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A Webserver Based Agricultural Field Monitoring System

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Abstract: The lack of Human resource for the most important job on earth "farming" has motivated the idea of automating the field monitoring and control of the agriculture field from remote places. Webserver technology which would provide the environment details of a remote place through the internet connection would make this problem to be solved in a better manner. The development of the sensor and the wireless communication has led to a very sophisticated technology to be applied in the monitoring and controlling the agriculture field.

This project attempts to develop a solution for the remote monitoring of the agriculture field through the webserver. The remote agriculture field's environment can be realized and controlled through the webpage developed on the webserver. Here the webserver is developed on the Rasberry PI microcomputer which would be present at the agriculture field remotely.The Raspi is interfaced with the temperature, moisture and the water level sensor through the ADC channels .These sensors output is updated in the webserver instantaneously. And this webserver comprises of the WIFI router. Considering the cost of operation the static IP address for the web server is not activated but the WIFI IP address is used for the wireless communication.

The WIFI output is received from the other system, which will be in the remote end. And the control from the Webserver on the field could be applied like whether to irrigate the field or not etc. A CMOS camera is interfaced with the LVDS port of the raspberry PI board and the leaf classification algorithm is developed to find whether there are weeds in the field.

I. INTRODUCTION

The contemporary world is in a transition stage where problems concerning global issues, such as global warming and alternative energy sources, are combined with new challenges demanding immediate solutions. Society's focus has shifted from economic growth to sustainable development, where environmental, social, and economic aspects are considered together, rather than separately. Policies that promote sustainability in all sectors of the economy (manufacturing, agriculture, and services) are now considered as a part of good governance. Problems such as climate change, population growth, and poverty (especially hunger), occur in a context of a gradual depletion of natural resources and the fear of diminishing coal energy reserves. These are some of the global issues that are thought to require multidisciplinary approaches in order to be addressed successfully.

II. PROBLEMS FACED

The process of utilizing technology in farming and cultivation requires deep knowledge of agricultural processes, biology, chemistry, and empirical knowledge. There are many parameters which must be taken into consideration and investigated in depth when designing a system that should improve cultivation procedures by making the whole process more effective and sustainable.

In order to design and build a precision agriculture system that can be widely used by many users and applied in different contexts, many questions need to be addressed. Some of these questions are:

A. Is it feasible to design a system that will accommodate every possible scenario in an agricultural context and do so for all possible users?
B. Is automation in agriculture really useful and in what part or parts of the cultivation process (e.g. seed planting, growing, harvesting, selling) can it be applied?
C. What is the cost of the cultivation process and how can this cost be reduced by automating one or more parts of this process?

III. PROPOSED SOLUTION

This project attempts to develop a solution for the remote monitoring of the agriculture field through the webserver. The remote

