AUTOGREENHOUSE FARMING

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***Abstract*—Agriculture is the backbone of India's economic activity and our experience during the last 50 years has demonstrated the strong correlation between agricultural growth and economic prosperity. The present agricultural scenario is a mix of outstanding achievements and missed opportunities. If India has to emerge as an economic power in the world, our agricultural productivity should equal those countries, which are currently rated as economic power of the world. We need a new and effective technology which can improve continuously the productivity, profitability, sustainability of our major farming systems. One such technology is the green house technology. Although it is centuries old, it is new to India.**

Fig.1:Greenhouse Image

Keywords-Agriculture;farming;greenhouse;sensor; temperature;humidity.

I.INTRODUCTION

A greenhouse (also called a glasshouse) is a building in which plants are grown. These structures range in size from small sheds to industrial-sized buildings. A miniature greenhouse is known as a cold frame.

A greenhouse is a structural building with different types of covering materials, such as a glass or plastic roof and frequently glass or plastic walls; it heats up because incoming visible solar radiation (for which the glass is transparent) from the sun is absorbed by plants, soil, and other things inside the building. Air warmed by the heat from hot interior surfaces is retained in the building by the roof and wall. In addition, the warmed structures and plants inside the greenhouse re-radiate some of their thermal energy in the infrared spectrum, to which glass is partly opaque, so some of this energy is also trapped inside the glasshouse. However, this latter process is a minor player compared with the former (convective) process. Thus, the primary heating mechanism of a greenhouse is convection. This can be demonstrated by opening a small window near the roof of a greenhouse: the temperature drops considerably. This principle is the basis of the autovent automatic cooling system. Thus, the glass used for a greenhouse works as a barrier to air flow, and its effect is to trap energy within the greenhouse. The air that is warmed near the ground is prevented from rising indefinitely and flowing away.

Although heat loss due to thermal conduction through the glass and other building materials occurs, net energy (and therefore temperature) increases inside the greenhouse.

II.LITERATURE SURVEY

There are more than 50 countries now in the world where cultivation of crops is undertaken on a commercial scale under cover. United States of America has a total area of about 4000 ha under greenhouses mostly used for floriculture with a turnover of more than 2.8 billion US $ per annum and the area under greenhouses is expected to go up considerably, if the cost of transportation of vegetables from neighbouring countries continues to rise. The area under greenhouses in Spain has been estimated to be around 25,000 ha and Italy 18,500 ha used mostly for growing vegetable crops like watermelon, capsicum, strawberries, beans, cucumbers and tomatoes. In Spain simple tunnel type greenhouses are generally used without any elaborate environmental control equipments mostly using UV stabilised polyethylene film as cladding material.

STATUS IN INDIA

Greenhouses are being built in the Ladakh region for extending the growing season of vegetables from 3 to 8 months. In the North-East, greenhouses are being constructed essentially as rain shelters to permit off-season vegetable production.

III. SYSTEM DESIGN

The design uses sensors to observe and control changes in the climatic parameters inside the greenhouse. The sensors used are temperature sensor, light sensor, humidity sensor, moisture sensor. Conveyor belt are used to move the growth and accordingly the growth is taken. A LCD display is also used to keep check of the parameters whose observation

is given by the sensors. A USB module is used for online expert adcvice.ADC microcontroller is the heart of the complete system. It is actually responsible for all the process being executed. It will monitor & control all the peripheral devices or components connected in the system. Power Supply will supply the various voltage requirement of each unit.

Fig.2: System Design of Greenhouse Farming

IV.SYSTEM BLOCK DIAGRAM

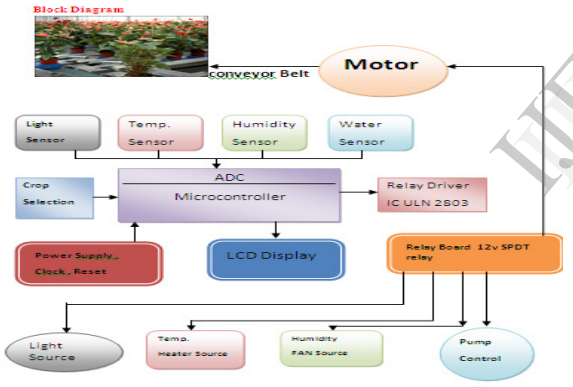

Fig.3: Block Diagram of the system

The function of different blocks is:

A. Light Sensor: light sensors, or photo detectors, including semiconductor devices such as photocells, photodiodes, phototransistors, CCDs, and Image sensors; vacuum tube devices like photo-electric tubes, photomultiplier tubes; and mechanical instruments such as the Nichols radiometer to detect light.

B. Temperature Sensor: Temperature sensors include analog and digital sensor ICs designed for temperature monitoring of a system. These include local temp sensors, remote temp sensors and temp switches. These devices feature low power and high accuracy operation.

C. Humidity Sensor: A humidity sensor, also called a hygrometer, measures and regularly reports the relative humidity in the air. A humidity sensor senses relative humidity. This means that it measures both air temperature and moisture.

