

# Intelligence Vertical Farming with Automation

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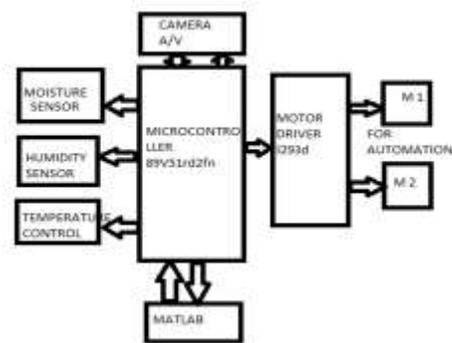
**Abstract:**-- the intelligence vertical farming is a idea inspired by looking after the present condition of agriculture and the quality of food we are feeding to human beings and the effect of it on their health .the food of the future is nowhere to go but up .and because of that demanding growth we need to find out different ways to increase the production without affecting the quality but as we are taken only one point into consideration that is quantity and left the quality behind and because of that so many health problems have been occurred and it got so worst that last year 550,000 people got blind because of deficiency of vitamin A .toxins levels of food are increased so much that we are eating slow poison in terms of food which is killing human body slowly and eventually end up with disaster so here is the new concept working on globally by different institutions and implemented over many cities to improve the food quality and productivity with quantity also named as “VERTICAL FARMING”

**Keywords-** vertical, intelligence ,automation ,food quality ,toxins

## I. INTRODUCTION

Do you ever wonder that all the foods we eat from where it come. it came from from large huge farm fields which are miles away from our cities on thousands of Acres of land but as we live in the the world of growth every day there is demand of more than yesterday and it's a big problem because land are not going to give you food more than its capacity so we started using different chemicals fertilizers in order to takeout more growth from farm fields and results are quite bad because quality has gone way much low .there are few problems when it comes to farming and the biggest one is fresh water about 70% of fresh water from available source on the earth is required by agriculture and it depends on whether too much rain too much cold too much sun destroy billions of crops every year and there is a fact that farms are very far away from cities they need to travel thousands of miles of distance to reach towards the people and because of that transportation add carbon layers on food which affect the quality of the food to very harmful level.so there is an technology or approach that is called vertical farm imagine a green house in the middle of he city now imagine that green house is increased in the vertical direction like multistory building now because of this concept we can gro the food in the city itself and there are so many advantages because of this technology like transportation cost will get reduced by 80%,the water use for farming will get reduced to 75% carbon layers will get reduced to 5% because there will be no transportation of food. And people will be able to enjoy the quality vegetables every day.

## II. INTERFACING PROTOTYPE BLOCK DIAGRAM



*Fig 1.1*

Above figure shows that block diagram of intelligence vertical farming system which includes all sensor circuitry and moter drive assembly for automation .we are using microcontroller 89v51RD2FN in order to control the all necessary parameters with supporting circuitry. Two motors are used M1 amd M2 interfaced with microcontroller via driver IC because microcontroller is a low power is a low power device runs at the 5v and motor which we are using runs at 12/24 v so in order to match the operating voltages we need to put a driver ic with controller and then interface motors

Motors we are using can be DC motor or servo motor. These two motors are used to rotate the individual floors of building in rotation 360 degree .on the left hand side we interfaced moisture sensor humidity sensor, temperature control system ,camera audio/video , and matlab interfaced to watch the whole system and different

parameters in terms of weather and take necessary action to keep them in control. Via programming. Sensor which we are using can be increased or decreased as per requirements because there are numerous sensors to measure different parameters.

