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Research on User Based Environmental Network Monitoring Application: An WSN Approach

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ABSTRACT: *WSNs are originally motivated for the use in military applications, such as border monitoring. Now days it is mainly focused on civilian applications such as environment monitoring, object tracking and bio-medical applications. Now a days, the applications of WSNs are several and diverse, and the applications in agriculture are still budding. One appealing WSN application is in environmental monitoring and greenhouses, where the plant conditions such as climate and soil do not depend on natural agents. To manage and monitor the environmental factors, sensors and actuators are critical. Under these circumstances, WSN should be used to make a distributed assessment, spreading sensors all over the greenhouse by means of distributed clustering. This paper reveals some grave issues when a wireless sensor network is exposed to real world environment to monitor and manage parameters like temperature, humidity, smoke, CO2, light and greenhouse gases and how distributed clustering mechanisms can be integrated within this monitoring process. The challenges in user based environmental network monitoring application of wireless sensors have been elaborated in this paper.*

KEYWORDS —Wireless Sensor Network (WSN), Greenhouse, Environment Control, Distributed Clustering.

INTRODUCTION : WSNs consist of hundreds of even thousands of sensor nodes which may be sparsely distributed in remote locations. Thus, it becomes infeasible to recharge or replace the dead batteries of the nodes. As soon as, some of the sensor nodes in a WSN run out of energy, they stop functioning causing progressive deconstruction of the network. Therefore, one of the most stringent limitations that the development of a WSN faces is that of power consumption. Due to current technological advances, the development of materials for tiny and low

cost sensors became technically and economically reasonable. In order to put into practice a WSN, few parameters are to be well thought-out: deployment of wireless sensor nodes uncovering of percentage of pollution (De Boer, M. 1998) and other environmental conditions, converting them into an equivalent electrical signals for processing. An enormous number of these sensors nodes can be networked in countless applications (Van Egmond, N.D. 1998) that entail unattended operations fashion a wireless sensor network. Wireless sensors are devices that vary in size from a portion of glitter to a floor of cards. Integration of a variety of components with an internal distributed clustering mechanism for these sensor nodes craft an exceptional monitoring system. A sensor node is functionally composed of: sensing unit that is intended and programmed to sense pollutants in air, light, temperature, humidity, pressure, etc., a converter that converts the sensed signal from analog to digital signal, a processing unit process the signals sensed form sensor with aid of embedded memory, operating system and few related transceiver circuits. A radio unit facilitates communication from the node level to the sink level. Powering these components is classically one or two tiny sized batteries.

There are also wireless sensors exploited in applications that use a fixed assessment, wired power source and do not use batteries as power source. In an exterior environment where the power source is batteries, wireless sensors are positioned in an area of interest that is to be monitored, any in a random or known fashion. The most pro of wireless sensors is that they may be implemented in an environment for extended time period, incessantly detecting the environment without the need for human interaction or action. If a centralized clustering method is used, the operation becomes immobile with unchanging design, leading to reduced scalability. When a distributed clustering technique is employed, the CH can be rotated periodically, thereby the life span of the wireless sensor nodes can be prolonged with added scalability (Boselin S.R., et al). This investigation discusses a quantity of chief issues when a distributed clustering mechanism is used for real world environmental monitoring application.

RELATED WORK IN NETWORKS MONITORING: There are complementary types of technologies such as a GPS system, which can be added to

perk up their performance. There is an imperative system for forest fire detection based on satellite imagery, which studies the images taken from satellites. But, weather conditions are greater important problem in these systems. Clouds and rain soak up parts of the frequency spectrum and lessens spectral resolution of satellite imagery. A fire is detected when it has grown-up quite a lot, so real time detection cannot be provided. Moreover, these systems are very costly. The system presents numerous advantages: automatic action consistent data superiority, cost-effective use and rapid response but not in real-time. A novel system called Fire sensor sock, to defend every sensor node of a wireless sensor network in order to keep away from these devices being damaged or destroyed when they are sending the data, detecting or controlling a fire has been anticipated. Fire sensor sock is an extraordinary protection dedicated to the thermal insulation of sensors that leave undamaged their ability to sense thermal data. Thus, the purpose of this work is to have a wireless sensor network that is intelligent to resist being burnt. The sensors will keep on transmitting data flow to the final user.

Besides, a WSN protected with Fire sensor sock is capable of sensing thermal information in the open air. They are able to spot a fire and track the fire spread during its spatial and temporal evolution. Nowadays, wireless sensor networks are widely used to watch, detect a fire and there is a fair quantity of literature on it. An example is the Fire Bug system. A system based on a wireless sensor network for forest fire monitoring has been planned with MICA motes using GPS attached to it. Its purpose is to assemble environment parameters like temperature, relative humidity and the barometric pressure whilst there is an active fire. Motes correspond with base station and information is amassed in a database server.

