



SMART GREEN HOUSE ANDROID APP TO MEASURE MICROCLIMATIC ENVIRONMENT

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ABSTRACT

This paper gives details about Smart Green House Android App which Monitors and Controls the microclimatic environment inside a green house. From a green house we can easily detect temperature, humidity, light and water level sensor value on android app. As per sensor values, we set a fixed threshold values for each sensor, depending on sensor's changing values we are going to control cooling fan, rooftop, water sprayer and focus light. Just pressing the button in android app, we can make on/off motors and it also has datasheet of all horticulture plantation and season wise precaution material for monitoring and controlling. The main objective of this project is to make it simple in design, easy to install, user friendly to monitor and record the values of temperature, humidity, water level and sunlight of the natural environment that are continuously modified and controlled without human interrupt in order optimize them to achieve maximum plant growth and yield.

Keywords - Wi-Fi Module, PIC Microcontroller, Android App

I. INTRODUCTION

In the early decades, Green House farmers can not accurately detect the level of temperature, humidity, light and water level inside the green house. They only come to know the condition inside the green house by manual operation or by feel it by themselves, which is not precise to control. Ultimately, it experiences a huge part on their daily operations.

This paper introduces Green House Monitoring System which monitors and controls minor changes. There are four kinds of activities that are designed in the system. First, if temperature is high or low then it can be changed as per requirement by using the fan. Second, if weather inside green house is moist, then rooftop can be opened to lower the humidity level. It can be used to open or close the rooftop based on the needs. Third, if the light intensity is above or below the threshold value, then focus light will be on. Fourth, monitors the water level in the green house, if the green house is too dry, the water sprayer can be activated. To maintain the water level, sprayer can be deactivated. The monitoring and controlling is conducted through android smart phone which is based on Wi-Fi Protocol.

The proposed system is an embedded system which is used for microclimatic parameters of a greenhouse which improves quality of crops or specific plant species results maximum production over crop growth. It also diminishes the difficulties involved in the system by reducing human interrupt to the best possible level. The sensors sense the changing parameters and microcontroller reads the input data in analog form which further

converted into digital form by inbuilt ADC inside PIC microcontroller. The PIC microcontroller then performs the needed actions by employing device drivers and Wi-Fi protocol.

II. PROPOSED SYSTEM

The proposed system is based on the Wi-Fi protocol module in which the parameters in the green house are monitored by the android app and it will be observed and compared with the standard values which are fixed in the app. So if parameters inside green house will increase or decreased, it will firstly compared with app value after sensing it by sensors and as per the requirement it will be controlled by the PIC microcontroller to the original value which is made fixed to the app. This system is more effective due to the use of Wi-Fi protocol and android app. Reason is, it is much easy to use by anyone to control the condition without any physical effort.

III. METHODOLOGY

The Green House monitoring system mainly consists of two subsystems: First, transmitter, where the sensors sense the parameter and transmitted to the receiver through Wi-Fi module. Secondly, an android app monitoring station placed separately. This system as a whole is used in Green House application.

The hardware design consists of four sensors namely: Temperature Sensor, Humidity Sensor, Light Sensor and Level Sensor. For the temperature sensor, if the temperature inside the green house is high or low then it can be changed as per requirement by using the fan which is used as output for temperature sensor. For maintaining humidity, if weather inside green house is moist, the rooftop can be opened to lower the humidity level. It can be used to open or close the rooftop based on the needs. For light sensor, if the light intensity is above or below the threshold value, then focus light will be on. Therefore focus light is used as output for light sensor. For the level of water, level sensor is used.

