interface on the device, and input the following commands to test the functionality.

1. Check the information of all connected USB devices:

   ```
   # lsusb
   ```

2. Display the details of all storage devices and their partitions:

   ```
   # fdisk -l
   ```

3. Mount a USB drive to a specified directory (e.g., /mnt):

   ```
   # mount /dev/xxx /mnt
   ```

4. Unmount the USB drive:

   ```
   # umount /dev/xxx
   ```

4.5 GPIO

The device offers 6 general-purpose input/output ports with GPIO values starting from 242 through 247. Input the following commands to configure the port (GPIO1 for instance).

```
# echo 242 > /sys/class/gpio/export              // export the port
# echo out > /sys/class/gpio/gpio242/direction   // set the port as an output
# echo 0 > /sys/class/gpio/gpio242/value         // pull down
# echo 1 > /sys/class/gpio/gpio242/value         // pull up
# cat /sys/class/gpio/gpio242/value              // verify if the port is pulled down or up
```

4.6 DI & DO

The device offers four digital input (DI) and four digital output (DO) channels.

	DI-	DI+	DI value
DI Wiring	Ground	High level	1
	Ground	Low level	0

Commands for DI_1:

```
# echo 232 > /sys/class/gpio/export              // export the port
# echo in > /sys/class/gpio/gpio232/direction    // set the port as an input
# cat /sys/class/gpio/gpio232/value               // read the value of the port
```

Commands for DI_2:

```
# echo 233 > /sys/class/gpio/export

# echo in > /sys/class/gpio/gpio233/direction

# cat /sys/class/gpio/gpio233/value
```

Commands for DI_3:

```
# echo 234 > /sys/class/gpio/export

# echo in > /sys/class/gpio/gpio234/direction

# cat /sys/class/gpio/gpio234/value
```

Commands for DI_4:

```
# echo 235 > /sys/class/gpio/export

# echo in > /sys/class/gpio/gpio235/direction

# cat /sys/class/gpio/gpio235/value
```

DO Wiring	DO-	DO+
	Negative pin	Positive pin

Commands for DO_1:

```
# echo 236 > /sys/class/gpio/export               // export the port
# echo out > /sys/class/gpio/gpio236/direction    // set the port as an output
# echo 1 > /sys/class/gpio/gpio236/value          // high level
# echo 0 > /sys/class/gpio/gpio236/value          // low level
```

Commands for DO_2:

```
# echo 237 > /sys/class/gpio/export

# echo out > /sys/class/gpio/gpio237/direction

# echo 1 > /sys/class/gpio/gpio237/value

# echo 0 > /sys/class/gpio/gpio237/value
```

Commands for DO_3:

```
# echo 238 > /sys/class/gpio/export

# echo out > /sys/class/gpio/gpio238/direction

# echo 1 > /sys/class/gpio/gpio238/value

# echo 0 > /sys/class/gpio/gpio238/value
```

Commands for DO_4:

```
# echo 239 > /sys/class/gpio/export

# echo out > /sys/class/gpio/gpio239/direction

# echo 1 > /sys/class/gpio/gpio239/value

# echo 0 > /sys/class/gpio/gpio239/value
```

4.7 CAN

The device implements a CAN bus (CAN0) for connecting a sensor, or actuator, or other field instruments for device control.

Wiring	CAN_H	CAN_L	CAN_G
	CAN_H	CAN_L	CAN_G

```
# ifconfig -a          // enumerate all network interfaces including the CAN bus

can0: flags=128<NOARP>  mtu 16

    unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00  txqueuelen 10  (UNSPEC)

    RX packets 0  bytes 0 (0.0 B)

    RX errors 0  dropped 0  overruns 0  frame 0

    TX packets 0  bytes 0 (0.0 B)

    TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

