Wireless, Internet Based, Temperature Monitoring System

The Wireless Temperature Monitoring System is an active RFID based system. It provides fully automated and real-time internet based temperature monitoring. Built following an innovative sensor-to-database technology, it permits to collect data from multiple world-wide locations to a single database. The system can simultaneously handle over 16 millions uniquely identifiable sensors.

The Pultronics system can be used for fixed position sensing in a temperature controlled environment as well as for monitoring assets moving through a supply chain. This fully automated system is capable of continuous real-time temperature monitoring in warehouses, laboratories, refrigerators or for assets.

System components

- Hardware devices:

  - Sensor Tag model STA-434-01,
  - Reader model TR-434A;

- Software tools including:

  - Service
  - Administrative tools
  - User access tools

Figure 1 System block diagram

Sensor Tag model STA-434-01 is a small battery powered wireless sensor. The sensor attached to an asset monitors the temperature, as the object is moving through the facility. In particular, Sensor Tag can be placed inside a refrigerator or container. If the measured temperature exceeds low or high temperature limits, the alarm signal is issued. The Sensor Tag can be installed on monitored asset within seconds without any special tools or procedures. Hermetically sealed, it can be used in harsh outdoor environment.

Figure 2 Internet based remote temperature monitoring

Reader model TR-434A is a networked device receiving data from Sensor Tag devices and transmitting the data to a central database. Deployment of the system as a modular matrix of Sensor Tags and Readers, at strategic locations, provides full coverage of the surveyed area. The cellular system of Reader devices, in addition of temperature monitoring capability, provides real-time location of Sensor Tags.

Collected data is automatically transferred to a server and to a central database. The system continually updates the central database with incoming sensor data. In typical applications the system can simultaneously track millions of sensors, with database update latency of few seconds.
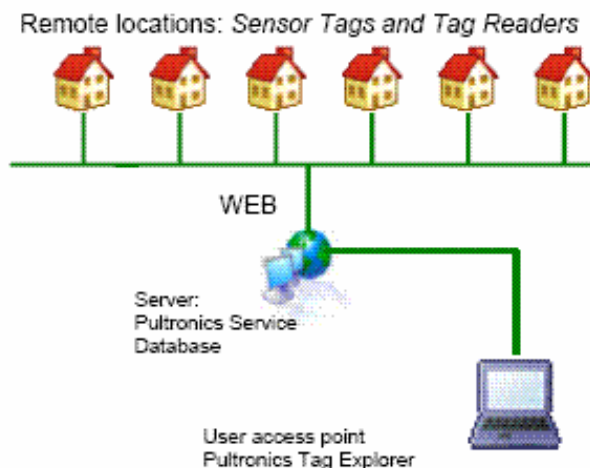
System is modular, and accepts additional Sensor Tags and Readers as 'Plug and Play' devices. The system can be reconfigured 'on-the-fly' through easy to use software tools.
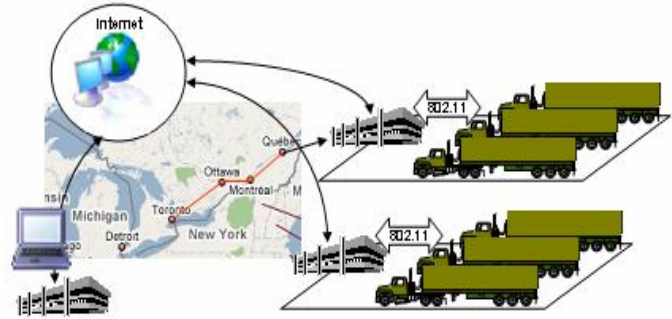
The Wireless Temperature Monitoring System takes full advantage of communication means provided by the LAN and access to the Internet. It makes possible the streamlining of a large amount of captured data both within the LAN and to an outside server accessible through the Internet. Pultronics software package enables users to achieve high-speed control and acquisition of real-time data from anywhere in the world. Furthermore, it makes data accessible from world-wide locations. Low cost and universality of the Internet renders it the best suited medium to accommodate such demands.

