SEQUENT MICROSYSTEMS Smart Fan HAT for Raspberry Pi User Guide

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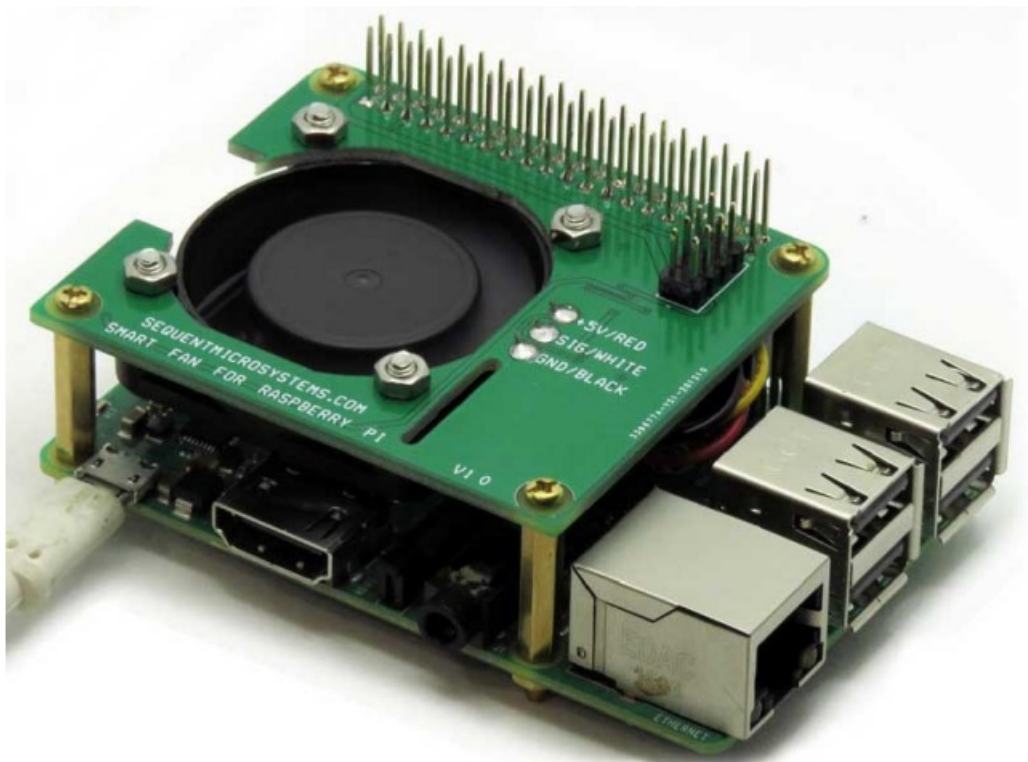
Contents

GENERAL DESCRIPTION

The Smart Fan is the most elegant, compact and inexpensive cooling solution for your Raspberry Pi. It has the form factor of the Raspberry Pi HAT. It receives commands from Raspberry Pi through the I2C interface. A step-up power supply converts the 5 Volts provided by Raspberry Pi to 12 Volts, ensuring precise speed control. Using pulse width modulation, it powers the fan just enough to maintain a constant temperature of the Raspberry Pi processor.

The Smart Fan preserves all the GPIO pins, allowing any number of cards to be stacked on top of Raspberry Pi. If another add-on card has to dissipate power, a secondary Smart Fan can be added to the stack.