```
# ip link set can0 down                          // disable the CAN bus

# ip link set can0 type can bitrate 500000       // set the bitrate to 500000

# ip link set can0 up                            // enable the CAN bus

# cansend can0 123#1122334455667788              // send a message to can0 with the ID '123'

# candump can0                                   // listen for and display the CAN messages
```

4.8 I²C

The device offers an I²C bus for connecting peripherals. Remember to use short jumper wires to minimize signal interference.

Wiring	**SDA**	**SCL**	GND	**VCC**
	SDA	SCL	GND	3.3V/5V power supply

The device's I²C bus is mapped as i2c-7 in the filesystem.

You can use the following commands to write and read values from an I²C device, respectively.

i2cset -y 7 <device address> <register address> <value to write to the register>
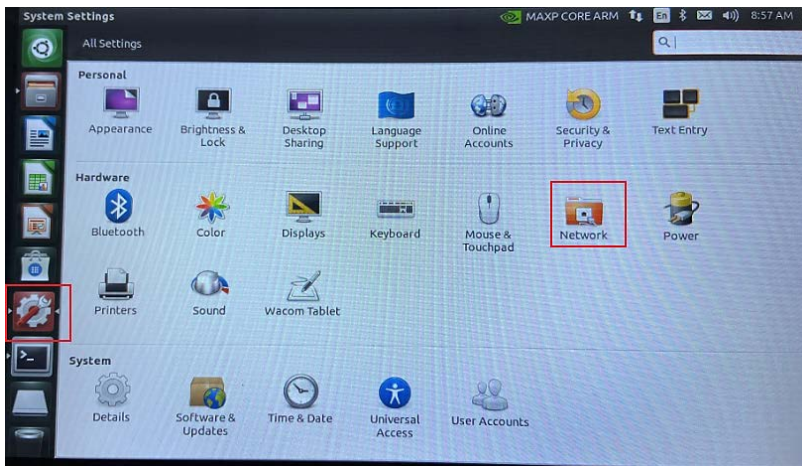
i2cget -y 7 <device address> <register address>

For example：

