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High-Tech Poly House Cultivation using Intel Galileo with Sensor Network through Internet

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Abstract: Poly house Cultivation is being developed to achieve good crops with less labour cost. Poly house is made up of polyethylene sheet having rectangular shape to grow the crops in a controlled environment even in unfavorable conditions. By using automated control system, crucial parameters like temperature, humidity and water level necessary for the growth of plants can be maintained and controlled automatically. The thickness of the sheet can be varied according to the requirement that depends on the crop type to be grown. Generally Poly houses are directed from east toward west to utilize the maximum amount of sunlight. This model has developed with the mesh topology consists various nodes which are deployed inside poly house and are controlled by IOT technology

Keywords: Agriculture, environment monitoring, Poly house, Internet of Things (IoT), Sensors, Android mobile Application, Intel Galileo, PHP, Web server, Arudino

I. INTRODUCTION

Parameters like temperature, humidity, CO2 levels, Ph of soil, soil moisture content and water level plays an important role for the growth of plants.

By sending the various sensors data through wired method to Intel Galileo, a microcontroller board based on the Intel Quark SoC X1000, desired atmospheric conditions can be maintained by using various output devices.

The decisions can be taken by a PHP based web server, the notifications and controlling, with the help of an Android application in the farmer phone..

II. INTEL GALILEO BOARD

Intel Galileo is a microcontroller board based on the Intel® Quark SoC X1000 Application Processor, a 32-bit Intel Pentium-class system on a chip. It's the first board based on Intel® architecture designed to be hardware and software pin-compatible.

It has 14 digital I/O pins, 6 analog inputs, a serial port, and an ICSP header. 14 digital input/output pins, of which 6 can be used as Pulse Width Modulation (PWM) outputs; Each of the 14 digital pins on Galileo can be used as an input or output, using pin Mode(), digital Write(), and digital Read() functions.

A UART (Universal Asynchronous Receiver/Transmitter) port pins (0 and 1), this is also known as the Arduino 1.0 pin out. Operate at either 3.3V or 5V the core operating voltage of Galileo is 3.3V.

Galileo board is also software compatible with the Arduino Software Development Environment (IDE) Other ports A full sized mini-PCI Express slot, 100Mb Ethernet port, Micro-SD slot, RS-232 serial port, USB Host port, USB Client port, and 8MByte NOR flash come standard on the board.

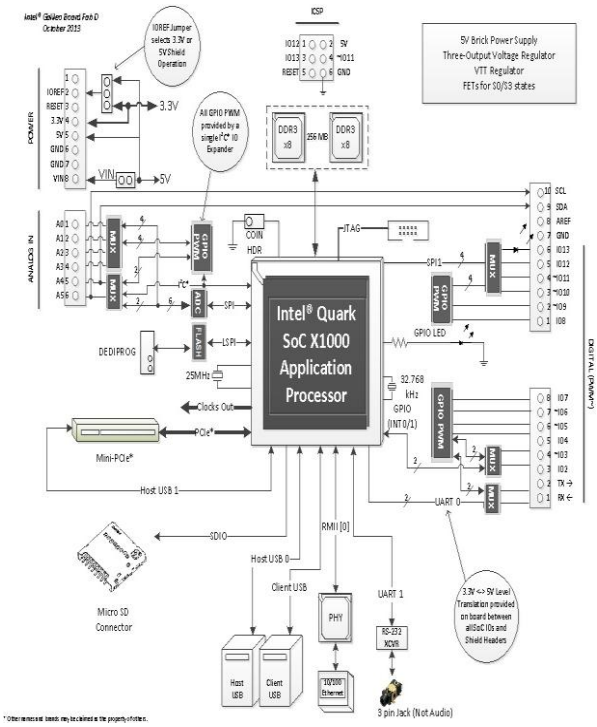

Figure 1: Intel Galileo

The board features an Intel® Quark SoC X1000 Application Processor, designed for the Internet of Things. It's smaller and more power A very light distribution of Linux is loaded onto the 8 MB of flash memory.

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III. HARDWARE DESIGN OF THE SYSTEM

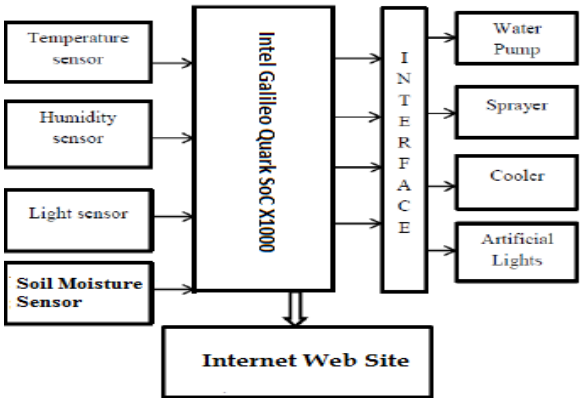

FIGURE2: BLOCK DIAGRAM OF POLY HOUSE CULTIVATION USING WIRED TECHNOLOGY

A.Design of the sensor node circuit

Sensor node is the main part of the ploy house Monitoring network, which is responsible to collect environment parameters, and sending them to the Intel Galileo board..