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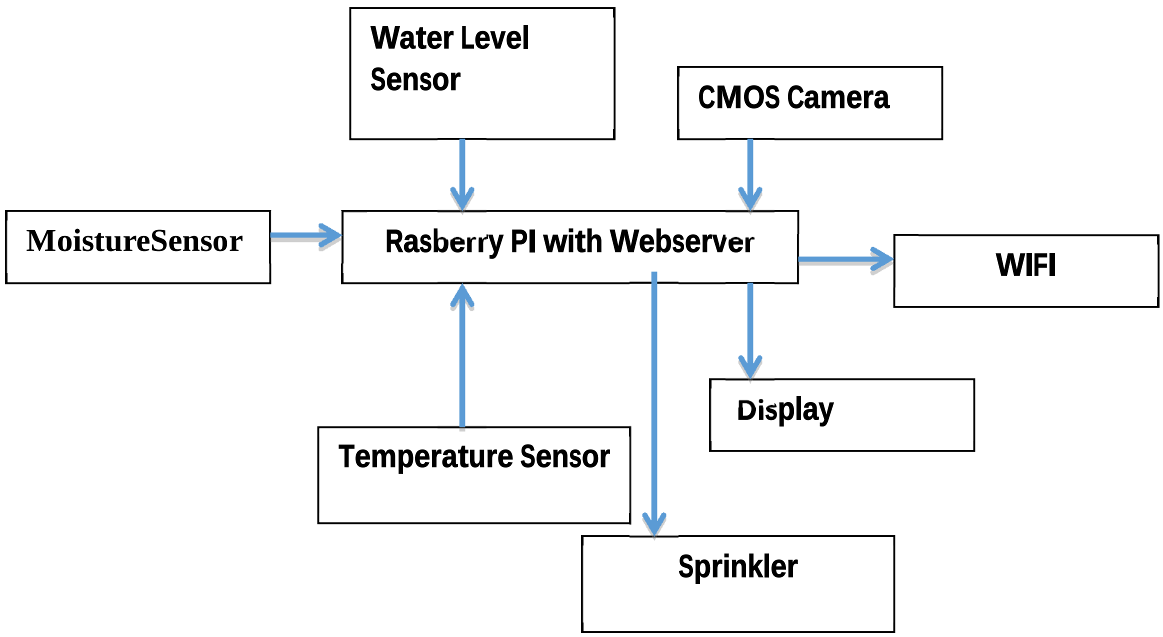
agriculture field's environment can be realized and controlled through the webpage developed on the webserver. Here the webserver is developed on the Rasberry PI microcomputer which would be present at the agriculture field remotely. The Raspi is interfaced with the temperature, moisture and the water level sensor through the ADC channels .These sensors output is updated in the webserver instantaneously. And this webserver comprises of the WIFI router. Considering the cost of operation the static IP address for the web server is not activated but the WIFI IP address is used for the wireless communication. The WIFI output is received from the other system, which will be in the remote end. And the control from the Webserver on the field could be applied like whether to irrigate the field or not etc. A CMOS camera is interfaced with the LVDS port of the raspberry PI board and the leaf classification algorithm is developed to find whether there are weeds in the field.

IV. BLOCK DIAGRAM

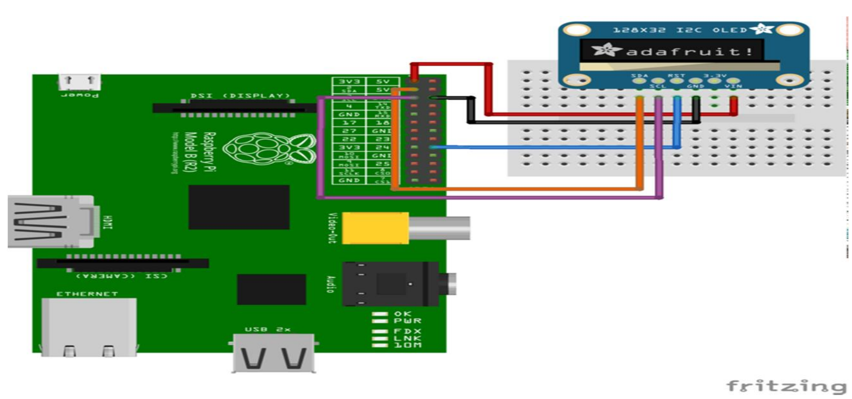
A. Field Side



B. Monitoring Side

C. Overview of Hardware Connection

You can hook up an OLED to the Raspberry Pi using either the Pi's I2C or SPI interface. If your OLED supports both I2C and SPI, make sure to check how the solder jumpers are configured to expose the right interface.