```
# i2cset -y 7 0x12 0x22 0x33

# i2cget -y 7 0x12 0x22
```

4.9　Networking

You can tap on the network icon (↑↓) to view the network connectivity of the device.

You can otherwise access the network settings from **Settings > Network**.

4.9.1　Ethernet

Currently the two Ethernet jacks are configured as WAN ports for connecting a switch or router. The network interfaces for ETH1 and ETH2 are eth1 and eth0, respectively in the system. They can be customized to LAN based on customer needs.

After connecting the device to a switch or router using an Ethernet cable, you can:

- Use the ifconfig command to show information about the network interfaces on the device;

- Use the ping command followed by a domain or IP address of the remote host to test the connectivity of the device.

4.9.2　Wi-Fi

Install the Wi-Fi antennas before connecting to a wireless network. You then can tap on the network icon (↑↓) to browse through the available Wi-Fi SSID list, then input the correct password to connect to the target Wi-Fi network.

After connecting the device to a target Wi-Fi SSID, you can use the commands same as those for Ethernet network to test the connectivity.

4.9.3 4G/5G

For 4G/5G communication, follow the steps set out in 2.1 to insert the activated Micro SIM card and install the 4G/5G antennas. Then, proceed with the steps below to configure the cellular network.

1. Tap on the network icon (↑↓) > **New Mobile Broadband connection** or navigate to **Settings > Network > > Add new connection**;

2. Follow the setup wizard to configure your country or region, and select our provider and data plan;

3. Confirm your SIM card information by tapping on the **Apply** option;
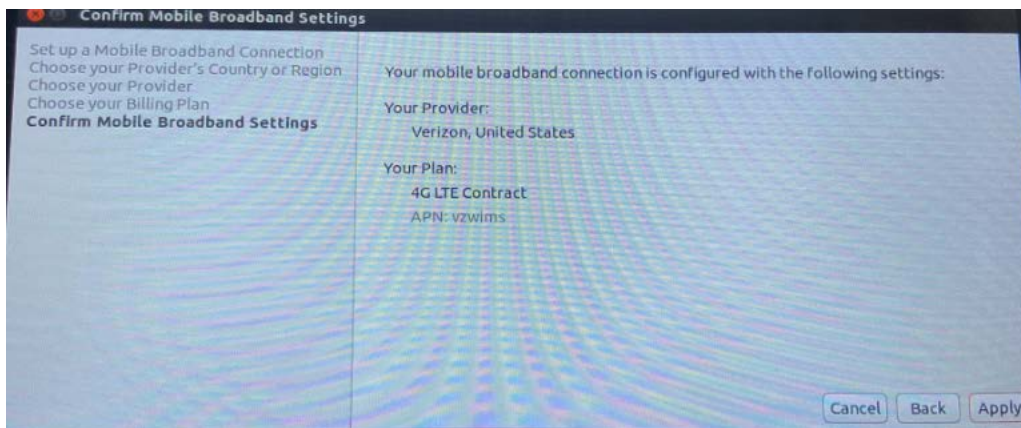
4. Tap on the network icon (↑↓) and select the mobile network you just created;

5. Enter a random password and tap on **OK**;

6. Wai a few seconds and then there will be a "Connection Established" prompt, indicating the 4G/5G network is ready for use;

7. Run the ifconfig command to check the network interface information;

8. Use the ping command to test the connectivity.

4.10 Pairing with a Bluetooth Device

1. Tap on the Bluetooth icon ( ) and select the **Bluetooth Settings** option;

2. In the Bluetooth device setup window, tap on the **+** icon and available Bluetooth devices will be displayed;
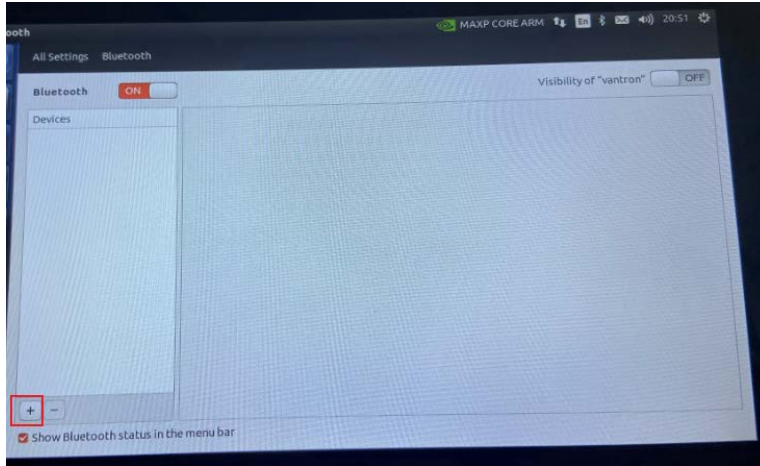
3. Navigate through the list to locate the desired Bluetooth device, select it and tap on "Next";

4. Follow the setup wizard to input the pair code and tap on "Matches";

5. Wait a few seconds for the pairing;

6. In the final step, there will be a message indicating that the target device is successfully set up.
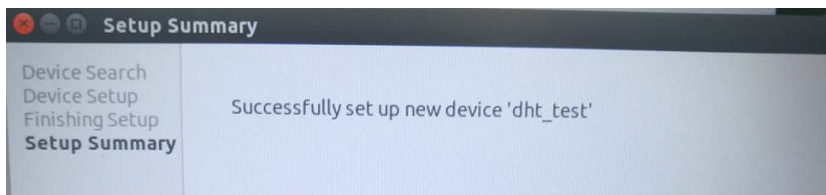
4.11 Micro SD Card

Once you insert a Micro SD card into the device following the steps set out in 2.1, the directory of the Micro SD card will automatically display on the desktop. You can also use the df -h command to display information about the disk space usage on the filesystems.
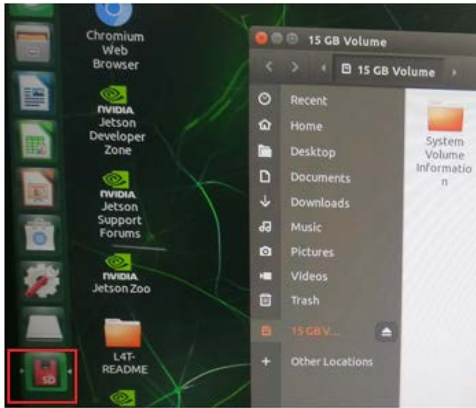
4.12 System time and RTC time

You can access the system time settings by tapping on the time stamp on the menu bar and selecting the "Time & Date Settings" option.
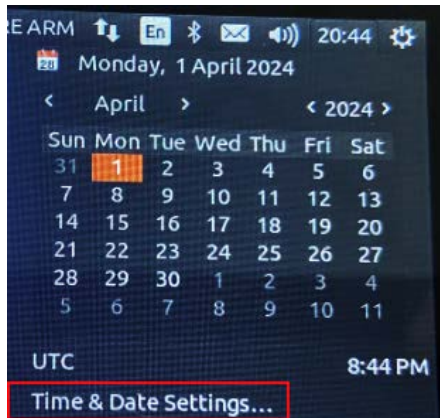
Then you can select your location and choose to set the time manually or use the Internet time (network access is required).

Real-Time Clock (RTC) is a hardware component that keeps track of the device time and date. Adjusting the RTC can help address issues related to time discrepancies or resets in software system time settings.

1. Set the system date & time;

   # date -s "2024-02-24 14:38:10"   // replace with your own date and time

2. Synchronize the RTC time with the system time;

   # hwclock -w -f /dev/rtc0

   # hwclock -w -f /dev/rtc1

3. Check the hardware RTC time;

   # hwclock -r -f /dev/rtc0, or

   # hwclock -r -f /dev/rtc1

4. Shut down the device for about 5 minutes and then power it on again;

5. Check the RTC time information.

   # date

4.13 Watchdog Timer

Enable and feed the watchdog using the following command.

echo 1 > /dev/watchdog

Once the watchdog timer is enabled, if the watchdog is not fed within 65 seconds, the device will automatically restart.

4.14 Video

To play a video file, please copy it to the filesystem (e.g., in the current directory: /home/vantron) and play it using gst-play-1.0.

gst-play-1.0 test.mp4   // test.mp4 is the name of the video file

CHAPTER 5 DISPOSAL AND WARRANTY

