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Monitoring on Environmental Geographical Conditions in User WSN Networks: An Analytical Research

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ABSTRACT: *A wireless sensor node is self-assured by a processor, local memory, sensors, radio, battery and a base station accountable for receiving and processing data collected by the nodes. They carry out cooperative activities due to limited resources and nowadays, the applications of these networks are copious, varied and the applications in agriculture are still budding. One interesting purpose is in environmental monitoring and greenhouse control, where the crop conditions such as weather and soil do not depend on natural agents. To control and observe the environmental factors, sensors and actuators are necessary. Under these conditions, these devices must be used to make a distributed measure, scattering sensors all over the greenhouse using distributed clustering mechanism. This paper reveals an initiative of environmental monitoring and greenhouse control using a sensor network. The hardware realization shows periodic monitoring and control of greenhouse gases in an enhanced manner.*

KEYWORDS—Sensor, Sensor Nodes, Wireless Sensor Network (WSN), Greenhouse Control, Environmental Monitoring, CO2 Monitoring, Distributed Clustering.

INTRODUCTION: Water and air quality are essential to maintain the equilibrium between human development and a healthy environment. It is also important to notice that by means of looking for a more efficient production in factories both pollution and consumption of natural resources can be decreased. Processes, such as boiling, drying, binding, and so forth, are being carried out by almost every kind of the current factories. Those processes are responsible of a great amount of gas emissions and polluted water discharges. Although the majority of the factories have their own sewage plants, it is crucial to measure the quality of the waste water that is being poured into the public sewer. Due to the reasons above, the necessity of monitoring production processes and environmental parameters has become an essential task for the industrial community.

Even though there are myriad other approaches that are now being used, WSNs can offer a cheaper solution while having data acquisition in real time, working in an unattended way. Typically, the environmental data acquisition in factories is carried out manually and occasionally or using wired systems that are normally expensive and not flexible. This solution is not the best in terms of security, as it is necessary to hire workers to take measurements in dangerous places such as chimneys or waste water pipes. In this way, if a catastrophic discharge occurs, the factory will not notice it until next measurement, which can be several weeks later. That is one of the

reasons why WSNs can offer a more reliable and safe measuring process. The most imperative factors for the quality and yield of plant growth are temperature, humidity, light and the level of the carbon dioxide. Constant monitoring of these ecological variables gives information to the cultivator to better understand, how each aspect affects growth and how to administer maximal crop productiveness. The best possible greenhouse climate modification can facilitate us to advance productivity and to get remarkable energy saving, predominantly during the winter in northern countries. In the past age band, greenhouses it was enough to have one cabled dimension point in the middle to offer the information to the greenhouse automation system. The arrangement itself was typically simple without opportunities to supervise locally heating, light, ventilation or some other actions which were affecting the greenhouse interior climate. The archetypal size of the greenhouse itself is much larger than it was before, and the greenhouse facilities afford several options to make local adjustments to light, ventilation and other greenhouse support systems.

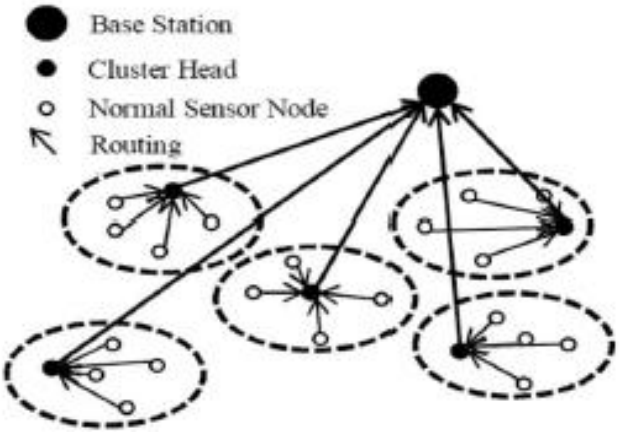

Fig.1: Clustering in a Sensor Network

However, added measurement data is also needed to put up this kind of automation system to labour properly. Increased number of measurement points should not dramatically augment the automation system cost. It should also be probable to easily alter the location of the measurement points according to the particular needs, which depend on the definite plant, on the possible changes in the external weather or greenhouse arrangement and on the plant placement in the greenhouse. Wireless sensor network can form a helpful part of the automation system architecture in contemporary greenhouses constructively. WSN maintenance is also relatively inexpensive and trouble-free. The only other costs occur when the sensor nodes run out of batteries (figure 2) and the batteries need to be recharged or replaced. In this work, the very first steps towards the wireless greenhouse automation system by building a wireless measuring arrangement for that purpose is taken and by testing its feasibility and reliability with a straightforward experimental setup. Distributed clustering mechanism is used for some classified reasons like sensor nodes prone to failure, better collection of data and

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minimizing redundant information. Hence these distributed clustering mechanisms cover enormously self-organizing capability.

