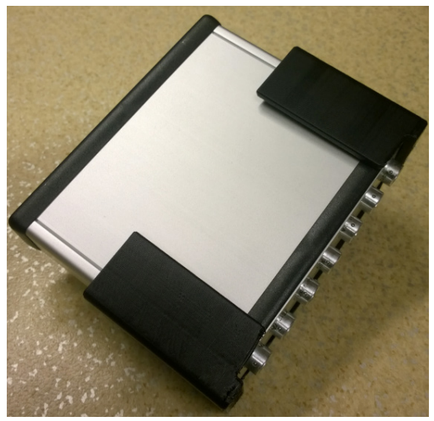
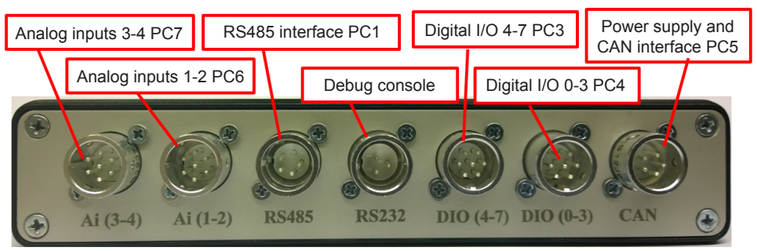
## CLAFIS Gateway housing and antennas view



## CLAFIS Gateway motherboard and interfaces panel views




**For further details contact:**

Kaunas university of technology
Eletrical and Electronics Faculty
Embedded systems laboratory
Studentų 50-444, Kaunas
Lithuania

**Vytautas Deksnys**
Phone: 00370698 48828
E-mail: vytautas.deksnys@ktu.lt

**Žilvinas Nakutis**
Phone: 0037037 300883
E-mail: zilvinas.nakutis@ktu.lt

# CLAFIS ioGateway

CLAFIS Gateway is IoT gateway device aimed to facilitate heterogynous field devices connectivity to Cloud hosted services. CLAFIS Gateway functionality extends beyond typical IoT gateway by supporting various measurement, diagnostic and control applications.

## Fields of application and integration opportunities

- IoT based process tracking and control in precision agriculture, industry, smart home, smart grid, street lighting control and transport systems, vending machines;
- Remote machinery monitoring, diagnostics and tracking (fleet management);
- Can be integrated with agriculture farm management information systems (FMIS);
- Demanded communication protocols and data preprocessing can be implemented by customer or ordered;
- Non-web browser HMI devices can connect using ModbusTCP, web-browser (HTML) HMI devices (Laptops, Smart phones, Tablet PC) can connect through WiFi/Ethernet/3G channel and TCP/IP protocol stack.

## Target groups

- OEM and system integrators;
- FMIS (Farm Management information system) developers/providers;
- Farmers;
- Researchers and developers.

## Features and specifications

**Hardware:**
- Variscite SoC based on Texas instruments AM3354 CPU (1GHz Cortex A8);
- DDR3 memory 512 Mb;
- Nonvolatile NAND flash memory 512 Mb
- Separate flow controller STM32L063 for field communications including WSN implementation;
- Lattice FPGA MachXO2 LCMXO2-7000HC (configurable for user application oriented processing);
- Plug-in architecture for new link HW modules development and insertion.

**Software:**
- Linux Debian operating system;
- Open specification for OPC UA server protocol adapters. This allows to integrate new wireless networks, as well as wired sensors with specified communication protocols;
- Acquired field data OPC UA server buffering in case of intermittent link (3G/4G) conditions (up to 1 day for 10 monitored items);
- REST interface based on JSON/XML can be added (currently supports only access to ModbusTCP field network).

CLAFIS COOPERATION

Project is supported by FP7 programme. Project acronym: CLAFIS. Project title: “CLAFIS – Crop, Livestock and Forests Integrated System for Intelligent Automation, Processing and Control”. Grant agreement No: 604659.

ktu 1922 faculty of electrical and electronics engineering

**Internal sensors:**
- 3D accelerometer;
- 3D gyroscope;
- Magnetometer;
- GPS coordinates and accurate time base.

**Field connectivity and interfaces:**
- Wireless low power modem in 169 MHz frequency range with GFSK modulation, AES128 data encryption/decryption;
- Wireless low power modem 169/868 MHz frequency range with LORA modulation, AES128 data encryption/decryption;
- 4 USB 2.0 ports;
- CAN-2 A/B interface;
- RS232/RS485 interface.

**Local Inputs/outputs:**
- 8 galvanic isolated programmable bidirectional digital I/O;
- 4 galvanic isolated analog outputs 0-20 mA 14 bits, 125ksps throughput;
- 4 galvanic isolated analog inputs 0-20 mA or 0-5V with 14 bits resolution, 250ksps throughput;
- Customizable preprocessing functions (logical and statistical processing, control with enhanced security, signal noise suppression, filtering and spectral analysis, sensors calibration) can be implemented using internal FPGA.