D. Water Sensor: The Soil Moisture Sensor is used to measure the volumetric water content of soil. This makes it ideal for performing experiments in courses such as soil science, agricultural science, environmental science, horticulture, botany, and biology. Moisture Sensor is use to:

- Measure the loss of moisture over time due to evaporation and plant uptake.
- Evaluate optimum soil moisture contents for various species of plants.
- Monitor soil moisture content to control irrigation in greenhouses

E. Power Supply: This unit will supply the various voltage requirement of each unit. This will be consists of transformer, rectifier, filter and regulator. The rectifier used here will be Bridge Rectifier.

F. Relay Driver: The eight NPN Darlington connected transistors in this family of arrays are ideally suited for interfacing between low logic level digital circuitry (such as TTL, CMOS or PMOS/NMOS) and the higher current/voltage requirements of lamps, relays, printer hammers or other similar loads for a broad range of computer, industrial, and consumer applications.

G. ADC Microcontroller: We have use PIC16F877A. This unit is the heart of the complete system. It is actually responsible for all the process being executed. It will monitor & control all the peripheral devices or components connected in the system.

H. Display Control: We are going to use 16x2 character LCD. This will be connected to microcontroller. The job of LCD will be to display all the system generated messages coming from the controller. LCD will provide interactive user interface. This unit requires +5VDC for its proper operation.

I. Motor: Belt conveyors are typically used to transport materials on the level or along slight slopes. They are driven by motors.

V.CIRCUIT DIAGRAM

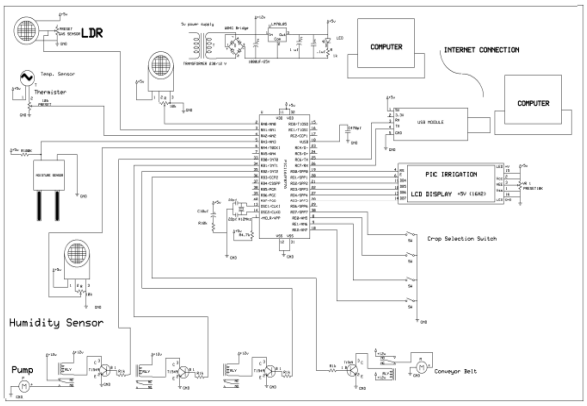

Fig.4:Circuit Diagram of Greenhouse Farming

CIRCUIT DIAGRAM EXPLANATION

PIC16F877A is used in this design. There are five ports RA,RB,RC,RD,RE.At port RA all Sensors like Temperature sensor ,Humidity sensor, Light sensor and Water sensor are connected to detect the various parameter change. Temperature sensor (Thermistor 10KNTC) is used to detect temperature variation. If there is change in temperature according to that Cooler or Heater is ON to maintain temperature. Humidity sensor is used to detect the moisture level in the soil, if moisture is fewer Sprinklers is ON for drip irrigation. Light sensor (LDR 10K) is used to control the light requirement of the crop. Water sensor is used to check the water level in the tank for drip irrigation .At port RB different resources like Heater, Bulb and Motor are connected. At port RC crop selection switches are used. Port RD is used for LCD display of size 16x2 to display the parameter change digitally and USB Module is also used at port RC to store data. Port RE is reserved for the future application. Clock Oscillator is connected at oscillator pin to provide crystal frequency of 11.0592MHz.power supply is to supply the various voltage requirement of each unit. This will be consists of transformer, rectifier, filter and regulator. The rectifier used here will be Bridge Rectifier.

VI.ADVANTAGES AND APPLICATIONS

The yield may be 10-12 times higher than that of out door cultivation depending upon the type of greenhouse, type of crop, environmental control facilities. Reliability of crop increases under greenhouse cultivation. Ideally suited for vegetables and flower crops. Year round production of floricultural crops. Off-season production of vegetable and fruit crops. Disease-free and genetically superior transplants can be produced continuously. Efficient utilization of chemicals, pesticides to control pest and diseases. Water requirement of crops very limited and easy to control. Maintenance of stock plants, cultivating grafted plant-lets and micro propagated plant-lets.

VII.FUTURE DEVELOPMENT

In nearby future, we will develop a multihop network to cover the entire greenhouse. Attach probes to the nodes so that the wireless nodes can be used to measure soil moisture and possibly other parameters from the flower pots. To implement the CO2sensor to the network by connecting it to the plug-in router node.

VIII. CONCLUSION

The yield may be 10-12 times higher than that of out door cultivation depending upon the type of greenhouse, type of crop, environmental control facilities. Reliability of crop increases under greenhouse cultivation. Ideally suited for vegetables and flower crops. Year round production of floricultural crops. Off-season production of vegetable and fruit crops. Disease-free and genetically superior transplants can be produced continuously. Efficient utilization of chemicals, pesticides to control pest and diseases. Water requirement of crops very limited and easy to control. Maintenance of stock plants, cultivating grafted plant-lets and micro propagated plant-lets Hardening of tissue cultured plants Production of quality produce free of blemishes. Most useful in monitoring and controlling the instability of various ecological system. Modern techniques of Hydroponic (Soil less culture), Geoponics and Nutrient film techniques are possible only under greenhouse cultivation.

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