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LINUX BASED GREENHOUSE MONITORING IN SMRART GRIDS

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Abstract - *Smart GRIDS are imagined to bolster substantial entrances of conveyed interest side assets combined with framework wide request reaction driven by monetary along with dependability signals. The utilities in the connection are putting forth request side administration administrations to best deal with other systems. The Demand Response incentivize clients with installments or monetary punishments to diminish utilization amid times of basic matrix conditions or times of high vitality costs. With the incorporation of data innovation and progressed scaling base into savvy networks, both utilities and clients can have admittance to 2 kinds correspondence frameworks, control gadgets, and visual interfaces that permit them to send, recover, picture, process, or control the vitality requirements. These advancements settle on mechanized operational choices practical in vitality frameworks, displaying a huge potential to enhance execution and viability of Demand Side Management and Demand response programs, permitting client direct association in these projects to better oversee vitality and force utilization.*

1.INTRODUCTION

1.1 Greenhouse Background.

The greenhouse can be defined as a structure with walls and roof made chiefly of transparent material such as glass, for plants demands regulated climatic conditions are maintained.. A small scale greenhouses are called cold frame. The region inside the greenhouse which are undergone sunlight is likely to be warmer than the outdoor temperature, which results in avoiding the plantation from undesirable weather. These ranges arrangements varies sheds to huge industrial sized buildings.

The conventional greenhouses uses the glass of thickness 0.003m ('its called horticultural grade') grade, quality of glass will be better which does not have any air bubble(which leads to scorching on the leaves due to formation of lenses structure).The material used in plastic greenhouse is film made of polyethylene along with multiwall sheets being polycarbonate material.

The growing environment of plants can be monitored by greenhouse structure in precise way. It rely on major technical requirements of these hothouse, the main parameters that can be monitored are

- The temperature,
- The levels of light,
- The degree of shade,
- The irrigation and fertilizer application
- humidity.

1.2 Need for greenhouse

Greenhouses can be implemented in order to eradicate problems encountered from the growing qualities in a shortcoming piece of land, just like a limited growing season else undesirable light levels, in addition to this they also enhances production of food in shortcoming atmosphere. There are several crops which needs to be grown whole year, The importance and demand towards booming in the food supply for countries in high latitude. The countries like spain, USA, Russia and Almeria where greenhouses occupies almost 49,000 acres of area.

1.3 Objective of the project

This project manages a novel various leveled directed approach with unique numerical advancement approach of greenhouses, which has to be promptly joined directly to vitality

center point administration frameworks with regards to shrewd networks to advance the operation of the vitality frameworks. In greenhouses, fake lighting, CO2 generation, and temperature; therefore, a numerical greenhouse structure suitable operate ideally is proposed, with the goal that it can be executed as a supervisory control in existing nursery control frameworks. The goal is to reduce all out vitality expenses and request charges with considering essential parameters of nurseries; specifically, temperature with CO2 focus levels ought to be kept inside worthy extents. In this manner, the proposed model consolidates climate estimates, power value data, and the end-client inclinations to ideally work existing control frameworks in nurseries. Impacts of instability in power cost and climate figure on ideal operation of the storerooms.

