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Role of Wireless Sensor Network in Precision Agriculture

Haifa Alqahtani*

Analytic in the Digital Era, Collage of Business and Economic, United Arab Emirates University, United Arab Emirates; h.alqahtani@uaeu.ac.ae.

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Abstract

In Agricultural Fields there are different climate conditions, greenhouses parameters are important to monitored regulate the crop production, and we would like to make a automation system to trace down climate conditions at different locations. The Wireless Sensor Network (WSN) do the job to automate and analyze the comparable parameters. We would like to develop a smartphone application and sensors used are electrochemical sensors, location sensors BeagleBone Controller and Various Sensors are Used.

Keywords: Humidity, Co2, Controller, Sink, Sensing node, Wireless sensor network, Solar plates.

1 | Introduction

Sensor networks are tight wireless networks of lowcost and small sensors which will gather and distrubutes envinorments data, Wireless Sensor Network (WSN) controlling the corresponding physical envinorments and empower monitoring from particular area with better accuracy and efficiency [1]. Sensor nodes have different energy and computations restrictions as consequence of not reasonable nature ad-hoc method forimplementations [2]. In this paper, we have planned the WSN to design good envinorment to monitor and regulate various climatic conditions [3]. We are going to do expand the WSN in green house. BeagleBone controller is device which would gather all climatic parameters deposit in to the webserver database by usual time interval, where the network is connected to BeagleBone Controller [4]. Smart Phone Application and Web Application will resolve the climatic parameter values and think the preventive measures for the comparable envinormental conditions. System will mechanized by storage batteries and Solar [5].

2 | Related Work

Agriculture field monitoring: instead of looking at the product and the level of reproduction of it alltime, this paper proposes design to monitor the same features using a WSN [6]. As it grows, quality and production of crops at agricultural temperatures, humidity and carbon dioxide levels are the most

Corresponding Author: h.alqahtani@uaeu.ac.ae

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importantclimatic boundaries [7]. Moreover, when a critical change in oneof measurements occurs, then the farmer will bereceived via SMS and email by an agricultural expert [8].

Extending automation to the farm: automation can be used to reduce the number of handicrafts as wellmaking farming clearer and leading to more farminggrowth [9]. The farm operation number can be automated likeirrigation system, livestock temperature control systemand farm produce [10]. In this activity they use the defaultlighting system, automatic spraying system, housetemperature control and security in farmhouses [11]. System isenergy saving because temperature and movement are sensitivedevices will only work if needed.

Energy saves: the plan is an important component of an agricultural-based economy [12].

Integrated WSN for smart sesame farming: the various parts of the farm are mechanically made, includingcycles of automatic irrigation system and protected temperature controlled walled areas in pet areas as wellhousehold items [13]. In our paper, we do programmedlighting frame, auto-sprinkler frame, indoortemperature control and safety of farm houses. Asthe temperature and movement of heart-touching gadgets will just workif necessary; such a framework provides effective vigor. The paper also outlines the elements to improve the safety of home [14]. The automatic working life of the ranch is a mustmost importantly in an agricultural-based economy [15].

3 | How WSN Works?

We will use the Wireless Network Network or Zigbee Network with the help of XBee devices. There are 3key components in the Zigbee network. Please refer to *Fig. 1* for moredetails [16]. Sensitive Notes or finishing devices are embedded withdifferent sensors like Co2, temperature and humidity. SensorNodes will recognize natural values and transmit themashes [17]. Rumors will collect values from a variety of sensorsnodes and transfer to the link. Eventually the coordinator will be able tocollect values from all routers from time to time [18]. Coordinator connected to a device that will be enabled by the Internet. Everythingvalues collected from the various censuses will bediscarded on the website for processing [19].

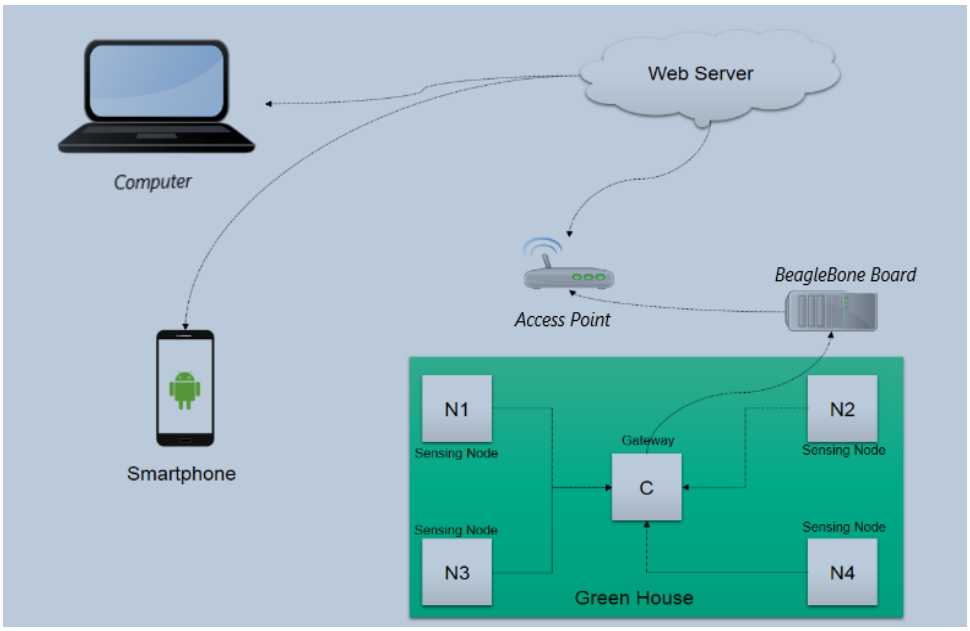

Fig. 1. Proposed system architecture.