B. Module of Sensor

For improving the power of the system, each of the he sensors will work with the power that supply by the Galileo board. All sensor nodes are fixed (not moving) static with wires. The block diagram shown figure 3.

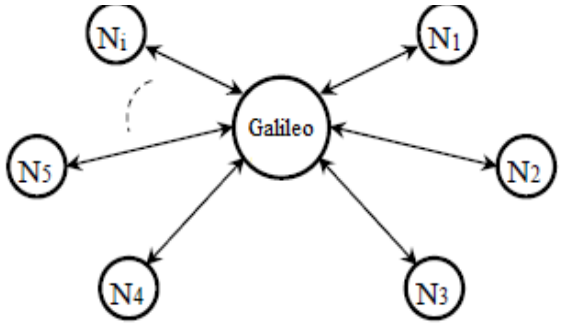

Figure 3: Each node consists of sensors and controlling units which are directly connected to the microcontroller unit Intel Galileo.

D. Temperature Sensor

Figure 4: Temperature Sensor

LM 35 has taken for measuring the temperature values inside poly house. It has high accuracy levels and doesn't require further requirement of any external calibration. The wide range of temperature about -55° to +150 °C can be sensed using LM35.

E. Humidity Sensor

DHT-11 provides the information about both temperature and humidity values. And it provides high quality, quick response and low price.

F. Soil Moisture Sensor

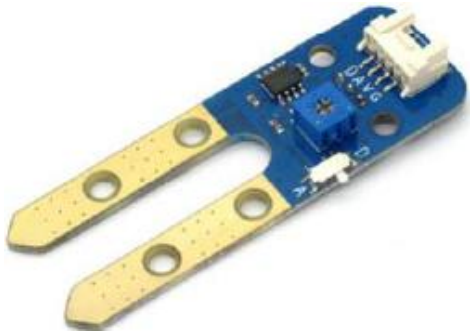

Figure 5: Humidity Sensor

Soil moisture sensor is used to detect the moisture content in the soil of the proposed model. This sensor provides either analog or digital outputs which can be selected by choosing the corresponding button on the board. By varying the potentiometer the suitable threshold value for the moisture content can be made. Analog data provides over wide range and where as digital provides the information about whether the soil is wet or dry.

G. Light Intensity Sensor

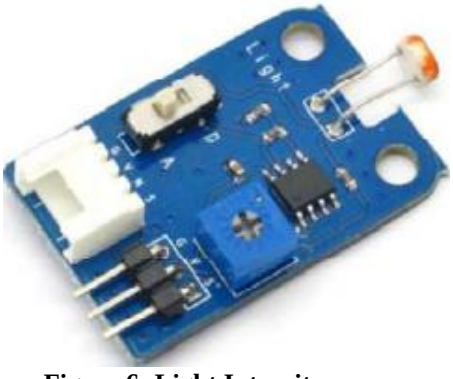

Figure 6: Light Intensity sensor

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Light detection for the proposed model can be achieved by using this sensor. This sensor also provides both the analog and digital outputs.

The attached control board receives the analog information about light through the attached light dependent resistor (LDR) and gives the proportionate output, specifically the resistance of photo resistor decreases with the increase of the light intensity in the surroundings.

IV. WIRED TECHNOLOGY

In this technology input sensors are connected directly with the Intel Galileo Board. To obtain the required conditions necessary actions are taken by using the output devices.

The analog output from these sensors are connected directly to Intel Galileo, it contains A0 – A5: 6 analog inputs, via an A-to-D converter Few surrounding parameters like ambient temperature, humidity percentage, light intensity range and soil moisture content inside polyhouse are controlled

V. WIRELESS TECHNOLOGY

Instead of wired, if using wireless technology, mainly it need a power supply for each sensor node. Wireless communication technologies such as WLAN, Wi-Fi, Bluetooth, ZigBee, ect needed for data transmit ions.

VI. PROBLEM DEFINITION

Wired Technology is better than wireless technology, problems are:

1) In wired, use of less hardware system
2) In wireless, need transmitters and receivers like Zigbee and its wireless range is limited.
3) Each sensors need separate power supply in wireless technology.
4) In wireless batteries needed, therefore overall installation cost is high.
5) In wired Sensors are directly connected with Intel Galileo, so loose of data rate is low, high performance
6) In polyhouse farming, sensors are not moving, so can be fixed like switches at home.

VII. SOFTWARE DESIGN OF THE SYSTEM

Software of the system consists of PHP web server, and an Android Application.

The sensors data are collected by Intel Galileo board and sent to PHP web server. So that the PHP can analysis the sensor data and report through the Android application.