Applications

- Remote temperature monitoring
  - Real-time and history of temperature profiles in cold-room, laboratory, warehouse, containers or other facilities
  - Temperature and refrigeration history
  - Real time data loggers
  - Multiple channel acquisition

- Temperature monitoring in critical area such as cold-rooms, controlled temperature warehouses, interior of refrigerators, server rooms

- Permanent or portable temperature monitoring solutions

- Transportation
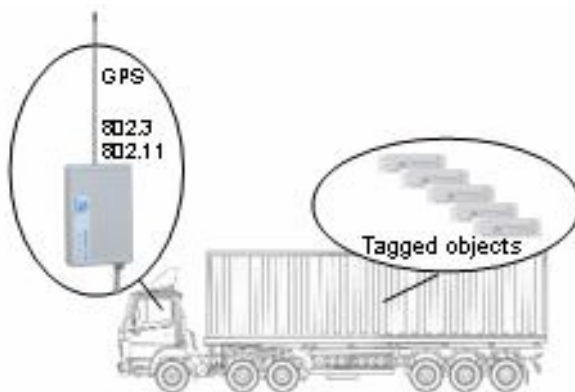
Figure 3   Item level continuous monitoring during transportation

Figure 4 Temperature monitoring in transit

Key Products Features

- Wireless, portable, battery powered sensors

- Temperature range -30 to 80 ^{o}C, resolution up to 0.0625 ^{o}C

- Wireless range up to 100m

- Anti-collision and error correction algorithms

- System supports almost unlimited number of sensors

- System is fully portable, can be installed and setup instantaneously, does not require electrician to install

- Antennas connected to internet, system supports simultaneously multiple locations (multiple warehouses)

- Software provides real-time data and log files

- Software provides interface to standard databases

- Collected data preserved in the occurrence of a power failure or unavailable connection to a server

- Temperature versus time profiles available for each sensor

- Alarm signal sent when temperature exceeds defined high or low limits

- Expected lifespan: up to 5 years

- Optional sensors: enhanced temperature range, motion, vibration, acceleration, tilt, humidity

- Approval: FCC Part 15, ESD, EN 300 220-3 2000, EN 300 489-3, 2000, EN61000-6-4, EN55022, RSS210, RSS102

Figure 5 Sensor Tag and Reader devices

Software tools

TagCenter NT Service

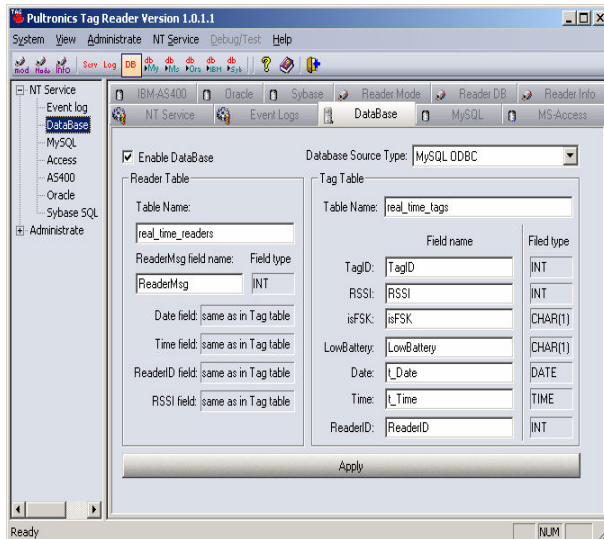- Service running on the server computer at central location or locally, if only one location is monitored

Figure 6 Configuration of database from TagReader

- Provides service for Reader devices

- Collects data from multiple Readers

- Updates the central database with current sensor data (whether database is a file or commercial database. Major data-base packages are supported)

- Supports multiple Readers in the network

- Communicates with TagExplorer and TagReader applications from Pultronics to make received data available to users

- Performs Reader firmware upgrade and configuration

TagReader

- Administrative tool used to establish and maintain TagCenter NT Service, and to setup network parameters

- Visualizes the collected data

- Permits to setup the Readers in the network

- Maintenance and test of Reader devices and system

- Customizes sensor record in local file, network database, customizes reports of a variety of sensor-data statistics

- Import/Export database

TagExplorer

- End user application communicating with TagCenter

- Provides GUI for the users to visualize and browse collected sensor data, without system administrator privileges

- Secure access to database

About Pultronics

With over 10 years of experience Pultronics is a proven expert in the micro-transmitter system design including design of ASICs (Application Specific Integrated Circuit) resulting in smallest existing active tags.

Contact Pultronics

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