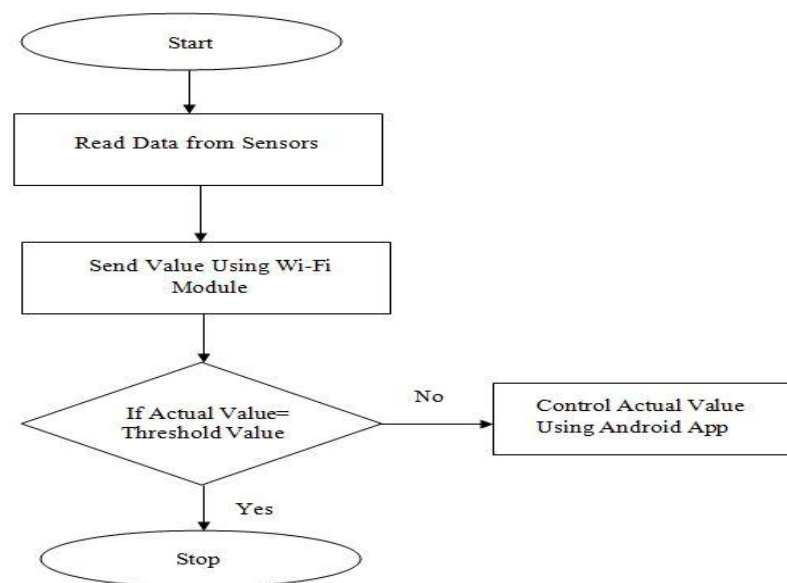


Fig. 1 Flow Diagram

If the green house is too dry, the water sprayer can be activated otherwise it can be deactivated to maintain the water level. These sensors are connected to the PIC microcontroller. The activation and deactivation of sensors

is done by the PIC microcontroller. When sensors sense the changing parameter, the analog values will be converted into digital one by PIC microcontroller. Then changing parameters will be compared with standard threshold values which made fixed in android app. As per requirement, it will increase or decrease the values by PIC microcontroller and controlled by app through Wi-Fi protocol which will be driven by the device driver. The device driver is used to communicate between controller and output. The transmission medium used here is Wi-Fi protocol which is more effective for system.

IV. BLOCK DIAGRAM

In the block diagram, we have provided inputs to microcontroller in the form of sensors. This microcontroller has inbuilt ADC. Wi-Fi protocol is used for communication of accurate microcontroller and android phone. Changing values are compared by android phone and controlled by controller. The system is easy to operate and more

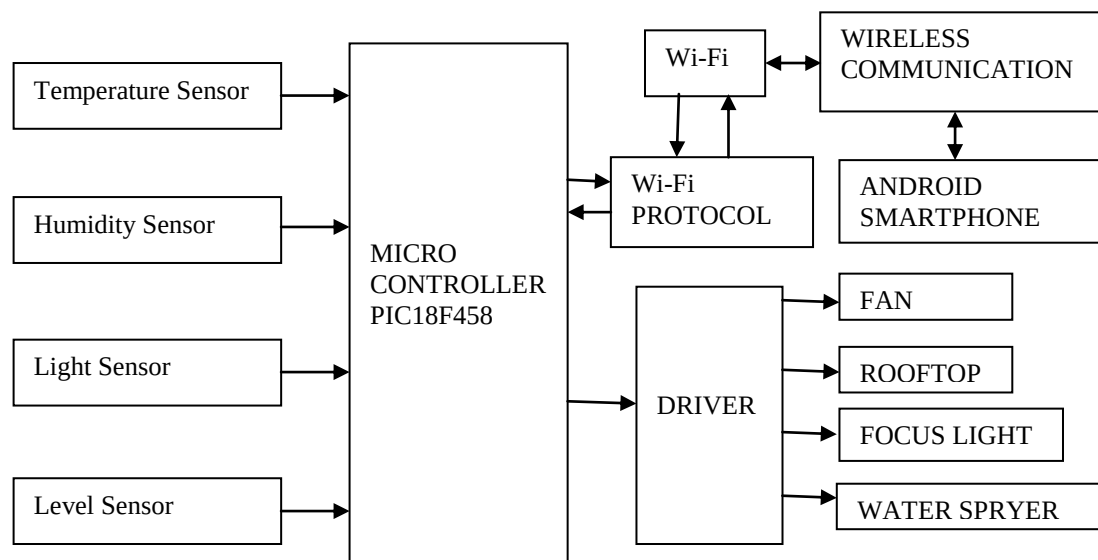


Fig.2 Block Diagram of System

4.1 Temperature Sensor

The temperature sensor is used here is LM35 sensor. Using LM35, we can measure temperature more accurately than a thermistor. It also possesses low self heating and does not because more than 0.1°C temperature rises in air. The operating temperature range is from -55°C to 150°C.