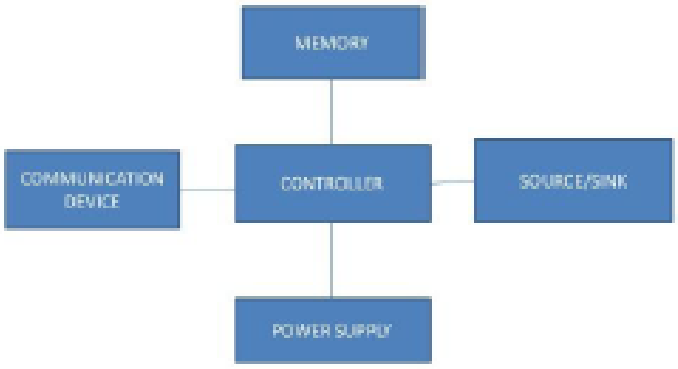

Fig.2: Varied Components of a Wireless Sensor Node

LITERATURE REVIEW: Open-air monitoring is an added celestial area for applications of sensors networks. One of the mainly delegate examples is the action of sensor nodes on Great Duck Island. This sensor network has been used for atmosphere monitoring. The sensor nodes used were gifted to sense temperature, barometric pressure and humidity. In adding together, passive infrared sensors and photo resistors were affianced. The arrangement was to watch the natural environment of a bird and its activities according to climatic changes. For that reason, a number of motes were installed within birds' burrows, to mark out the bird's presence, while the rest were deployed in the close by areas. Supervision of costly possessions like equipment, machinery, diverse types of stock or products can be a quandary. The problem is highly distributed, as these companies expand all over the globe. A gifted technique to attain asset tracking and deal with this trouble is believed to be with the exercise of sensor networks. The application of wireless sensors in petroleum bunks and chemical warehouses refers to warehouses and freight space administration of barrels. Fitness science and the health care arrangement can also yield from the employment of wireless sensors. Applications in this group include telemonitoring human physiological information remotely, tracking and monitoring of doctors and patients within a hospital, medicine superintendent in hospitals, etc. The association of both static and mobile networks is accomplished with the aid of mobile robots, which journey around the environment and set up motes that act as beacons. Landslide discovery employs scattered sensor system for predicting the happening of the landslides. The deliberation of predicting landslides by means of sensor networks arose out of a necessity to mitigate the stain caused by landslides to human lives and to the railway networks. A blend of techniques from earth sciences, signal processing, scattered systems and fault-tolerance is used. One solitary peculiarity of these systems is that it combines several distributed systems techniques to contract with the complexities of a distributed sensor network environment where connectivity is disadvantaged and power budgets are very

constrained, while fulfilling real-world requirements of protection.

Generally these methods use a set of low-priced single-axis strain gauges attached to cheap nodes, all with a CPU, battery and best wireless transmitter block. Forest fires, also recognized as feral fires are wild fires occurring in wild areas and cause chief damage to natural resources. Universal causes of forest fires squeeze lightning, individual carelessness and revelation of fuel to tremendous heat and aridity. It is well identified that in few cases fires are ingredient of the forest ecosystem and they are vital to the life cycle of native habitats. Sensor-Clouds can be used for fitness monitoring by using a measure of simply obtainable and most often wearable sensors like accelerometer sensors, propinquity and temperature sensors and so forth to collect patient's health-related statistics for tracking sleep action pattern, body temperature and other respiratory conditions. These wearable sensor devices should have sustain of Bluetooth's wireless interface, Ultra wideband and so forth interface for streaming of information, linked wirelessly to some smart phone through the interface. These smart phone devices perform like a gateway between the remote server and the wireless sensor through the internet.

PARAMETERS IN A GREENHOUSE

The Greenhouse Environment: A contemporary greenhouse can consist of copious parts which contain their own confined climate variable settings.

Sensors: Speedy response time, squat power consumption and tolerance beside moisture climate, relative humidity and temperature sensor forms an idyllic preference and explanation for the greenhouse environment.

Greenhouses: A greenhouse is a pattern covering the ground frequently used for growth and progress of plants that will revisit the owner's risk, time and capital. This exhibit is mounted with the purpose of caring crop and allowing a better environment to its advancement.

Temperature: Temperature is one of the main key factors to be monitored since it is unswervingly related to the development and progress of the plants.

Water and Humidity: An additional significant factor in greenhouses is water. The absorption of water by plants is associated with the radiation. The deficient in or low level of water affects growth and photosynthesis of these plants.

Radiation: Radiation is an elementary element in greenhouse production and sunlight is the key starting place of radiation.