FEATURES

- 40x40x10mm fan with 6 CFM airflow
- Step-up 12V power supply for precise fan speed control
- PWM Controller modulates the fan to keep constant Pi temperature

- Draws less than 100mA of power
- Fully stackable allows adding other cards to Raspberry Pi
- Uses only I2C interface, leaves full use of all GPIO pins
- Super quiet and efficient
- All mounting hardware included: brass stand-offs, screws and nuts
- Command line, Node-RED, Python drivers

WHAT IS IN YOUR KIT

1. Smart Fan add-on card for Raspberry Pi
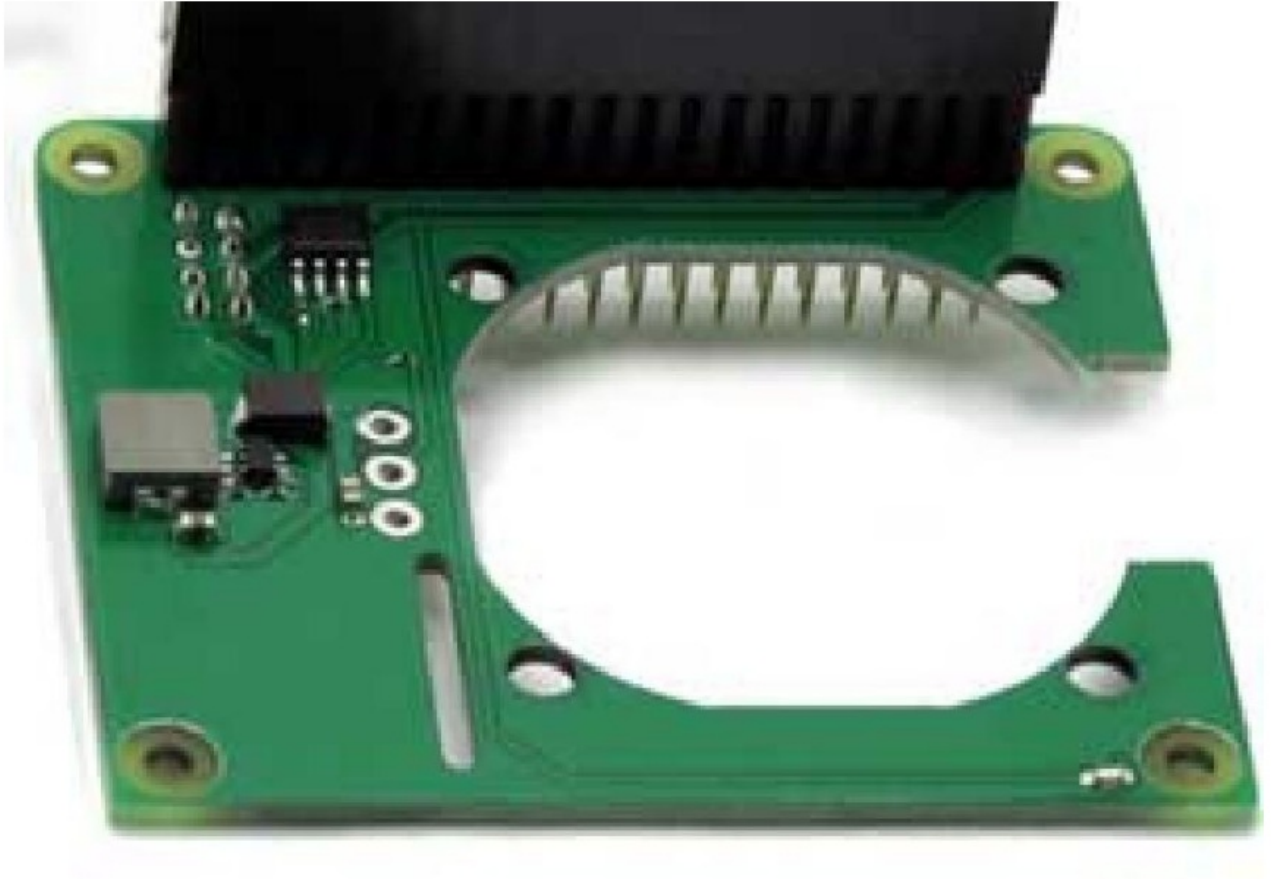
2. 40x40x10mm fan with mounting screws

3. Mounting hardware

a. Four M2.5x19mm male-female brass standoffs
**b.** Four M2.5x5mm brass screws
c. Four M2.5 brass nuts

QUICK START-UP GUIDE

1. Plug your Smart Fan Card on top of your Raspberry Pi and power up the system

2. Enable I2C communication on Raspberry Pi using raspi-config.

3. 3. Install the Smart Fan software from **github.com**:

```
~$ git clone https://github.com/SequentMicrosystems/SmartFan-rpi.git
~$ cd /home/pi/SmartFan-rpi
~/SmartFan-rpi$ sudo make install
~/SmartFan-rpi$ fan
```

The program will respond with a list of available commands.