2. DESIGN AND IMPLEMENTATION

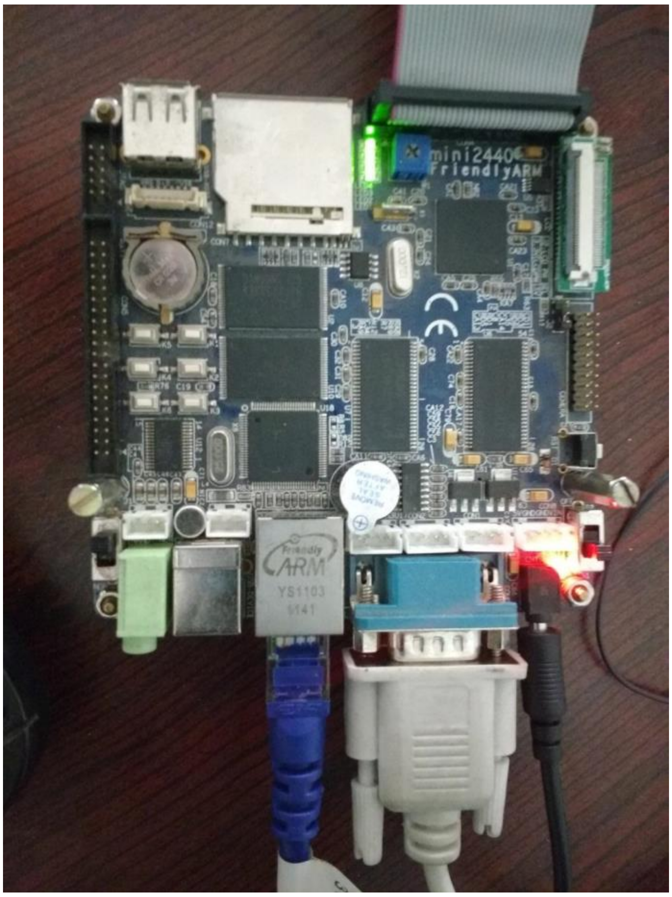

Fig- 1: Proposed system hardware.

The Fig 1 shows proposed system MCU hardware having development board which is connected to desktop system.

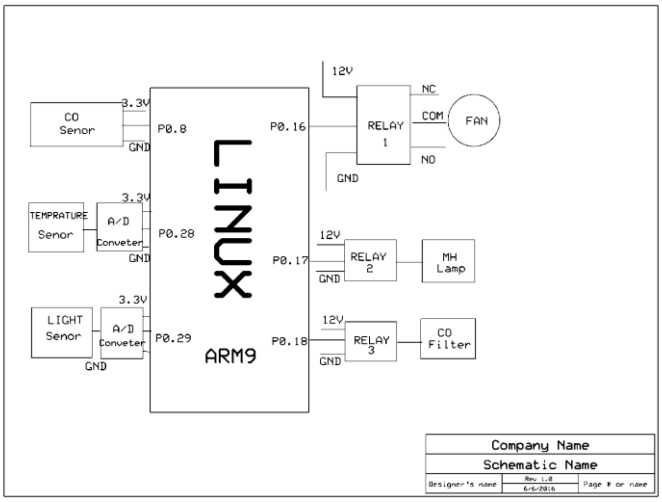

Fig -2:Block diagram of proposed system.

The block diagram shows the basic connection of components .The platform used to develop the project is LINUX and MCU is ARM9 .MCU controls the operation of actuators based on the signals received from input sensors.ARM9 is a microprocessor and Port 0 is programmed to work as input and 3 input sensors are connected to it. Likewise port 1 is programmed as output and corresponding actuators are connected to it. In the input side Analog to digital converter is connected as the pins of MCU is a digital pins and need a digital input to process the information. At the output no need of Digital to analog converter . Relay take over and operates with digital signal.

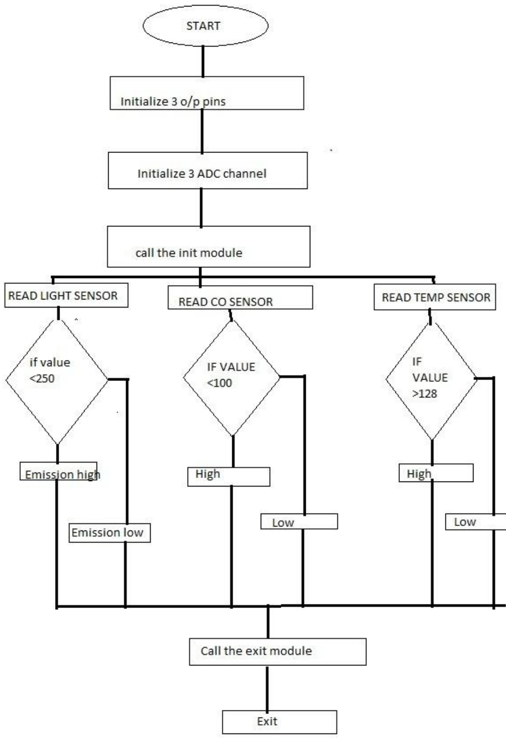

Fig- 3: Flow chart of the proposed system

The above diagram gives overview of software flowchart for proposed system and programmed in same flow. In the beginning all the input variables are initialized then these variables are continuously observed for any change . As soon as change is detected , and if it crosses the threshold value then corresponding output is actuated till the input signal is under control. To say the atmosphere inside greenhouse will be installed with these 3 sensors appropriately and monitored continuously.

4. RESULTS

4.1 Simulation.

The simulation of the proposed system in a desktop with screenshot is shown in following fig step by step.