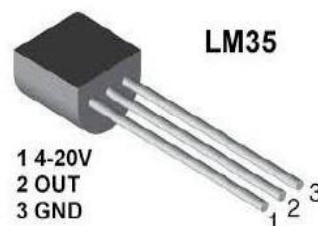


Fig. 3 Temperature Sensor

4.2 Humidity Sensor (HR202)

HR202 is a new kind of humidity-sensitive resistor made from organic macromolecule materials; it can be used in occasions like: hospitals, storage, workshop, textile industry, tobaccos, pharmaceutical field, meteorology, etc. Its features are Excellent linearity, low power consumption, wide measurement range, quick response, anti-pollution, high stability, high performance-price ratio. Its operating range is 20-95% RH. Humidity is the amount of water vapor in the air. Water vapor is the gaseous state of water and is invisible. Higher humidity reduces the effectiveness of sweating in cooling the body by reducing the rate of evaporation of moisture from the skin.

Sensor

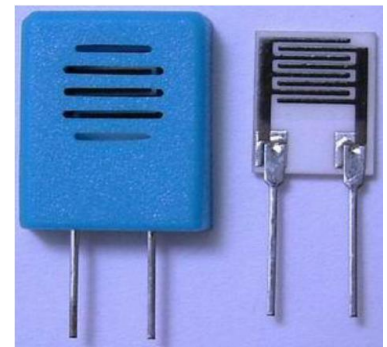


Fig.4 Humidity

4.3 Light Sensor

Photo sensors or photo detectors are sensors of lighter other electromagnetic energy. A photo detector converts light signals that hit the junction into voltage or current. The connection uses an illumination window with an anti-reflect coating to absorb the light photons.



Fig.5 Light sensor

4.4 Water Level Sensor

Level sensor detect the level of liquids and others fluid sand fluidized solids, including slurries, granular materials, and powders' that exhibit an upper free surface. Substances that flow become essentially horizontal in their containers because of gravity whereas most bulk solids pile at an angle of response to a peak.

Sensor



Fig.6 Water Level

4.5 Wi-Fi Module

Wi-Fi or Wi-Fi is a technology that allows electronic devices to connect to a wireless LAN network, mainly using the 2.4 gigahertz UHF and 5 gigahertz SHF ISM radio bands. A WLAN usually password protected, but may be open, which allows any device within its range to access the resources of the WLAN network.



Fig.7 Wi-Fi Module

4.6 Device Driver(ULN2803A)

The ULN2803A device is a high-voltage, high-current Darlington transistor array. The device consists of eight NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diodes for switching inductive loads. The collector-current rating of each Darlington pair is 500 mA. The Darlington pairs may be

connected in parallel for higher current capability

4.7 Microcontroller (PIC18F458)

This microcontroller has following features-

- Internal program memory 32Kbytes.
- Data Memory 1536bytes.
- 40MHz operating frequency.
- 4.10bit ADC (8 input channels).
- 5 I/O Ports (Port A,B,C,D,E).
- 4 Timers(Timer 0,1,2,3)
- 75 Instructions

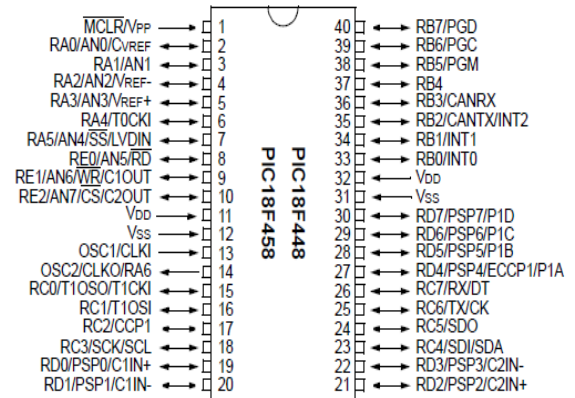


Fig. 8 Microcontroller

V. RESULT

The system based on Technology Acceptance Modeling. The output for the given analog input values are visualized in android application system. The input values are given which are in analog form by the sensors changes it into a digital value by PIC microcontroller's ADC.