BOARD LAYOUT
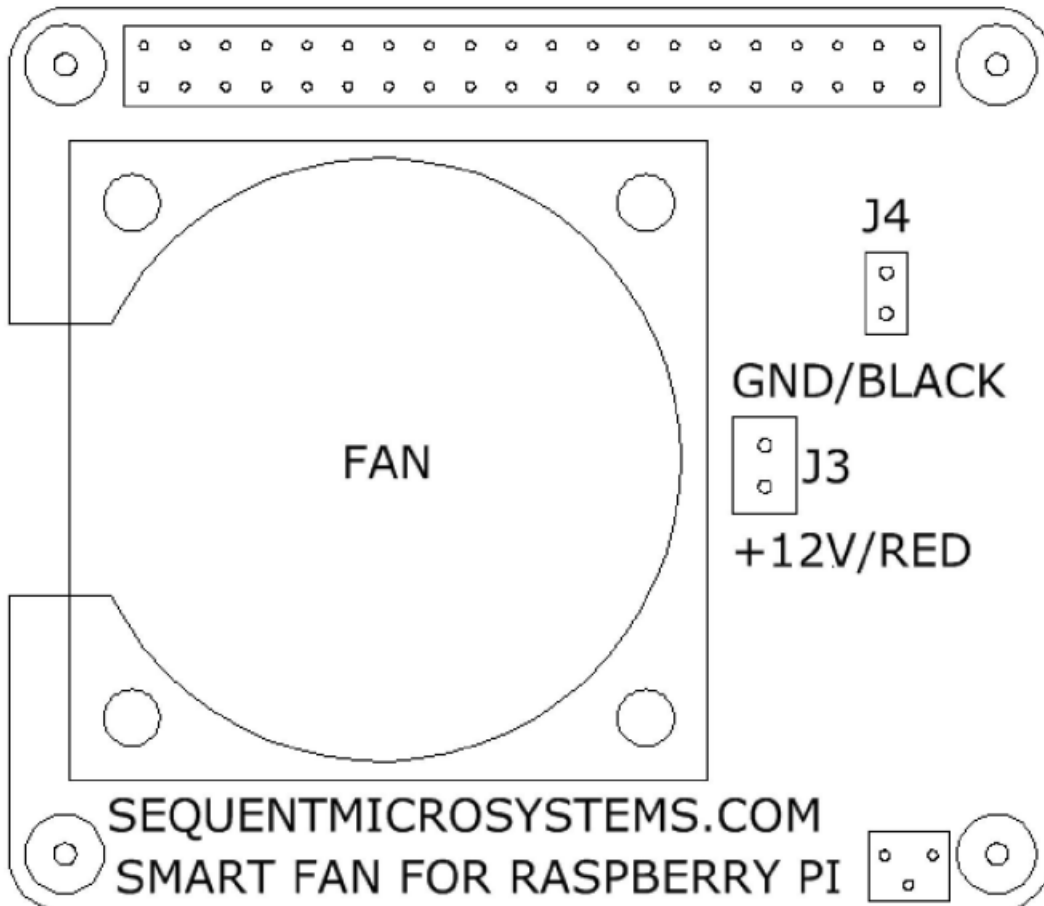
The Smart Fan comes with appropriate mounting hardware. All surface mount components are installed on the bottom. The fan is power from the Raspberry Pi GPIO connector and it draws less than 100mA. One or two fans can be installed on each Raspberry Pi. If the second fan is present, a jumper has to be installed on connector J4.

