



Early Warning System for Floods: Saving Lives with IoT-enabled Remote Monitoring and Control System

Background

Storms and floods are probably the most frequent disasters hitting tropical regions. While memories of the 2004 tsunami in the Indian Ocean remain fresh, each year mudslides and other events caused by huge rainfall are reported to claim lives here and there. It is widely known that the solution to mudslides is simply to plant more trees. This is, unfortunately, a very long-term approach that can hardly solve the threats just in front. Compared to waiting for trees to grow tall enough to hold the water, it is evidently more pressing to evacuate the population out of danger zones when disasters come.

Thailand is a country frequently stricken by heavy rains and related meteorological disasters. The Thai government has been long under pressure to protect its people and property. The advanced IoT technologies have made it possible to build a communications system that can detect the water level and send warning at the earliest possible time. Since 2005, Thailand government has been committed to building an early warning system that ensures enough time for evacuation.

Challenges

Thailand Water Resources Department seeks to acquire predictive data including the amount of precipitation, ground humidity, air temperature, air humidity. However, the initial radio connection was too expensive. To reduce costs, they switched to GPRS and satellite-based communication and then LTE.

The onsite data need to be transmitted to the control center, which retrieves the data every minute. When data show potential risks of flooding, the center sends out alerts so that the government can arrange early evacuation.

Therefore, the solution is expected to:

- Transmit data flawlessly with fast and reliable connectivity;
- Connect to a variety of meters and sensors on site;
- Read data through Modbus TCP/RTU;
- Be ruggedized enough to work in harsh environments with extreme weathers.



The **Water Resources Department** (Abrv: ONWR; Thai: สำนักงานทรัพยากรน้ำแห่งชาติ, RTGS: samnakan sapphayakon nam haeng chat) is Thailand's command centre for management of the nation's water resources. It functions as the legislative branch of water management. The 20-member body, presided over by the prime minister, includes five cabinet ministers, six River Basin Committee members, the head of the budget bureau, and the secretary-generals of the Office of the National Economic and Social Development Council (NESDC) and the Office of the Royal Development Projects Board. It vets project proposals from the ONWR prior to submission for cabinet approval. There are 22 River Basin Committees representing the topographic hydrology of Thailand's land mass. Each provides in-depth knowledge of local conditions and the needs of their inhabitants.





Features



InGateway502

- High-speed 4G LTE CAT4 cellular network connectivity
- Link redundancy, dual SIM failover, uninterrupted communications ensured
- Link detection mechanisms, auto-recovery from faults, auto redial when disconnected, ensuring high availability
- Built-in DeviceSupervisor™ Agent, with support for multiple PLC protocols such as Modbus and standard MQTT protocol, compatible with multiple IoT platforms and SCADA, data acquisition configured easily
- Powerful edge computing and data analysis capabilities, able to respond quickly to collected data and send commands downward
- Python programmable, easy for custom application implementation
- Industrial design, -20 ~ 70°C temperature range, 5 ~ 95% ambient humidity

Solution

InHand Networks partnered with Industrial Technology Supply Co., Ltd. (ITS) in delivering a remote monitoring solution for flood detection and early warning.

The solution consists of the InGateway502 (IG502) IoT edge gateway, and ITS's SCADA and database. The IG502 is deployed at each of the 2000+ observation stations countrywide.

On each site are installed multiple devices collecting data of water level, ground moisture, rainfall amount, temperature, etc. All those devices, as well as an HMI, are connected to the IG502, which is loaded with ITS's Python application. The SCADA system sends a polling request every minute, and the IG502 acquires data via its serial ports and Ethernet ports through Modbus RTU/TCP, and then uploads data to the SCADA, creating and managing different graphic status displays, so that technicians can view the data and do analysis. If signs of floods are detected, the SCADA sends warning to local stations, so that the administration can arrange early evacuation of residents in the neighborhood.

To ensure complete and accurate data transmission, the IG502 logs all data over the day and sends logfile to the center at midnight (after polling request received) in case there is missing data in the database. Generally, logged data are kept for more than a day in case of data request later on.