**Network:**
- 3G modem (4G optional);
- 10/100 Mbps wired Ethernet;
- Dual band WiFi modem with access point capabilities.

**Communication protocols:**
- OPC UA server;
- REST-to-Modbus (open specification);
- CAN sockets;
- Modbus via Ethernet and RS485.

**Security:**
- OpenVPN client using standard public key certificates;
- Data exchange confidentiality, authenticity and integrity between wireless sensors and gateway;
- Conditional access to the data via OPC UA server.
- Symetric keys distribution to gateway is performed by supervisor using WiFi channel and is automatically redistributed to connected smart sensors/controllers.

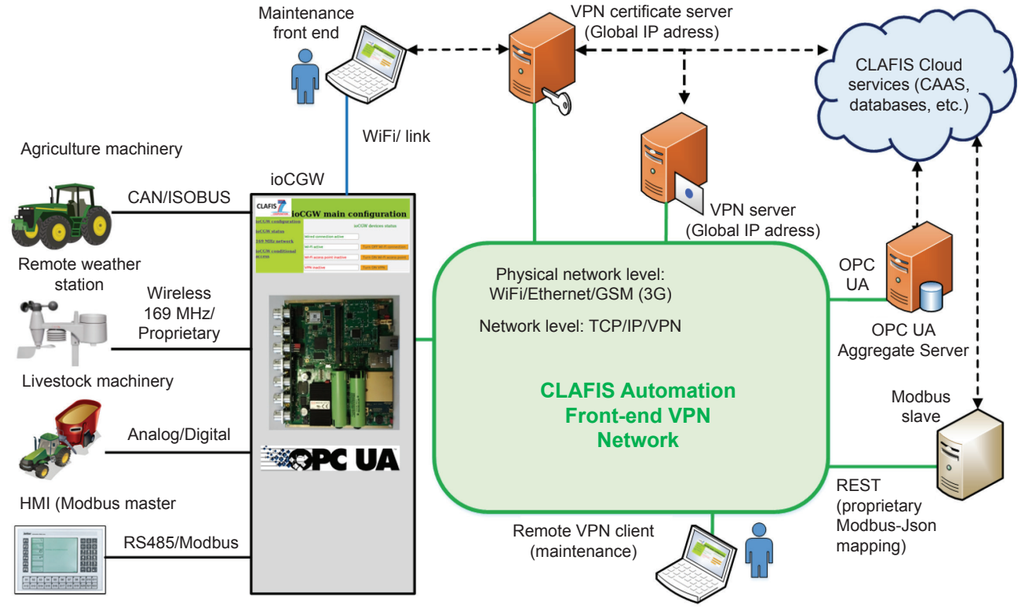
**Management and maintenance:**
- Remote and local maintenance and configuration through internal Web server;
- Remote and local conditional access control configuration;
- Remote and local status monitoring and control.

**Power supply:**
- External power supply 9-36 VDC;
- Power consumption 4.6W in dynamic working mode;
- Back up battery for secure shut-down.

**Environment:**
- Operating Temp: -25° to 85° C
- Storage Temp: -40° to 85° C
- Relative Humidity: 5 to 95%, non-condensing

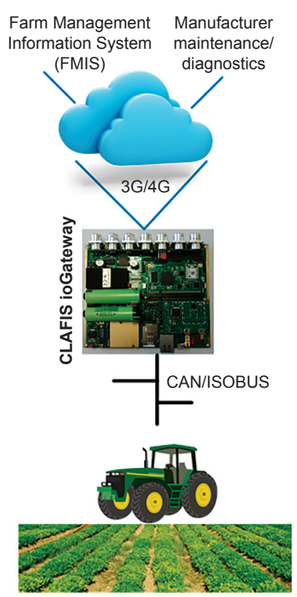
**Dimensions:**
- Size: L = 169.50 cm x W = 137.82 cm x H = 34.63 cm
- Weight: 0.67 kg

## ioGateway in communication infrastructure

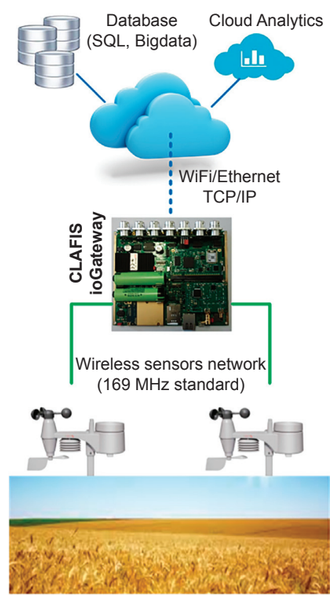



## Typical application scenario

**Machinery fleet management**




**Wireless sensor network connection to Cloud**




**Automation and remote management**