BLOCK DIAGRAM

POWER REQUIREMENTS

The Smart Fan is powered from the Raspberry Pi GPIO connector. It draws less than 100mA at 5V. The fan is powered by the on-board 12V step-up power supply which permits precise speed control.

MECHANICAL SPECIFICATIONS

The Smart Fan has the same form factor with the Raspberry Pi HAT.

SOFTWARE SETUP

The watchdog board occupies the I2C address 0x30.

1. Have your Raspberry Pi ready with the **latest OS.**
2. Enable I2C communication:

~$ sudo raspi-config

1. Change User Password Change password for default user
2. Network Options Configure network settings
3. Boot Options Configure options for start-up
4. Localisation Options Set up language and regional settings to match..
5. Interfacing Options Configure connections to peripherals
6. Overclock Configure overclocking for your Pi
7. Advanced Options Configure advanced settings
8. Update Update this tool to the latest version
9. About raspi-config Information about this configuration

P1 Camera **Enable**/**Disable connection to the Raspberry Pi Camera**
P2 SSH **Enable**/**Disable remote command line access to your Pi**
P3 VNC **Enable**/**Disable graphical remote access to your Pi using…**
P4 SPI **Enable**/**Disable automatic loading of SPI kernel module**
P5 I2C **Enable**/**Disable automatic loading of I2C kernel module**
P6 Serial **Enable**/**Disable shell and kernel messages to the serial port**
P7 1-Wire **Enable**/**Disable one-wire interface**
P8 Remote GPIO **Enable**/**Disable remote access to GPIO pins**

3. Install the Smart Fan software from github.com:
~$ git clone **https://github.com/SequentMicrosystems/SmartFan-rpi.git**
~$ cd /home/pi/SmartFan-rpi
~/wdt-rpi$ sudo make install
~/wdt-rpi$ fan
The program will respond with a list of available commands. Type "fan -h" for online help.
After installing the software, you can update it to the latest version with the commands:
~**$ cd /home/pi/SmartFan**
~/wdt-rpi**$ git pull**
~/wdt-rpi**$ sudo make install**
After installing the software, you can address the Smart Fan with the command "fan". The Smart Fan will respond with a list of available commands.

SMART FAN SOFTWARE

The Smart Fan can be controlled from any program using simple Command Line Python functions.
A Node-Red interface let's you set and monitor the temperature from the browser. The software can maintain the temperature history in a log file which can be plotted in Excel, an example loop can be found at **GitHub.com**

https://github.com/SequentMicrosystems/SmartFan-rpi/tree/main/python/examples

CONTROLLING THE FAN SPEED
Since the Smart Fan is slave to the I2C interface, Raspberry Pi must tell it what to do. Command line and Python functions are available to control the fan speed. Raspberry Pi needs to monitor the processor temperature and control the fan speed accordingly. A PID loop sample program can be downloaded from GitHub. In case of

malfunction, if the temperature exceeds a safe limit, Raspberry Pi must shut itself off to prevent burnout.

SELF TEST

The Smart Fan has a LED controlled by the local processor. At power up, the processor powers up the fan for 1 second, so the user can make sure the system is functional. The on board LED shows the status of the fan. When the fan is off, the LED blinks 1 time per second. When the fan is turned on, the LED blinks between 2 to 10 times per second, proportional with the speed of the fan.

Documents / Resources

[**SEQUENT MICROSYSTEMS Smart Fan HAT for Raspberry Pi**](#) [pdf] User Guide
Smart Fan HAT for Raspberry Pi, Fan HAT for Raspberry Pi, Raspberry Pi, Pi

References

- [**GitHub: Let's build from here · GitHub**](#)
- [**Home, Industrial & Building Automation I/O HATS for Raspberry Pi**](#)
- [**GitHub - SequentMicrosystems/SmartFan-rpi: Command line, python library and Node-Red node for Smart Fan**](#)
- [**SmartFan-rpi/python/examples at main · SequentMicrosystems/SmartFan-rpi · GitHub**](#)