Installation Guide v1.0 of Smart Device Application Software (RTK Base Included)

Chemessen, Inc.

You can watch the video(Youtube) about this document.

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1. Introduction

ROPPOR SDAS (Smart Device Application Software) is a software product designed for execution of various missions such as artificial intelligence (AI) and auto evasion. This is possible as the software enables communication with flight controllers (FC) via a controller, terminal device, etc., and as the software enables drones to connect with peripherals and the FC embedded with the Companion Computer known as Raspberry Pi.

2. Raspberry Pi OS (Raspbian) Installation

To install SDAS in Raspberry Pi, a separate monitor and keyboard are required. Connect an HDMI monitor and keyboard to Raspberry Pi, and proceed as follows.

- **Caution : Turn on the Raspberry Pi after connecting the devices and turn off the power when inserting/removing the SD card.**

2-1. Install Raspbian

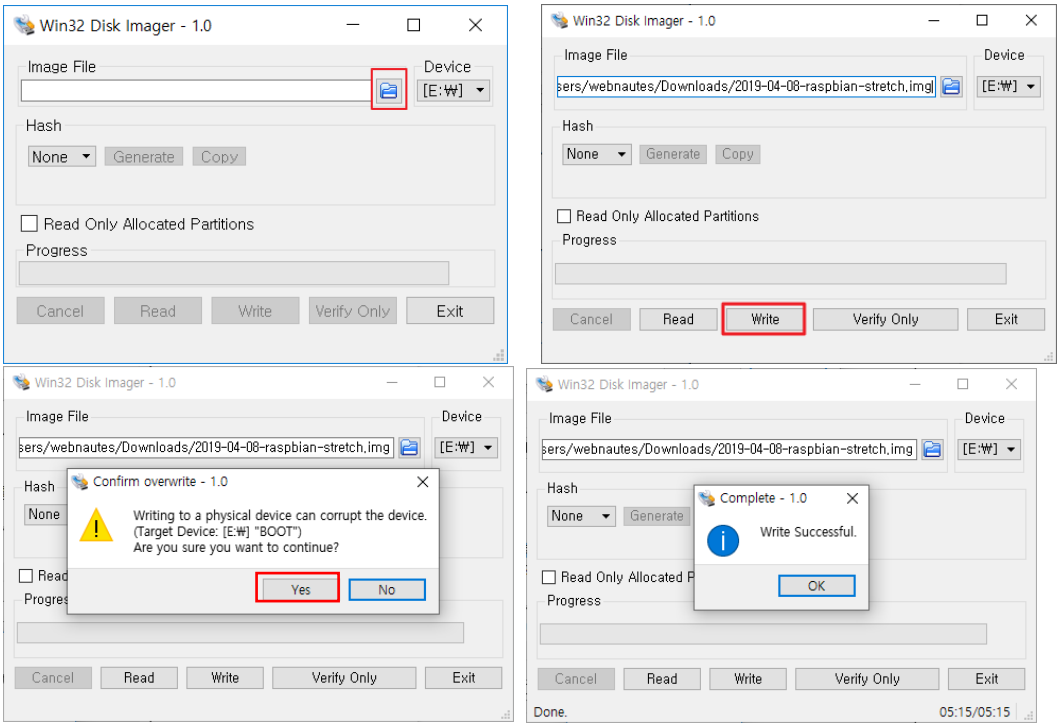
1) Prepare Raspbian OS Image

- Prepare the Raspbian OS image file (“SDAS_for_drone.img”) for the downloaded ROPPOR software.

2) Win32 Disk Imager Installation and OS Image Write

http://sourceforge.net/projects/win32diskimager/

- Download Win32 Disk Imager from the URL and install.
- After inserting the SD card into the PC, open the downloaded OS image file (“SDAS_for_drone.img”) in Win32 Disk Imager, designate an SD card drive to save, and click [Write]. (Significant time may be required depending on the network circumstances.)



- After writing is complete, insert the SD card in the Raspberry Pi to check that the Raspbian OS is working.

➔ raspberrypi login : pi
➔ Password : raspberry

3. SDAS or RTK Base Installation

Now, proceed with SDAS or RTK base installation. Significant amount of time may be required for installation depending on the network status, so proceed with sufficient allotment of time.