A. Software design of control system

The main analysis and controlling program can be developed under PHP which is quiet universal due to the technology and easy to realize the data communication and management with Intel Galileo Board. This program can able to analysis the data and report to Android application

B.Software design for Intel Galileo board

The software in the Intel Galileo board can be designed and burn by the open-source Arudino software IDE, makes it easy to write code and uploaded it to board, it runs on Windows platform.

VIII. CONCLUSION

In India traditional farming is popular but Polyhouse farming has come forward to replace this traditional farming. It provides better crop in a short period of time with less manual labor.

Polyhouse farming help the farmers for their living by growing multiple crops. Polyhouse cultivation avoids over & under irrigation and reduces the wastage of water.

In this study we discussed the wired sensor nodes, to monitoring system base on polyhouse environment parameters, the Intel Galileo board, Web server, Android application, and system software.

This system increases efficiency with low power for each sensor node and no sender and receiver transmitters. This system shorten the labor intensity of workers. This system is flexible and reliable for monitoring and control the ploy house.

The main advantage is that the system's action can be changed according to the situation for different types of crops. A stand by battery or solar cell can be used for reducing the power consumption and to avoid the power failure.

REFERENCES

[1]. Residence Energy Control System Based on Wireless Smart Socket and IoT KUN-LIN TSAI1, FANG-YIE LEU2, (Member, IEEE), AND ILSUN YOU3, (Senior Member, IEEE) Received April 26, 2016, accepted May 24, 2016, date of publication May 27, 2016, date of current version June 24, 2016.
[2] Design of Sensor Network for Urban Micro-Climate Monitoring Mukesh Jha, Prashanth Reddy Marpu, Chi-Kin Chau, Peter Armstrong Masdar Institute of Science and Technology Abu Dhabi, UAE 2015 IEEE
[3] Enhancing Network Lifetime in Precision Agriculture using Apteen Protocol Dr. K. M. Anandkumar ,Associate Professor Computer Science and Engineering Easwari Engineering College 2015 IEEE International Conference on Technological Innovations in ICT for Agriculture and Rural Development (TIAR 2015)
[4] Design and Deploy a Wireless Sensor Network for Precision Agriculture Tuan Dinh Le, Head of Computer Sciences, Department of Computer Sciences, Long An University of Economics and Industry 2015 2nd National Foundation for Science and Technology Development Conference on Information and Computer Science
[5] Monitoring of Soil Parameters for Effective Irrigation using Wireless Sensor Networks lB. Balaji Bhanu, Research Scholar in eSE, SeSVMV University, Kanchipuram, Tamilnadu 2014 Sixth International Conference on Advanced Computing (ICoAC)

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 5, Issue 9, September 2016

[6] Wireless Sensor Nodes for Environmental Monitoring in Internet of Things Cuong M. Nguyen, Jeffrey Mays, Dakota Plesa*, Smitha Rao, Minh Nguyen, J.-C. Chiao Electrical Engineering Department, The University of Texas at Arlington, Arlington, USA 2015 IEEE

[7] Power estimation and automation of green house using wireless sensor network Hemraj, University Institute of Engineering and Technology, Panjab University, Chandigarh, India 2014 IEEE

[8] Wireless Underground Sensor Network Design for Irrigation Control: Simulation of RFID Deployment Vinod Parameswaran, School of Agricultural,Computational and Environmental Sciences University of Southern Queensland 2013 Seventh International Conference on Sensing Technology

[9] Green House Monitoring and Controlling Using Android Mobile Application Aji Hanggoro, Electrical Engineering Department University of Indonesia, Depok, Indonesia2013 IEEE

[10] Wireless sensing and control for precision Green house managementAkshay C.1,Nitin Karnwal2, Abhfeeth K.A.3, Rohan Khandelwal4,Tapas Govindraju5, Ezhilarasi D.6, Sujan Y.7, Department of Instrumentation and Control Engineering, National Institute of Technology Tiruchirappalli, India 2012 Sixth International Conference on Sensing Technology (ICST)

[11] Wireless Sensors Network in the Efficient Management of Greenhouse Crops Alejandra Jiménez1, Santiago, Jiménez1, Pablo Lozada2, Cristhy Jiménez2 1Escuela Superior Politécnica del Ejército, Quito, Ecuador, 2Escuela Superior Politécnica de Chimborazo, Riobamba, Ecuador 2012 Ninth International Conference on Information Technology- New Generations

[12] Green House Environment Monitor Technology Implementation Based on Android Mobile Platform Wei Ai, School of Computer and Information, Three, Gorges university, Yichang, Hubei Province, China 2011 IEEE

[13] Design and Implementation of Indoor Environmental Monitoring Wireless Sensor Networks Based on JN5139 Lian Xiaoqin, * Hu Jianbin Zhang Xiaoli Wang Hairan, College of Computer and Information Engineering, Beijing Technology and Business University, Beijing Technology and Business University, Beijing, China 2010 3rd International Conference on Advanced Computer Theory and Engineering(ICACTE)

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