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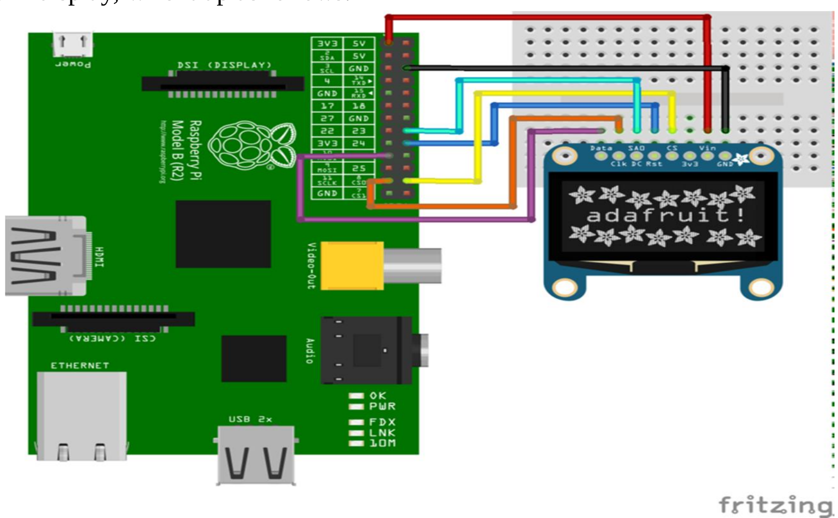
1) Connect display ground to Raspberry Pi ground (black wire).
2) Connect display VIN to Raspberry Pi 3.3 volt (red wire).
3) Connect display RST to Raspberry Pi GPIO 24 (blue wire). You can alternatively use any free digital GPIO pin for the reset pin.
4) Connect display SCL to Raspberry Pi SCL (purple wire).
5) Connect display SDA to Raspberry Pi SDA (orange wire).

D. SPI

1) To use the Pi with an SPI display, wire it up as follows:



a) Connect display ground to Raspberry Pi ground (black wire).
b) Connect display VIN to Raspberry Pi 3.3 volt (red wire).
c) Connect display CS to Raspberry Pi CE0 (yellow wire)
d) Connect display RST to Raspberry Pi GPIO 24 (blue wire). You can alternatively use any free digital GPIO pin for the reset pin
e) Connect display DC to Raspberry Pi GPIO 23 (cyan wire). You can alternatively use any free digital GPIO pin for the DC pin
f) Connect display CLK to Raspberry Pi SCLK (orange wire).
Connect display Data to Raspberry Pi MOSI (purple wire).

Note that the wiring above will use the Raspberry Pi's hardware SPI bus to communicate with the display. If you haven't done so already with your Pi, make sure to edit the blacklist.conf file to comment the line which disables SPI. Reboot your Pi and you should see the files /dev/spidev0.0 and /dev/spidev0.1 are now available.

Using hardware SPI is great for getting the fastest response from the display, however if you need more flexibility with pin usage you can use a software-based SPI implementation with any 5 free digital GPIO pins. See the example code usage on the next page for more information about configuring software SPI.

E. Camera Interfacing

1) The Raspberry – pi having LVDS (Low-voltage differential signaling) connector to interface CMOS camera.
2) The LVDS is Serial communications protocol.
3) It operates in low voltage
4) Default baud rate of R-pi is 115200.
5) We can change baud rate using stty –F/dev/ttyACM0 9600(any baud rate) command
6) When the R-pi reboot it set to default baud
7) Baud rate refers to number of signal or symbol change that occur per second. Here signal or symbol may be voltage, frequency or phase change
8) It is possible to have more than two symbol per transmission interval, where by each symbol represent multiple bits
9) If symbol rate is 4800 baud and each symbol represents two bits, overall bit rate of 9600 bits/sec.

Normally the number of symbols is some power of two, S=2^N.

Pin no.	Pin Name	I|O	Description
1	VCC		3.3v power supply
2	GND		ground
3	SCL	i/p	two wire serial interface clock
4	S_data	Bi-dir	Two wire serial interface data
5	VSYNC	o/p	Active high : frame valid
6	HREE	o/p	Active high : line data valid
7	PCLK	o/p	Pixel clk from sensor
8	XCLK	i/p	Master clk into sensor
9 to 16	D_out	o/p	Pixel data output(MSB to LSB)
17	PDWN	i/p	Power down

V. FUTURE SCOPE

This project finds application in domestic agricultural field. This can be used to ensure faithful irrigation of farm field

A. One such application is to protect the field from entering of wild animals and unknown persons by making use of fencing.