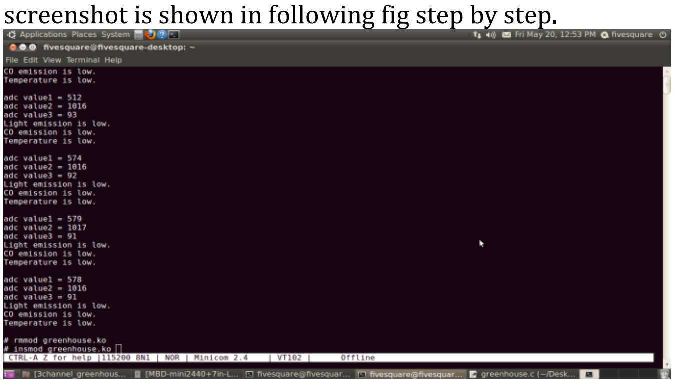

Fig -4: Atmosphere under control

The fig 4 signifies simulation result of atmosphere inside the green house under control. As observed from screenshot shown, temperature , light ,CO emission is found to be low. So atmosphere is proven to be under control.
The values of parameters displayed is found to be under control and it is continuously monitored. The actuator connected at the output of MCU will be off or inactive until parameters cross the threshold value.

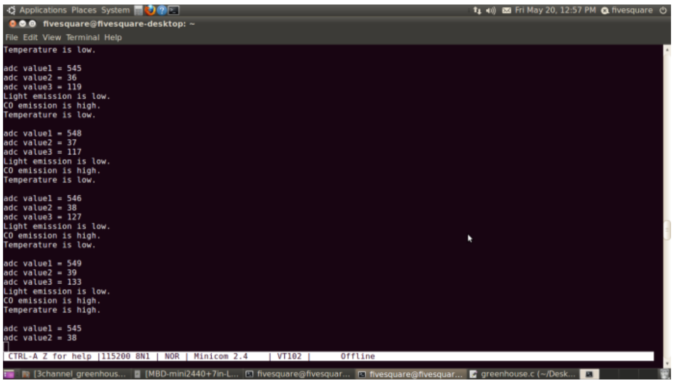

Fig- 5: One parameter crosses threshold.

The fig. 5 indicates that CO presence in the greenhouse atmosphere is detected by sensor and value of that parameter crossed the threshold level and respective actuator which is connected to CO filter is activated.The ADC reads the analog voltage from CO sensor and converts to respective digital value with respect to reference votage and displays in the monitor.

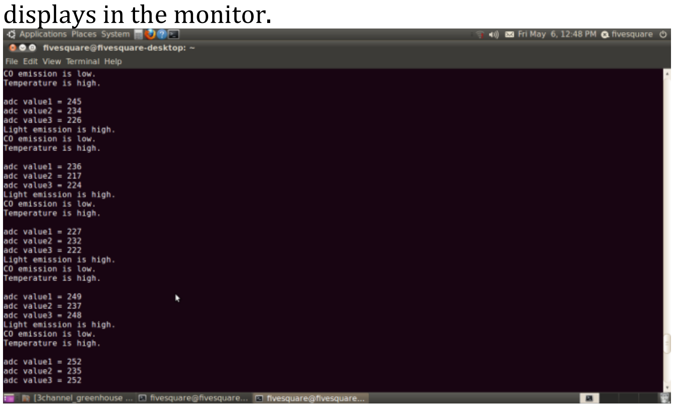

Fig- 6: two parameters found to have crossed threshold value.

The fig 6 shows Low intensity and high temperature in greenhouse atmosphere detected and the parameters are found to have crossed the threshold value and respective actuators are active

5.2Comparitive Analysis

The fig 7 would provide difference between proposed system and existing system.
The proposed system uses 32 bit ARM 9 processor compared to conventional 8 bit or 16 bit microcontroller.

COMPETITIVE FEATURES	ARM 9MCU	CONVENTIONAL MCU
PERFORMANCE	VERY FAST	FAST
DATA LENGTH	32 bit	8 or 16 bit
INPUT VOLTAGE	2.25 -5V	5V-12V

Fig-7: comparison table of proposed system and conventional system.

