# Green House Monitoring Using Fuzzy Logic

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***Abstract-****The techniques for weather control in greenhouse are to tune the harvesting needs and avoid unnecessary energy consumption. A greenhouse environment is an fabulous complex and dynamic environment. The usage of Fuzzy Logic Controllers (FLCs) represents a powerful way to minimize and facilitate management of climate conditions of the modern greenhouse. Since the temperature of greenhouse was important factor that affects the crops growth and the harvesting, we have designed and investigated a computer based on direct fuzzy Controller for greenhouse temperature control system. In this study, we present the complement of a fuzzy logic based control system for the regulation of climatic parameters under greenhouse using MATLAB software through heating and cooling to convince an exact range of temperature and humidity values. Some graphics user interfaces were developed, under MATLAB software for the real-time monitoring of the greenhouse system.*

***Keywords***-Direct Fuzzy logic, Greenhouse Climate, MATLAB, Monitoring.

## I. INTRODUCTION

he civilization under greenhouse, in Morocco, is a sector in full development which requires great assay to achieve some performance levels in view of high cost and scarcity of fossil energies. The difficult ageing economic context obliges the producers to mitigate their greenhouse production costs, to improve their performance and to seek the best sale price available by taking into account the context of market globalization. It was therefore compulsory to develop technical production to produce all the year. At first, the greenhouse was developed to protect the crops against hyper weather conditions, then for an early production by installing the control systems climate parameters, because the precocity was a pledge for better prices. In addition, the producers must equip their greenhouses with modern climate control systems, in order to maximize capability and optimize quality. A greenhouse environment is an fabulous complex, a dynamic environment and it is tricky to predict all the interactions encountered in the greenhouse culture. Precise control of the green house environment is critical in achieving the best and most capability growing environment and capability. Fuzzy logic aims to study the invincible knowledge representation and reasoning close to human language daily. Fuzzy logic feeds a control law often effective, without having to utilize to major theoretical developments. Indeed, fuzzy logic has mainly demonstrated more robust performance compared to traditional techniques, in positions where the mathematical model of the process was not well known or when the behavior of the process varies non-linearly. It offers the advantage to include linguistic knowledge on how to control a nonlinear process as greenhouse, taking into account the experiences of growers. The use of Fuzzy Logic represents a powerful way to minimize and facilitate management of climate conditions of the modern greenhouses Using fuzzy logic could enable machines to understand and respond to vague human concepts such as hot, cold, dry, etc It also could feed a relativity simple approach to reach definite conclusions from invincible information.The difficult current economic context obliges the producers to reduce their green house production costs, to better their performance and to look for the best sale price available by taking into account the context of market globalization. It was therefore necessary to develop technical production to produce all the year. At first, the greenhouse was developed to protect the crops against hyper weather conditions, then for an early production by installing the control systems clime parameters, because the precocity was a promise for better prices. A greenhouse environment is an incredibly complex, a dynamic environment and it is difficult to predict all the interactions encountered in the greenhouse culture. Precise control of the greenhouse environment is critical in achieving the best and most efficient growing environment and capability. Fuzzy logic aims to study the invincible knowledge representation and reasoning close to human language daily. Fuzzy logic feeds a control law often effective, without having to utilize to major theoretical developments. Indeed, fuzzy controllers have mainly demonstrated more energetic performance compared to traditional techniques, in positions where the mathematical model of the process was not well known or when the behaviour of the process varies non-linearly. It offers the advantage to include linguistic knowledge on how to control a nonlinear process as greenhouse, taking into account the know of growers. The use of Fuzzy Logic Controllers (FLCs) represents a powerful way to minimize and facilitate management of climate conditions of the modern greenhouses.

## II. BLOCK DIAGRAM

As shown in the following fig.1 we are monitoring the sensors using AVR Microcontroller and MATLAB

software is used for fuzzy logic in that we are getting real time graph plotting of sensors. we are using PL2303 module for serial communication. We are setting the threshold value in the coding as soon as sensors that value then automatically related parameters will on/off. Here, LM35 temperature sensor are used to sensing temperature and LDR to controlling the light intensity. Humidity sensor is used to sensing the humidity and all value display on LCD. Graphically representation also shown and threshold value crosses suppose temperature then fan start running. Then we are controlling or changing light intensity.