### III .SERVO MOTOR

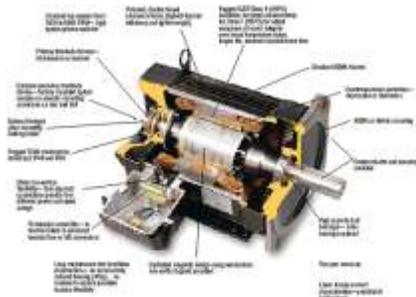


Fig 1.2

A Servo is a small device that has an output shaft. This shaft can be positioned to specific angular positions by sending the servo a coded signal. As long as the coded signal exists on the input line, the servo will maintain the angular position of the shaft. As the coded signal changes, the angular position of the shaft changes. In practice, servos are used in radio controlled airplanes to position control surfaces like the elevators and rudders. They are also used in radio controlled cars, puppets, and of course, robots. Servos are extremely useful in robotics. The motors are small, as you can see by the picture above, have built in control circuitry, and are extremely powerful for thier size. A standard servo such as the Futaba S-148 has 42 oz/inches of torque, which is pretty strong for its size. It also draws power proportional to the mechanical load. A lightly loaded servo, therefore, doesn't consume much energy. The guts of a servo motor are shown in the picture below. You can see the control circuitry, the motor, a set of gears, and the case. You can also see the 3 wires that connect to the outside world. One is for power (+5volts), ground, and the white wire is the control wire. So, how does a servo work? The servo motor has some control circuits and a potentiometer (a variable resistor, aka pot) that is connected to the output shaft. In the picture above, the pot can be seen on the right side of the circuit board. This pot allows the control circuitry to monitor the current angle of the servo motor. If the shaft is at the correct angle, then the motor shuts off. If the circuit finds that the angle is not correct, it will turn the motor the correct direction until the angle is correct. The output shaft of the servo is capable of travelling somewhere around 180 degrees. Usually, its somewhere in the 210 degree range, but it varies by manufacturer. A normal servo is used to control an angular motion of between 0 and 180 degrees. A normal servo is

mechanically not capable of turning any farther due to a mechanical stop built on to the main output gear.

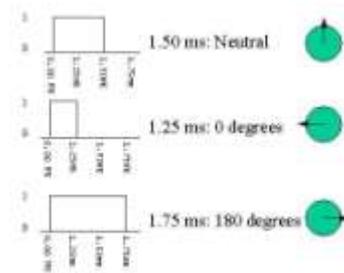


Fig 1.3

The amount of power applied to the motor is proportional to the distance it needs to travel. So, if the shaft needs to turn a large distance, the motor will run at full speed. If it needs to turn only a small amount, the motor will run at a slower speed. This is called proportional control.

How do you communicate the angle at which the servo should turn? The control wire is used to communicate the angle. The angle is determined by the duration of a pulse that is applied to the control wire. This is called Pulse Coded Modulation. The servo expects to see a pulse every 20 milliseconds (.02 seconds). The length of the pulse will determine how far the motor turns. A 1.5 millisecond pulse, for example, will make the motor turn to the 90 degree position (often called the neutral position). If the pulse is shorter than 1.5 ms, then the motor will turn the shaft to closer to 0 degrees. If the pulse is longer than 1.5ms, the shaft turns closer to 180 degrees.

### IV. MOISTURE SENSOR

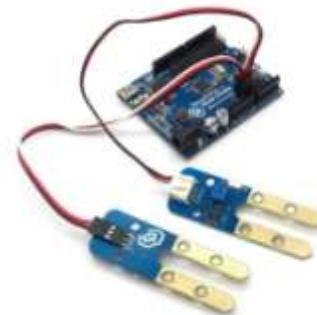


Fig 1.4

This is a very simple touch sensor switch that is built with the555timerIC.You just need to touch the metal plate and the relay gets energized and is kept in this state for about 100 seconds, then is released. This kind of sensor switch is suitable for making touch operated bells, buzzers

of small toys which operate for a small time and then switch off automatically. The input impedance of the trigger is very high and the touch sensor switch can be triggered by the voltage induced in the human body. The relay is a 12 V DC relay operating at currents less than 200 mA. This sensor is used to sense the moisture level of the plants because moisture raising can be different for different plants and this must be controlled in order to achieve the quality plants so this done with the help of interfacing this sensor with controller and via matlab we can read the data of moisture on screen and take back up of it for further studies

### V. DARK SENSOR

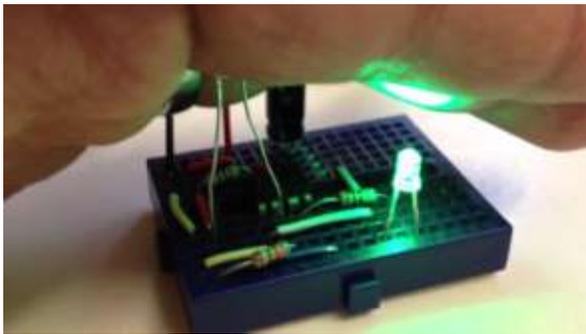


Fig 1.5

In above circuit R1 can be used to adjust the sensitivity. And the working of the circuit is very simple. The LDR will have very low resistance during day time so the transistor Q1 will be in OFF condition. And during night time the resistance will be very high so automatically the transistor Q1 will be ON. The Q1 is PNP transistor and the emitter of Q1 is given to base of Q2. So the Q2 transistor will be ON only if the transistor Q1 is ON. The TRIAC is used in the circuit to make the circuit complete. As the TRIAC will allow voltage to pass from either direction only when there is a certain threshold voltage in gate terminal. And the gate of TRIAC is controlled by transistor Q2. So totally the lamp will be ON during night time and will be again switched off during day light. To change the sensitivity of the circuit to light adjust R2

### VI. HUMIDITY SENSOR



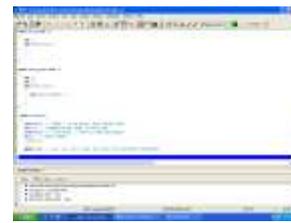
Fig 1.6

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analog input pins needed). It's fairly simple to use, but requires careful timing to grab data. The only real downside of this sensor is you can only get new data from it once every 2 seconds, so when using our library, sensor readings can be up to 2 seconds old.