5.1   Disposal

When the device comes to end of life, you are suggested to properly dispose of the device for the sake of the environment and safety.

Before you dispose of the device, please back up your data and erase it from the device.

It is recommended that the device is disassembled prior to disposal in conformity with local regulations. Please ensure that the abandoned batteries are disposed of according to local regulations on waste disposal. Do not throw batteries into fire or put in common waste canister as they are explosive. Products or product packages labeled with the sign of "explosive" should not be disposed of like household waste but delivered to specialized electrical & electronic waste recycling/disposal center.

Proper disposal of this sort of waste helps avoid harm and adverse effect upon surroundings and people's health. Please contact local organizations or recycling/disposal center for more recycling/disposal methods of related products.

5.2   Warranty

Product warranty

VANTRON warrants to its CUSTOMER that the Product manufactured by VANTRON, or its subcontractors will conform strictly to the mutually agreed specifications and be free from defects in workmanship and materials (except that which is furnished by the CUSTOMER) upon shipment from VANTRON. VANTRON's obligation under this warranty is limited to replacing or repairing at its option of the Product which shall, within **24 months** after shipment, effective from invoice date, be returned to VANTRON's factory with transportation fee paid by the CUSTOMER and which shall, after examination, be disclosed to VANTRON's reasonable satisfaction to be thus defective. VANTRON shall bear the transportation fee for the shipment of the Product to the CUSTOMER.

Out-of-Warranty Repair

VANTRON will furnish the repair services for the Product which are out-of-warranty at VANTRON's then-prevailing rates for such services. At customer's request, VANTRON will provide components to the CUSTOMER for non-warranty repair. VANTRON will provide this service as long as the components are available in the market; and the CUSTOMER is requested to place a purchase order up front. Parts repaired will have an extended warranty of 3 months.

Returned Products

Any Product found to be defective and covered under warranty pursuant to Clause above, shall be returned to VANTRON only upon the CUSTOMER's receipt of and with reference to a VANTRON supplied Returned Materials Authorization (RMA) number. VANTRON shall supply an RMA, when required within three (3) working days of request by the CUSTOMER. VANTRON shall submit a new invoice to the CUSTOMER upon shipping of the returned products to the CUSTOMER. Prior to the return of any products by the CUSTOMER due to rejection or warranty defect, the CUSTOMER shall afford VANTRON the opportunity to inspect such products at the CUSTOMER's location and no Product so inspected shall be returned to VANTRON unless the cause for the rejection or defect is determined to be the responsibility of VANTRON. VANTRON shall in turn provide the CUSTOMER turnaround shipment on defective Product within **fourteen (14) working days** upon its receipt at VANTRON. If such turnaround cannot be provided by VANTRON due to causes beyond the control of VANTRON, VANTRON shall document such instances and notify the CUSTOMER immediately.

Appendix   Regulatory Compliance Statement

This product has been determined to be compliant with the applicable standards, regulations, and directives for the countries where the product is marketed.

FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Note: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate this equipment.

RF Radiation Exposure Statement:

1. This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and your body.

2. The device has been evaluated to meet general RF exposure requirement.

IC Statement

This device complies with ISED's licence-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and

2. This device must accept any interference received, including interference that may cause undesired operation.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be chosen so that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Le présent appareil est conforme aux CNR d' ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. Le dispositif ne doit pas produire de brouillage préjudiciable, et

2. Ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radio électrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.