Concerning armed applications, the province of concentration extents from information collection, normally to opponent tracking (Hao,J., et al.,) or battleground surveillance. For instance, mines might be regarded as dangerous and obsolete in the future and may be replaced by thousands of separated motes that will sense an intrusion of defensive units. Outdoor monitoring is another celestial area for applications of wireless sensors networks. one of the fabulous examples is the exploitation of wireless sensor nodes on an Island. This wireless sensor network was used for habitat observation

(Dardari,D., et al.,). The sensor nodes that were employed were talented to sense and monitor the temperature, barometric pressure and humidity. Additionally, passive infrared sensors and photo resistors were engaged at a moderate level. The traditional arrangement was employed to effectively monitor the natural background of a bird and its behavior according to the changes in relative climatic conditions. For such reason, a quantity of wireless sensor motes were installed inside birds burrows to speak out the bird's presence while the rest were set out in the close by location areas. The data sensed by various motes are aggregated by the utilization of sensor nodes and are conceded to the monitoring station through the gateway. Management of precious assets like utensils, equipments and diverse types of products can be a quandary (Boselin S.R., et al.,). Owing to this reason, the dilemma is highly distributed, as these corporations expand to the edge of the globe. One emerging gifted way to realize the tracking of asset and deal with this problem is believed to be with the use of wireless sensor networks. The appliance of sensor nodes in petroleum bunks and chemical warehouses refers to warehouses and storage management of containers or barrels.

The design is that sensor motes attached to large barrels will be intelligent to locate nearby located objects, detecting their content inside and alerting when inaptness happens with their own and aging effects. Health care system can also yield from the use of wireless sensor nodes with the patients. Emerging applications in this category include telemonitoring human physiological statistics, monitoring of the patients within a hospital, monitoring drug administrator in hospitals, etc. (Lee, D.S., et al.,). In case of smart sensors, retina prosthesis chip constituting of hundreds of sensors are set within the human eye. This allows the patients with inadequate vision to see at a relative ample level. Cognitive disorders which might probably lead to Alzheimer's can be monitored and very well controlled at their premature stages with the aid of wireless sensors. Robotic applications previously implemented are the unearthing of level sets of scalar fields using mobile sensor networks and imitation of the task of bacteria for seeking and discovering dissipative gradient sources.

SOME NETWORK PARAMETERS:

Sensors: Speedy response time, relative humidity and temperature, the sensor forms an ideal solution for greenhouse

environment. Smart communication between the sensors is analogous to IIC interface. Patchy output signal is properly handled by a filter to obtain accurate luminosity values. This arrangement is basically mounted with the belief of defending the crop and allowing an improved environment for its progress. This guard is much adequate to guarantee a superior quality in the production in some cases. But, when the foremost intention is to achieve an improved control on the horticulture expansion, it is indispensable to manage the variables that sway the growth of a culture.

Temperature: Temperature is one of the most significant factors to be monitored because it is unswervingly related to the plant growth. Intended for all plants, there is a minimum temperature assortment considered to be perfect and to most plants this range is comparatively varying around 30ºC. Amongst these temperature parameters of to be controlled are essential the extreme, maximum, minimum temperature and tolerably the difference between these temperatures.

Water and humidity: An additional imperative aspect in greenhouses is water. The assimilation of water by plants is associated with radiation. The nonappearance or low level of water influences growth and photosynthesis. Besides this, air and ground humidity also adjust the development of plants. The air humidity is correlated with transpiration, while the ground humidity is interrelated to water absorption and photosynthesis. An environment with extreme humidity decreases plants transpiration thereby reducing the growth and may endorse the proliferation of fungus. On the other hand, low humidity level environments might cause dehydration of the plants.

Radio design and number of devices: In order to plan the wireless sensor network, the signal loss during its path in a rural or forest environment has to be considered to the highest degree. The major parameter to be considered here is the coverage. How far the Wireless IP camera and the wireless sensor could be from the access point to accept enough signal power has to be cautiously analyzed before real world implementation.

Hardware deployment: A router can be used as the core controller. It is an embedded system that has a wireless IEEE 802.11 b interface, a Fast Ethernet interface in its board and so it meets the requisites. In addition, a router offers internally general purpose input/output (GPIO), UART (JP2) and ETAJ (JP1)

ports. A few extensions can be made to the router by using these ports.

Wireless IP camera: The wireless cameras chosen transmit MPEG-4 standard video compression, which has superior compression and excellence compared to other standards. It also consumes little bandwidth. MPEG-4 is frequently used in video streaming over IP environments. The video is streamed by means of the HTTP protocol with very good quality results.

CONCLUSION: As a greenhouse is a relatively minute and controlled environment, power utilization of the sensor nodes is an important criterion to be considered. This technology can also be useful in breeding of confined animals in precision zoo, where the sensor nodes should propel information about the fauna. To manage and check the environmental factors the wireless sensors and actuators are indispensable. For a WSN to make distributed measure, dispersal of sensors all over the greenhouse using distributed clustering has been done. This paper reveals some solemn issues when a wireless sensor network is uncovered to real world environment to check and control parameters like temperature, humidity, smoke, CO2, light and greenhouse gases and how distributed clustering mechanisms can be integrated within this monitoring procedure.

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