3. CONCLUSIONS

The proposed method is a updated technique for the management of atmosphere in green house. Which is very demanding and need very badly to agriculture oriented countries like China ,India ,Russia. Because hardware and software used here has superior extended features like processor speed, extended number of inputs, memories., and has been updated for future enhancement like parallel enhancement of many modules, work as host to OS,GUI ,secure login, secondary database, networking, capabilities, enhance no of input sensors.
Optimization of 1 to 2 % would save the resources and revenue of the nation quite huge. green house is a demanding technology likewise implementation rate is increasing exponentially. In addition to this proposed technique has been proven to be best in market. Developing country like INDIA needs these kinds of technique where it can fulfill demands based on economy, this technique can be commercially disclosed for further development of country. The effectiveness of the proposed technique shown by simulation results reduce total resources and revenue cost while sustaining the required green house operational constraints , exclusive presence of uncertainties.

6. FUTURE ENHANCEMENT

The proposed system is a updated to present technology and future technology. The design of the proposed system is versatile because it supports extension of many features mentioned in following.

- Applications in which MCU needs networking of more than one MCU can be done in using proposed system. For instance , Industries running more than one greenhouse in blocks but same premises can be networked and can be monitored. With sound knowledge of programming. Likewise Applications required web based monitoring of greenhouses.

In addition to this Enhanced features the proposed system supports many application oriented
Features .which are mentioned below in Fig.

SUPPORTIVE FEATURES	ARM 9 MCU	CONVENTIONAL MCU
Web based application	YES	NO
Network based application	YES	NO
Power saving options	YES	YES (very few)
OS compatibility	YES	NO
WIFI application	YES	NO
Database supportability	YES	NO

greenhouse or wifi based networking can be implemented without any hassle using proposed system. For instance greenhouse of same company in different premises can be monitored programming web based or wifi based.

- Application in which database management needed will be supported by proposed system. For example monitored values of greenhouse which has to be stored in server and tracking of that parameters offline can be done , supported by proposed system without extra.

REFERENCES

[1] M. ChehreghaniBozchalui, S. Hashmi, H. Hassen, C. Canizares, and K. Bhattacharya, ―Optimal operation of residential energy hubs in smart grids,‖ IEEE Trans. Smart Grid, vol. 3, no. 4, pp. 1755–1766, Dec. 2012.
[2] A. Ipakchi and F. Albuyeh, ―Grid of the future,‖ IEEE Power Energy Mag., vol. 7, no. 2, pp. 52–62, Mar./Apr. 2009.
[3] F. Rahimi and A. Ipakchi, ―Demand response as a market resource under the smart grid paradigm,‖ IEEE Trans. Smart Grid, vol. 1, no. 1, pp. 82–88, Jun. 2010.
[4] Q. Zou, J. Ji, S. Zhang, M. Shi, and Y. Luo, ―Model predictive control based on particle swarm optimization of greenhouse climate for saving energy consumption,‖ in Proc. IEEE World Autom. Congr., Kobe, Japan, 2010, pp. 123–128.
[5] D. G. Hart, ―Using AMI to realize the smart grid,‖ in Proc. IEEE PES Gen. Meeting—Convers. Del. Elect. Energy 21st Cent., Pittsburgh, PA, USA, 2008, pp. 1–2.
[6] E. Brown and R. N. Elliott, ―On-farm energy use characteriza- tions,‖ Amer. Counc. Energy-Efficient Econ., Washington, DC, USA, Tech. Rep. IE052, Mar. 2005.
[7] M. Meul, F. Nevens, D. Reheul, and G. Hofman, ―Energy use efficiency of specialised dairy, arable and pig farms in flanders,‖ Agric. Ecosyst. Environ., vol. 119, nos. 1–2, pp. 135–144, Feb. 2007.
[8] N. Sigrimis, K. Arvanitis, and G. Pasgianos, ―Synergism of high and low level systems for the efficient management of greenhouses,‖ Comput. Electron.Agric., vol. 29, nos. 1–2, pp. 21–39, 2000.
[9] C. Stanghellini and W. T. M. van Meurs, ―Environmental control of greenhouse crop transpiration,‖ J. Agric. Eng. Res., vol. 51, pp. 297–311, Apr. 1992.
[10] J. M. Aaslyng, J. B. Lund, N. Ehler, and E. Rosenqvist, ―IntelliGrow: A greenhouse component-based climate control system,‖ Environ. Model.Softw., vol. 18, no. 7, pp. 657–666, Sep. 2003.
[11]G. Soto-Zaraza et al., ―Trends in automated systems development for greenhouse horticulture,‖ Int. J. Agric. Res., vol. 6, no. 1, pp. 1–9, 2011.