CO2 Concentration: CO2 is an indispensable nutrient for the plant development, allowing the adaptation of carbon. The carbon retaining process occurs through the photosynthesis when plants take away CO2 from the atmosphere.

THE FEATURED MODEL: The proposed model is implemented in hardware, tested and the results show an excellent improvement in the sensing parameters when compared to the existing set of environmental monitoring and greenhouse control models. Sensor arrays like temperature sensor, light sensor, humidity sensor and CO2 sensors are incorporated in the board. The sensed data is processed by the micro controller and displayed in the LCD display. Wireless transmission of the parameters is accomplished by a zigbee module that sends information to the remote monitoring station periodically. To control and monitor the environmental variables planned in an earlier section, sensors and actuators capable of

measuring and controlling the values inside the greenhouse are essential. Figure 3 shows the basic block diagram of the proposed model. Due to cost considerations, the proposed model uses sensor network instead of wireless sensor network. The sensed data is forwarded to the gateway. The gateway then forwards the data to the remote monitoring base station. The base station is a remotely located software configured computer, where the monitored details are periodically visualized to carry out further control actions.

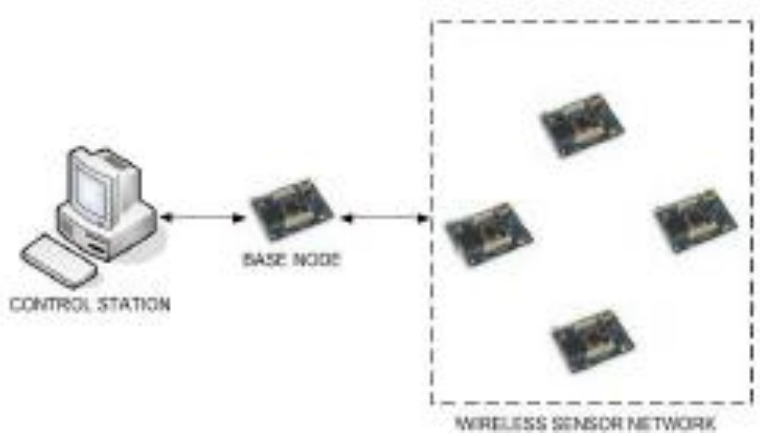

Fig.3: Block Diagram of the Proposed Model

In the proposed model, the ideal evaluation depends on the culture and type of plant. Control systems can be separated into either centralized or distributed systems. In a centralized system a single constituent is accountable for gathering and processing the data. So, every components of the system are connected to this private element. In a distributed control system, connections between nodes and the information processing is distributed amid the system components. The crucial advantages of a distributed system may include: Reliability: a component stoppage affects barely part of the structure, Expansion: the possibility of adding up of a new component without massive changes in the system, Flexibility: changes in the process related to the components involved in these basic operations. The major difficulty of these technologies is that they are not developed for WSN and they do not present mechanisms to perk up energy efficiency.

Fig.4: Experimental Setup for environmental Monitoring

In this way, it is credible to check all places inside the greenhouse, identifying not only restricted values as in many applications, but checking numerous real world and distributed values. Therefore, the greenhouse control ought to be improved, allowing a resolution in a way that the absolute environment can be adjusted as close as feasible to a set point. Figure 4 shows the experimental setup for environmental monitoring. The difficulties in applying WSN in agricultural applications include higher costs and short of standardization on WSN communication protocols. Due to cost constraints, the proposed model is designed with ordinary sensors. In future, the same sensor network will be simulated in NS-2 for a distributed clustering mechanism.

FUTURE SCOPE AND CONCLUSION: A model of agricultural application using sensor networks for greenhouses monitoring and control has been presented. The WSN technology, although under development, seems to be gifted mainly because it allows real time data acquisition. However, for such agricultural relevance to be developed, some technological challenges should be determined. A greenhouse is a controlled environment and does not need a lot of climatic parameters to be controlled. The use of this technology in large scale seems to be something for the near future. In this application, huge climatic parameters can be monitored using the sensors obtainable. As a greenhouse is fairly small and controlled environment, and energy is a partial resource, the likelihood of replacing batteries or even resorting to a sturdy energy source adaptation is a helpful feature. This paper reveals a plan of environmental monitoring and greenhouse control by means of a sensor network. The hardware implementation shows periodic monitoring and control of greenhouse gases in an improved manner. Future research is concentrated in application of the same mechanism using wireless sensor network. This knowledge can also be applied in breeding of cramped animals in precision zoo, where the sensor nodes should propel information about animal temperature, pressure and additional vital signals to guarantee a strong environment to animals. In order to attain better energy efficiency, this mechanism will be implemented in real-world wireless sensor network, with a well-known energy efficient distributed clustering mechanism.

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