Benefits

Local meteorological status constantly monitored, lives and property safeguarded

Available with reliable 4G cellular networks and multiple redundancy mechanisms, the **IG502** delivers continuously stable and reliable connectivity to onsite devices, ensuring constant monitoring of local meteorological status and protection of people's lives and property throughout the country.

Custom applications serve your business to the fullest

Python programmable, the **IG502** enables running of custom applications. Customers with certain development capabilities can write their own script and design the solution the way that serves business best.

Powerful data storage and processing capabilities, free from data loss

Built with ARM Cortex-A8 processor, 512MB RAM and 8GB eMMC FLASH, the **IG502** demonstrates powerful capabilities for local data processing, ensuring reliable operation of onsite business applications and sufficient space for history data storage.

Extensive interfaces, "all-in-one" data acquisition for multiple variables

The **IG502** is built with multiple interfaces, including Ethernet, serial ports, I/Os, USB, etc. Multiple variables from different devices can be acquired with one device, which saves costs.

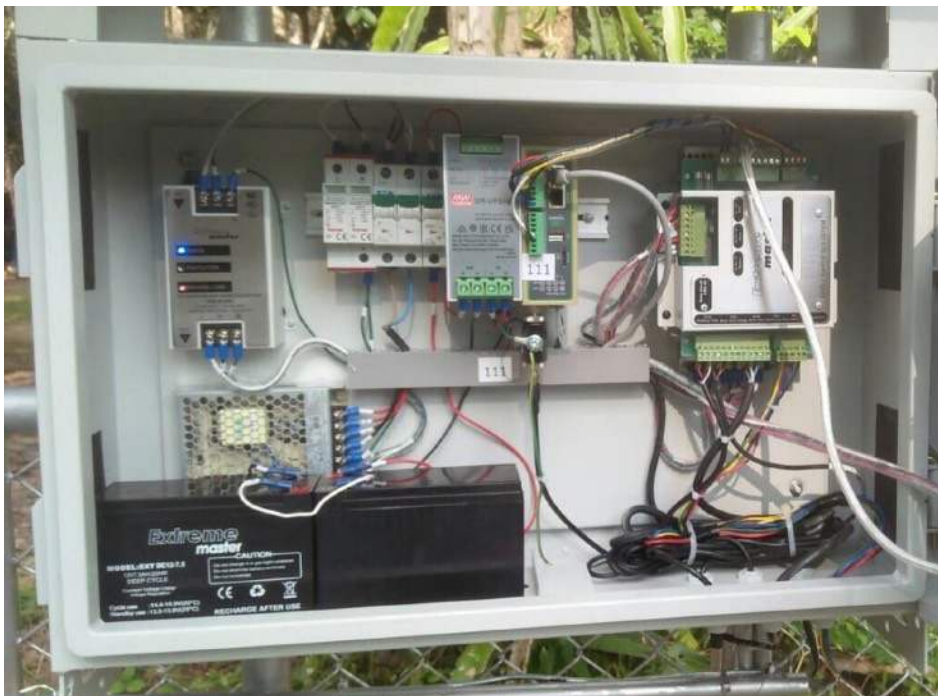


More Applications

The **IG502** series is a small-sized and cost-effective IoT edge gateway that is designed for industrial IoT. The **IG502** provides omnipresent, uninterrupted Internet access over globally deployed LTE cellular networks and various broadband services. It supports multiple industrial protocols such as Modbus TCP/RTU and major IoT clouds like AWS and Azure, enabling easy and quick configuration of edge- to-cloud data acquisition. With superb edge computing capabilities and a custom development platform, the **IG502** helps pre-process, filter and analyze data locally, relieving the cloud from excessive working load. It is able to connect tens of thousands of devices and provide high-speed data channels for device management. The **IG502** is ideal for data collection and monitoring of distributed unattended devices in a wide range of industries, including industrial automation, smart grid, smart building, new energy, etc.

Learn more:

<https://www.inhandnetworks.com/products/ingateway502-iot-edge-gateway.html>



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