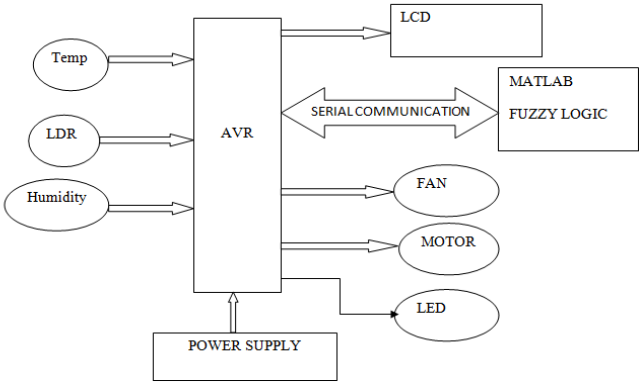


Fig.1 Block Diagram

## III. POWER SUPPLY

When working with electronics, you always demand one basic thing power. In every electronic circuit power supply is required. The proper working of each and every component, the exact amount of voltage and current to be supplied to it. If the power exceed its limit, it can be fatal. Below is the circuit diagram of power supply which gives output of 5V, as only that numerous is required for microcontroller. Its circuit diagram and designing calculation are given below.

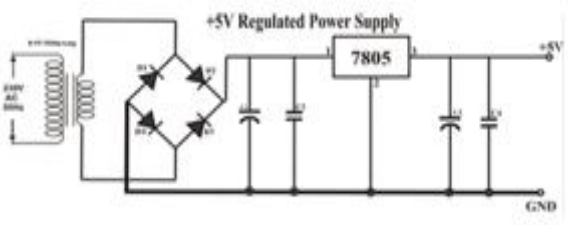


Fig.2 Power Supply

### A. Power Supply Component Design

1) Voltage regulator design:

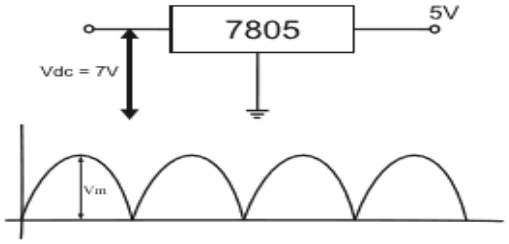


Fig.3 Output waveform of IC 7805

We require +5V o/p. The drop-out voltage of regulator is 2V (As per datasheet). Vdc = 5+2 = 7V So at the regulator input minimum 7V should be applied.

According to formula, Vdc= 2Vm / pi

Assuming there is no Ripple Capacior From

Vm = Vdc . pi / 2

= 7 x 3.14 / 2

= 10.99V

Vm=10.99

Vm = 10.99V

During one cycle, two diode are conducting.

Drop of volatge of one diode = 0.7V

Drop of volatge of two diode = 1.4V

Vim = Vm + 1.4V

Vim = 10.99 + 1.4 = 12.39V

Vim=12.39V

Vrms = Vim / Sqrt (2)

=12.39 / Sqrt (2)

= 8.76V

Vrms=8.76V

Vim = 12.39V

So we select transformer of 9V Similarly Im = Idc x pi / 2.

Im = 400m x 3.14 / 2 = 628mA

Irms = Im / Sqrt (2)

= 628m / Sqrt (2)

= 444.06 mA Irms

Irms=444.06mA

= 444.06mA

So we select transformer with current rating of 500mA.

Considering voltage and current transformerwe take 0-9V / 500mAm

Transformer - 0-9V / 500mA Step down

2) Rectifier Design

PIV of diode = Vm = 12.39 V
Im = 628 mAmp
So we select bridge IC of 1 Ampere rating.

3) Filter Capacitor Design

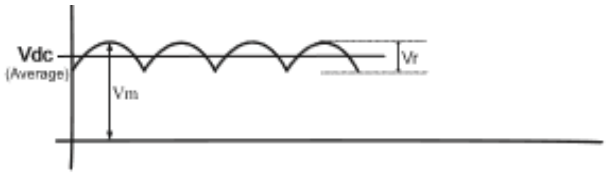


Fig. 4 Output waveform of filter

R = Vdc / Idc
= 7 / 400m
= 17.5 Ohms

Vr = 2 (Vim - Vdc)
= 2(12.39 - 7)
= 10.78V

C = Vdc / (FxRxVr)
= 7 / (100x17.5x10.78)
=371.05uF
So for safe working we select capacitor 0f 1000uF

C = 1000uF / 35V

C1 - 1000uF/35V - Electrolytic Capacitor
C2,C4 C3 0.1uF Ceramic Capacitor
C3- 220uF/25V Electrolytic Capacitor

## IV. CONCLUSION

A greenhouse temperature and humidity control algorithm based on direct Fuzzy logic controller were designed, tested and implemented. Several actuators and sensors are installed and connected to an acquisition and control system based on personal computer and a datum acquisition card. The overall tests indicated that the fuzzy controller worked satisfactory but at the expense of actuators frequent activity. This research has successfully showed that Lab VIEW and Fuzzy Logic controller can be applied to develop a system for monitoring climate parameters under greenhouse. Using a computer system can cause some difficulties for the producer inexperienced with computers. But the developed system has advantages that the designed program is user-friendly and there sult could be easy to analyse by the user, as the front panel is a graphical user interface. The use of fuzzy logic requires however, the knowledge of a human expert to create an algorithm that mimics his/her expertise and thinking.

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