B. By considering IP address for webserver wide range of connectivity over the world can be obtained.

VI. CONCLUSION

To fulfill the faithful irrigation of farm field this project is effective one, by this project we come to known awareness against,

A. High temperature,

B. Moisture level,

C. Sensing water table,

D. Total field security & protection.

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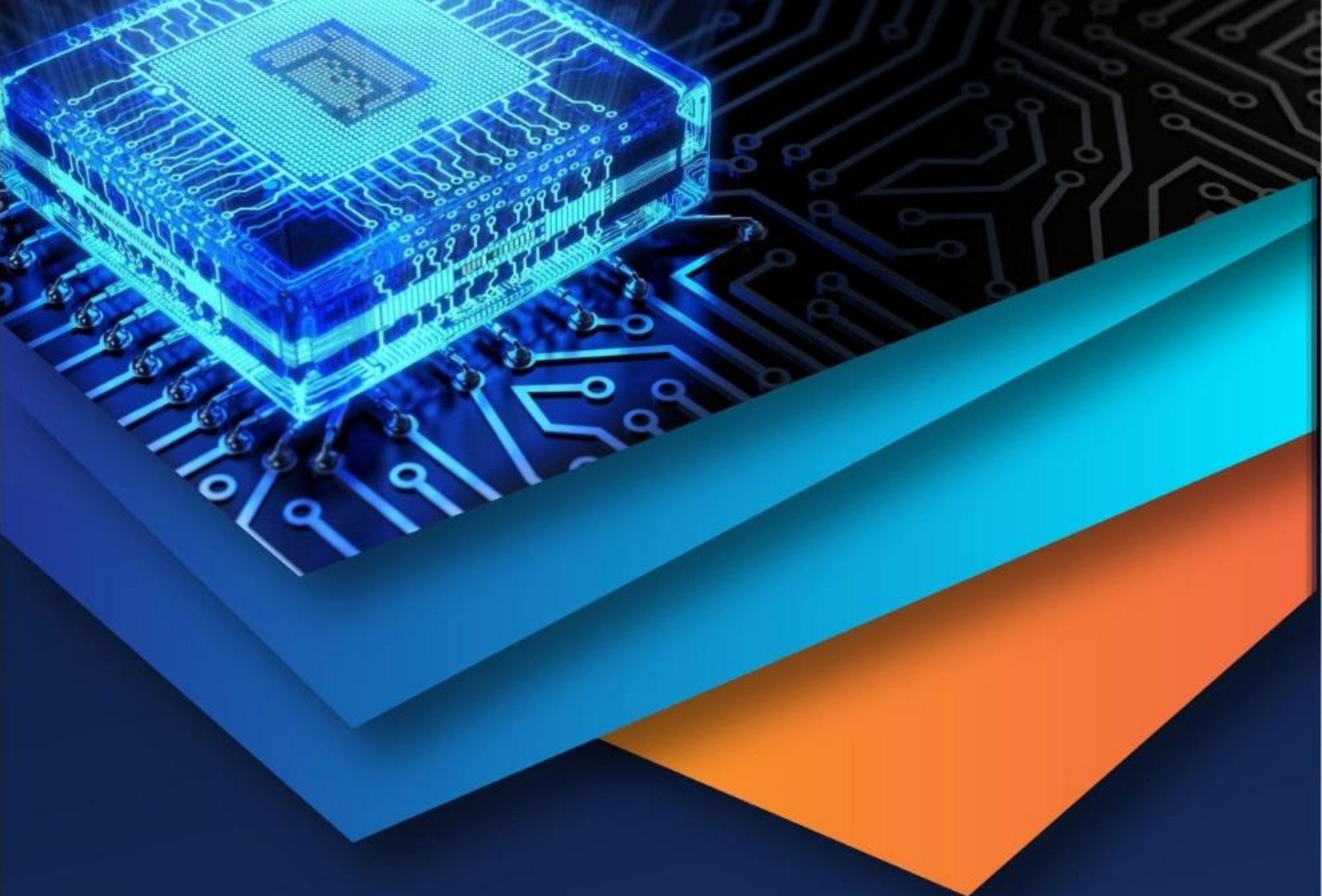

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45.98

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TOGETHER WE REACH THE GOAL

IMPACT FACTOR: 7.429

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