- **Caution : Please proceed after completing the ROPPOR Server/Private/Art software installation guide.**

3-1. Connect to Wi-Fi Network

You must connect to a network before installation. For Raspberry Pi 3A+, there is no LAN port, so you must connect via Wi-Fi. After obtaining the SSID and password for Wi-Fi, turn on the Raspberry Pi. After booting is complete, enter the following command to enter the SSID and password for Wi-Fi.

```
$ cd /home/pi
$ sudo ./setwifi
```

```
What is your wifi ssid?
What is your wifi password?
Please push Enter to Reboot
```

- Enter the SSID and password for Wi-Fi according to the instructions and then press [Enter] key to reboot. Check the IP address through the following command after reboot.

```
$ ifconfig
```

```
eth0: flags=4099<UP,BROADCAST,MULTICAST>  mtu 1500
        ether b8:27:eb:4b:1a:3d  txqueuelen 1000  (Ethernet)
        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

lo: flags=73<UP,LOOPBACK,RUNNING>  mtu 65536
        inet 127.0.0.1  netmask 255.0.0.0
        inet6 ::1  prefixlen 128  scopeid 0x10<host>
        loop  txqueuelen 1000  (Local Loopback)
        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

wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500
        inet 192.168.150.71  netmask 255.255.255.0  broadcast 192.168.150.255
        inet6 fe80::6604:bd4e:3d0b:2ff7  prefixlen 64  scopeid 0x20<link>
        ether b8:27:eb:1e:4f:68  txqueuelen 1000  (Ethernet)
        RX packets 112  bytes 12658 (12.3 KiB)
        RX errors 0  dropped 0  overruns 0  frame 0
        TX packets 113  bytes 20877 (20.3 KiB)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

➔ Check if an IP address has been assigned to wlan0.

3-2. Launch SDAS or RTK Base Installation Program

Launch Install_ROPPOR uploaded to the Raspberry Pi to install SDAS or RTK base. Proceed after learning about the selection of SDAS or RTK base installation, Server (AWS/Dedicated, for ROPPOR Server) or Network Relay PC (for ROPPOR Private/Art) Public IP address, drone sequence ID number for installation, and mounted battery cell.

```
$ cd /home/pi
$ ./Install_ROPPOR
```

Enter the command above and answer the following questions to proceed with installation.

1. Install [SDAS] for ROPPOR Server/Private/Art
2. Install [ROPPOR RTK base station]
0. Exit
Please input install package (0~2) :

- Enter 1 when it is SD card for SDAS (on drone) and enter 2 when it is used for RTK base.

Please input drone ID (if '0' Exit) :

(* This does not appear when installing RTK base.)

- Enter the drone sequence ID number to configure (Assign sequentially from number 1).

Please input cell number of battery (if '0' Exit) :

(* This does not appear when installing RTK base.)

- Enter the battery cell of the drone being configured.

Please input OpenVPN server IP (if '0' Exit) :

- Enter the public IP address of network relay PC or server (for ROPPOR Server package).

When launching the installation file, update and upgrade (apt-get update /apt-get upgrade) of the packages, etc. installed on Raspbian OS will perform first. (Update/Upgrade time varies depending on the packages installed.)

Install SDAS after update/upgrade. (Significant time may be required depending on the network circumstances.)

Question for LTE modem is displayed during installation. Answer accordingly and continue with the installation. (Sixfab https://docs.sixfab.com/page/setting-up-the-ppp-connection-for-sixfab-shield-hat, need to apply for each LTE device)

```
Please choose your Sixfab Shield/HAT:
  1. GSM/GPRS Shield
  2. 3G, 4G/LTE Base Shield
  3. Cellular IoT App Shield
  4. Cellular IoT HAT
  5. Tracker HAT
  6. 3G/4G Base HAT
```

(Enter 2 when using shield, enter 6 when using HAT) + [Enter] key

