

CityZcanHub Technical Datasheet

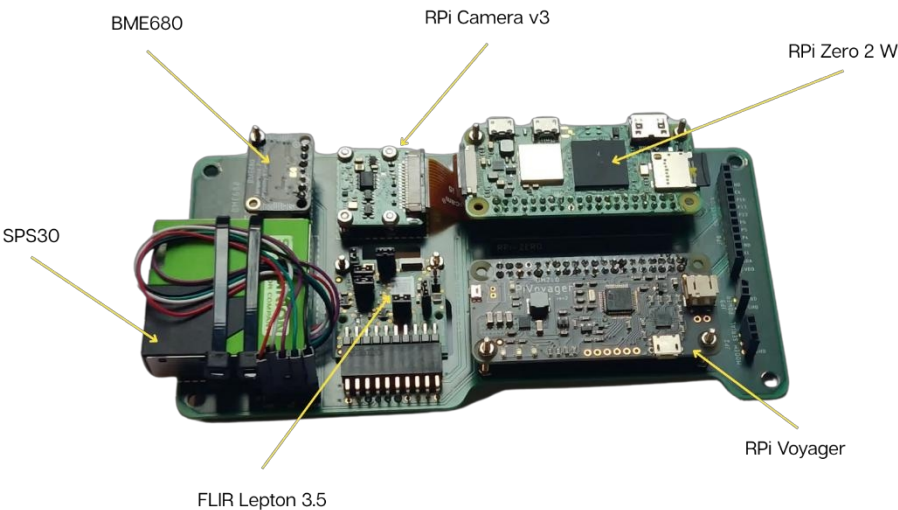
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1. System Overview

CityZcanHub is a compact, modular environmental sensing platform designed for urban microclimate studies, capable of acquiring multispectral thermal and air quality data. The system is optimized for deployment in dynamic urban contexts, supporting both mobile and fixed installations.

2. Hardware Components

Subsystem	Component	Description
Main Compute Module	Raspberry Pi Zero 2 W	Quad-core ARM Cortex-A53 CPU, 1GHz, 512MB RAM
Visual Imaging	Raspberry Pi Camera Module v3	12MP autofocus camera, Sony IMX708 sensor
Thermal Imaging	FLIR Lepton 3.5	160×120 LWIR sensor, radiometric output, 8.7Hz refresh rate
PM Sensor	Sensirion SPS30	Optical particle counter (PM1.0, PM2.5, PM4.0, PM10)
Gas & Climate Sensor	Bosch BME680	VOC, temperature, humidity, pressure sensor (I2C)
Communication	u-blox NEO-M8N-0-12 + SIMCom A7670E	GNSS (GPS/GLONASS/QZSS) and LTE CAT-1 modem with serial UART interface
Power Supply	PiVoyager Smart UPS	Li-ion battery controller with RTC and programmable startup/shutdown
Storage	microSD card	Up to 128GB, FAT32/ext4 file system
Battery	Li-ion 10,000 mAh	Approx. 8 hours runtime under full sensor load
Charging	USB-C 5V input	Direct charging via USB, pass-through supported



3. Interfaces and Communication

- **USB:** 1x USB OTG port, used for the SIMCom A7670E LTE modem or for general serial data communication.
 - **SPI:** Dedicated connection to the FLIR Lepton 3.5 thermal camera.
 - **I2C:** Shared bus for BME680, SPS30, and PiVoyager modules; expansion supported.
 - **UART (Serial):** Used for GNSS data via the u-blox NEO-M8N and modem control via SIMCom A7670E.
 - **MIPI CSI:** Connected to the Raspberry Pi Camera Module v3 for visual imaging.
 - **GPIO:** General-purpose pins available via an extension header for future peripherals or custom inputs.
 - **Wi-Fi:** Integrated 802.11n wireless module (default AP mode address: [http://\[IP\]](http://[IP]))
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4. Software & Data

- **OS:** Raspberry Pi OS Lite (Debian-based)
 - **Data Format:** CSV, JSON (configurable)
 - **Access Protocols:** SMB (Samba), HTTP(S) web dashboard
 - **Dashboard:** Hosted on-device, accessible via browser
 - **Time Sync:** Optional RTC via PiVoyager or GNSS (via u-blox NEO-M8N)
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5. Operating Conditions

- **Operating Temperature:** -10°C to +50°C (based on component spec)
 - **Ingress Protection:** Splash-resistant and dustproof enclosure
 - **Deployment Modes:** Stationary or mobile (manual transport or vehicle-mounted)
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6. Compliance and Notes

- Designed for research and educational purposes
 - Avoid direct rain or full sun exposure for optimal sensor accuracy
 - Data accuracy may be affected by airflow obstruction or electromagnetic interference
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7. Documentation and Resources

- [FLIR Lepton 3.5 Datasheet](#)
- [Sensirion SPS30 Datasheet](#)
- [Bosch BME680 Datasheet](#)
- [u-blox NEO-M8N Datasheet](#)
- [SIMCom A7670E Datasheet](#)
- [Omzlo PiVoyager UPS Manual](#)

For full source files, firmware updates, and schematics, contact:
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