Wireless sensor network

A Wireless sensor network, also known as WSN detects things like temperature, sound, vibrations, pressure, motion, or pollutants through spatially distributed autonomous sensors. They are currently being used for industries and civilian use such as industrial process monitoring and control, machine health monitoring, monitoring of the environment, healthcare applications, home automation, and traffic control.

Each node can have more than one sensor and generally also has a radio transceiver or some other type of device used for wireless communication, a small microcontroller, and an energy source (such as a battery). The prices, complexity, and sizes of sensor nodes vary, a complex node the size of a shoe box could be a few hundred dollars and a very very small one that isn't very complex could be pretty cheap. The price and size of these nodes depend on energy, memory, computational speed, and bandwidth.

Each sensor supports a multi-hop routing algorithm where nodes function as forwarders, relaying data packets to a base station, this is known as a wireless as-hoc network.

Applications of WSNs generally are used for some type of monitoring, tracking or controlling. More specific applications would be things like habitat monitoring, tracking objects, detecting fires or landslides, and monitoring traffic. Generally a WSN would be scattered in an area where its sensor nodes collect data.

Area monitoring would involve a WSN being put in an area where some occurrence is being monitored. An example of this could be a country at war with another could place many nodes over a battlefield which would then detect enemy intrusion. These sensors would detect heat, pressure, sound, light, electro-magnetic fields, vibration, etc.), if a sensor were to go off it would be reported to a base station (a message could be sent through things like the internet or satellite). Another form of area monitoring could be detecting vehicles (motorcycles to train cars).

Environmental monitoring is similar to area monitoring but is a little different because generally the application of these sensors aren't long lasting projects because of what is being monitored. Usually environmental monitoring would be monitoring the state of permafrost in the Swiss Alps, monitoring coastal erosion, or glacier monitoring.

Greenhouse monitoring would involve monitoring the temperature and humidity levels inside a green house. If the temperature and/or humidity drops the sensor could notify the manager of the green house (through an email or text) or trigger misting systems, open vents, turn on fans, or control a wide variety of system responses.

Machine Health Monitoring now involves WSNs because it saves money (by not having to install wires which can be up to $1000 per foot) as well as utilizing more functions (more locations are accessible, etc). The WSNs have been developed for machinery condition-based maintenance, they basically monitor machinery using the sensors has allowed less room for human error when checking the equipment.

Monitoring of levels landfill ground wells is another many things wireless sensor networks can help with. They can monitor the leachate level and the removal. A wireless device and submersible pressure transmitter monitors the level, the sensor's information would be wirelessly sent to a main system that logs the data, performs calculations, or notifies personnel. When wireless sensors aren't used for this the leachate levels are read manually which is more time consuming and people can misread or write incorrect things down.

Wireless sensor networks have a lot of distinct characteristics. They have the ability to withstand bad environmental conditions, can deal with node failures, are very portable, have dynamic network topology, communicate failures, their node heterogeneity, large scale of deployment, unattended operation, and the capacity of a node is scalable and is only limited by the bandwidth of a gateway node. Sensor nodes can be imagined like a small computer. They generally have a processing unit (with limited computational power and memory), sensors, a communication device, and a power source. The base stations are one or more notable components of the WSN that has a lot more computational energy and communication resources. These base stations work like a gateway between sensor nodes and the end user.

Sensor nodes in use now are more of a prototype. A big challenge in using sensor nodes is how to produce low cost and small ones. The scarcest resource of WSN nodes is energy. Energy establishes how long the WSN will last. Wireless sensor networks are meant to be sent out in many environments and in a large scale. Algorithms and protocols need to fix lifetime maximization, robustness and fault tolerance, self-configuration. Security and mobility (when the nodes or base stations are moving) need to be improved as well.

All information received from: en.wikipedia.ord/wiki/wireless_sensor_network