3.1 | Proposed Work

WSN for precision horticulture: using the correct SDI-12 agricultural toolsthe standard used for horticulture accuracy by designfor the new wireless sensor node (GAIA SoilMote). Using theIEEE 802.15.4 standard wireless communication can be achieved with transceiver complaint [20]. Available softwareused by GAIA SoilMote based on TinyOS. There are twomethods are designed to ensure the formation of sensory nodes. The first section contains laboratory certification forhardware and software proposed by the system as wellwhich includes research on the use of power and independence [21]. The type of application selected has great potential in the agricultural sector and especially the development of PA Applications (Precision Agriculture).

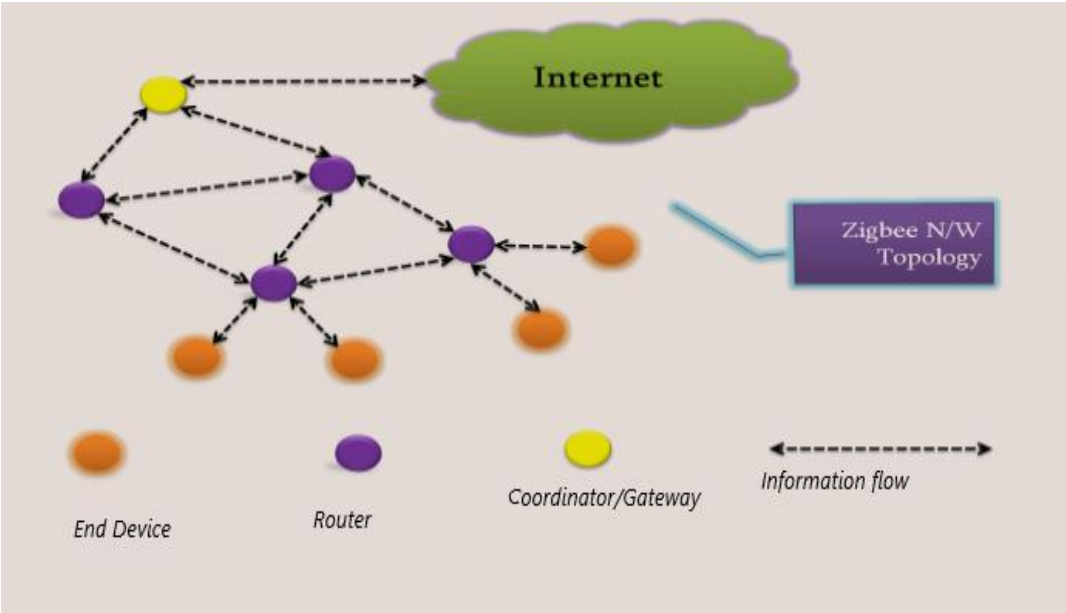

Fig. 2. Zigbee network topology (WSN).

4 | System Architecture

- *Green house.*
- *Sensing node.*
- *Coordinators (Gateway).*
- *BeagleBone.*
- *Routers.*
- *Webserver.*
- *Access point.*
- *Smartphone application.*
- *Computer application.*

Computer application: the web application can be accessed from any enabled interneta device where we can constantly monitorgreenhouse. Graphs, Charts and History used efficiency [22]. Even the web system will be multilingualsupport that any farmer can use effectively. The web application will be hosted on the web server. From the webapplication can remotely block any such XBee device such as closing OPEN at any time [23]. Web application will notanalyze values periodically and predict specific actionsdepending on the circumstances.

Routers: routers with XBee devices operating independently receive various readings from sensors nodes and forward themvalues to coordinator. This also can work with solarpower and storage batteries. Optional routerspart of the network because the sensor node can send directly toprices on link/gate.

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Beagle Bone (BB): BeagleBone is a small device powered by Debain OperatingSystem. We can do all the work we canusing any computer device. BB will contact yougate/connector with serial interface. The python API will doalways check frames or prices on the serial port forthe coordinator will be sending all the values to the serial port of BeagleBone. Since BB is a computer tool we can connectconnected to it via Ethernet port or Wi-Fi/Wireless LAN. BBwill access the API on the web server and discard all readingsin the database.

Sensing node: various sensors such as Co2, temperature and humidity are present attached to the sensor node. The hearing code will read the values bya regular interval and transfer it to the routers. Sensing NodesAdjustable XBee devices for various sensors. XBee devices can work in Solar Power as wellas storage batteries. These devices are remotely configurable.

5 | Conclusion

Infarming climate, Co2 and humidity are the most essential parameters. The growth of crops is mainly depending on these three parameters. Presently farmers do not have any type of system which would show real-time levels of that type parameters. Even farmer do not know that when humidity is raised or Co2 level increased in his green house, as a consequence of it crop production gets troubled. The proposed system is going to monitor thechanges periodically and take the action automatically or pretend the required action to the farmer. Systemwill have a plan to anticipate the graphical representations of all the streaming data.

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