The android software is already working properly and appropriate manner with the purpose in the beginning, that is to get temperature, humidity, light intensity and water level values from green house and give input to control components in green house. After development is finished, test for sensor's work is done and device is working properly. The testing that has done shows that condition in datasheet of sensor and in system is accurate. The test result shows in temperature 30°C to 70°C, humidity is still in normal range area. If temperature gets higher and more, relative humidity will be decrease and goes near to zero.

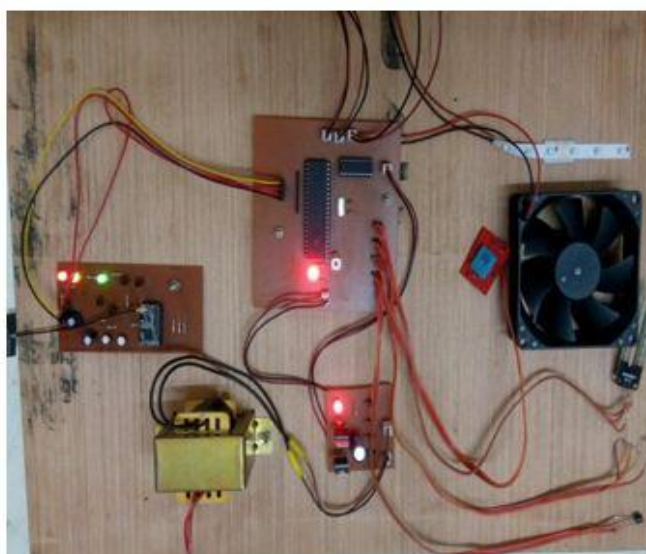


Fig. 9 Actual setup

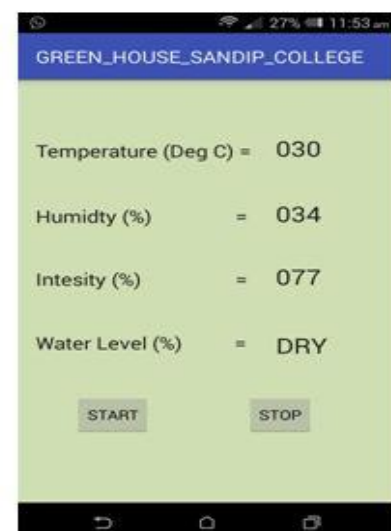


Fig. 10 App parameter output



VI. CONCLUSION

The system has successfully overcome on the drawbacks of the existing systems by reducing the power consumption, time required, maintenance and complexity. It also provides a flexible and precise form of maintaining the environment.

6.1 Advantages

- User friendly and easy to use
- Reliable
- Gives accurate result
- Less maintenance
- Fast communication

6.2 Applications

- Household purpose
- Chemical laboratories
- Industrial purpose
- Medical and Botanical applications

REFERENCES

- [1] Keerthi.v, Dr.G.N.Kodandaramaiah. Cloud IoT Based Greenhouse Monitoring System. Int. Journal of Engineering Research and Applications ISSN: 2248-9622, Vol. 5, Issue 10, (Part - 3) October 2015, pp.35-41
- [2] B.VidyaSagar. Green House Monitoring and Automation using GSM. International Journal of Scientific and Research Publications, Volume 2, Issue 5, May 2012 ISSN 2250-3153
- [3] Alausa Dele W.S, KeshinroKazeemKolawole. Microcontroller Based Green House Control Device. International Journal of Wireless & Mobile Networks (IJWMN) Vol. 3, No. 1, February 2011
- [4] D.D.Chaudhary, S.P.Nayse, L.M.Waghmare. Application of wireless sensor networks for greenhouse parameter control inprecision agriculture. The International Journal Of Engineering And Science (IJES)||Volume|| 2 ||Issue|| 11 ||Pages|| 129-135 || 2013 ||ISSN (e): 2319 – 1813 ISSN (p): 2319 – 1805
- [5] S. V. Viraktamath, sindhu d. Hegadekatte, sangeeta m. Achari, Sudharani y. Khawast, swapna g.m. Automatic greenhouse monitoring and controlling system using PLC. Proceedings of 40th IRF International Conference, 11th October 2015, Pune, India, ISBN: 978-93-85832-16-1