```
Do you want to continue? [Y/n]
```

(Y) + [Enter] key

```
What is your carrier APN?
```

(Enter address according to the carrier used) ex) lte.sktelecom.com + [Enter] key

- APN List (Korea example, Need to search for each LTE provider)

➔ SKT 3G : web.sktelecom.com(General configuration) / internet.sktelecom.com(For modems)

➔ SKT 4G : lte.sktelecom.com(General configuration) / lte-internet.sktelecom.com(For modems)/ ltetab.sktelecom.com (For tablet PCs)

➔ KT 3G : alwayson.ktfwing.com

➔ KT 4G : lte.ktfwing.com

➔ LG U+ : internet.lguplus.co.kr

```
Does your carrier need username and password? [Y/n]
n
What is your device communication PORT? (ttyS0/ttyUSB3/etc.)
ttyUSB_LTE4
Do you want to activate auto connect/reconnect service at R.Pi boot up? [Y/n]
Y
```

Enter as shown above for the three questions above.

```
Press ENTER key to reboot
```

Press [Enter] key to reboot when the dialog above is displayed.

3-3. Install Video Streaming (ROPPOR Server/Private package only for using camera)

Proceed with video streaming package installation. This is an optional installation so it can be omitted if video streaming isn't necessary. (Significant time may be required depending on the network circumstances.)

```
$ cd /home/pi
$ sudo ./video_set
```

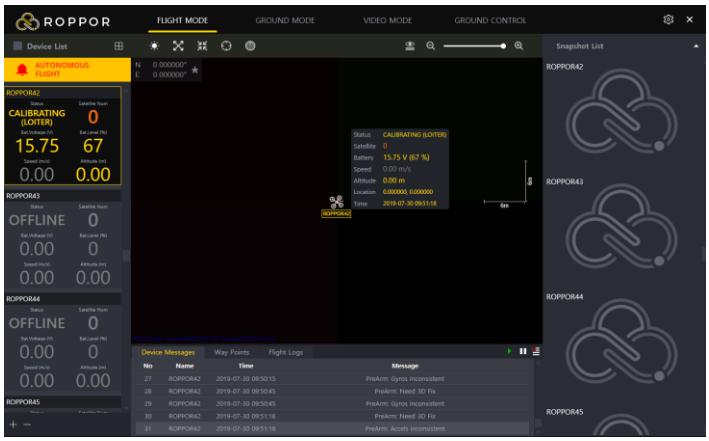
- Enter the command above and answer the following questions to proceed with installation.

Press ENTER to reboot

- Press [Enter] key to reboot when the dialog above is displayed.

3-4. Final Activation Check

After checking LTE connection through command Ifconfig, preparation is complete if the ROPPOR service execution is normal. After running the ROPPOR software in operating PC, please apply power to the drone and you can see the drone information displayed on the ROPPOR software. (It takes a few minutes)



3-5. Service Log

"Module.log" File is generated in the pathway "/home/pi/drone/logs/", and saves the activity log until now in sequence of time.

```
$ cat /home/pi/drone/logs/module.log
```

4. SDAS Setting

This is a guide for configuration of FC connection port, device information, battery cell, etc.

4-1. SDAS Setting

1) Mavlink-router (main.conf) Setting

- The default TCP connection port is designated as 14000. The user can directly change the TCP connection port.
- Baud rate for FC connection can be changed.

$ sudo nano /etc/mavlink-router/main.conf (into config file)
➔ [UartEndpoint bravo]
➔ Device = /dev/ttyS0
➔ Baud = 115200 (Baud rate for FC connection)
➔ [General]
➔ TcpServerPort=14000 (Default TCP connection Port)
➔ ReportStats=false
➔ MavlinkDialect=auto
$ sudo reboot (Reboot to apply changes)

2) SDAS (config.ini) Setting

Information on the drone configuration file.

config.ini		
[DEFAULT]	FC_PARAM	UDP port that receives FC data executed by mavlink-router
	UDP_PORT	UDP port to transmit device information to the sever software
	WS_PORT	Web socket port for log transmission to and command reception from the server software
	AGENT_ID	Device number
	CELL_BAT	Number of battery cells used
	SERIAL_KEY	Serial key of the operation PC
	LAST_UPDATE	Date and time of last update for SDAS
[SVR]	WS_HOST	Public IP of network relay PC or server for ROPPOR Server package
	VPN_HOST	VPN IP of operation PC or server for ROPPOR Server package