Low cost, 3 to 5V power and I/O, 2.5mA max current use during conversion (while requesting data), Good for 20-80% humidity readings with 5% accuracy, Good for 0-50°C temperature readings  $\pm 2^\circ\text{C}$  accuracy, No more than 1 Hz sampling rate (once every second), Body size 15.5mm x 12mm x 5.5mm, 4 pins with 0.1" spacing. This sensor is interfaced with arduino circuit board and via this sensor we will control the humidity by measuring it every second it changes and record the data as per our study with combination of temperature, humidity, moisture we will develop the appropriate temperature as the plant required by generating a complete control system of automatic temperature control unit and this unit will act as per the sensors output to control unit

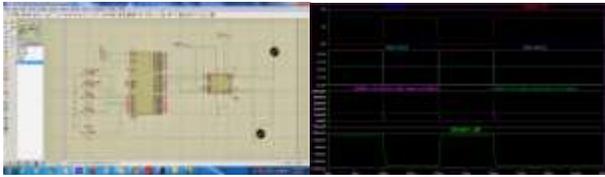
### VII. SOFTWARE IMPLEMENTATION

RIDE is a 32-bit Windows Integrated Development Environment (IDE) which contains a set of development tools for 8051 and XA microcontroller applications. This development environment includes color-coded syntax highlighting editor, a project manager, on-line help, and provides all the facilities needed to call the different RAISONANCE development tools. We used the ride software to decode the program file in to HEX file in order to upload it in to microcontroller



RIDE editor  
Fig 1.7

Proteus is one of the most famous simulators. It can be used to simulate almost every circuit on electrical fields. It is easy to use because of the GUI interface that is very similar to the real Prototype board. Moreover it can be used to design Print Circuit Board (PCB). We used this software to do necessary simulation of our microcontroller circuit diagrams



Simulation of L239D motor Fig 1.8

### VIII. PCB LAYOUTS

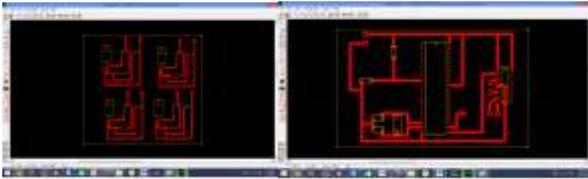


Fig 1.9

### IX. PROJECT CIRCUIT



Fig 1.10

### X. MATLAB

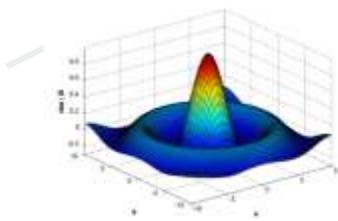


Fig 1.1

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. MATLAB is an interactive system whose basic data element is an array

that does not require dimensioning. This allows you to solve many technical computing problems, especially those with matrix and vector formulations, in a fraction of the time it would take to write a program in a scalar no interactive language such as C or Fortran.

The name MATLAB stands for matrix laboratory. MATLAB was originally written to provide easy access to matrix software developed by the LINPACK and EISPACK projects, which together represent the state-of-the-art in software for matrix computation.

MATLAB has evolved over a period of years with input from many users. In university environments, it is the standard instructional tool for introductory and advanced courses in mathematics, engineering, and science. In industry, MATLAB is the tool of choice for high-productivity research, development, and analysis.

MATLAB features a family of application-specific solutions called toolboxes. Very important to most users of MATLAB, toolboxes allow you to *learn* and *apply* specialized technology. Toolboxes are comprehensive collections of MATLAB functions (M-files) that extend the MATLAB environment to solve particular classes of problems. Areas in which toolboxes are available include signal processing, control systems, neural networks, fuzzy logic, wavelets, simulation, and many others.

### X. CONCLUSION

As per the developing rate of the world's biggest problem is food that how to feed the growing population .and agriculture is at the cutting age so that we need to think it's as a primary work to develop efficient technology which can be a solution to our future biggest problem and with proper research it may be possible

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