Garner Detector and Smart Irrigation System

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ABSTRACT

Garner Detector and Smart irrigation system refers a technique to find the type of garner which can cultivate in the soil and smart control to turn ON/OFF the motor. It is a gadget which is very supportive to agriculturists in agronomy. Nitrogen, phosphorus, potassium, magnesium content in the soil will be determined based on pH value of soil. MSP430 microcontroller, pH sensor LMP 91200, Damp sensor HDC1000EVM, Temperature sensor LM35, GSM module, and LCD are used.

Keywords : LCD, MSP430, GSM, HDC1000EVM, LMP 91200, LM35, GDP, pH, 10.RS232, MSP

I. INTRODUCTION

The concept of smearing automation on agronomy is very new. The agricultural industry is very much sheathing when compare to all other industries because the sort of job involved in agriculture cannot be predicted and many monotonous tasks are not exactly the same at every time. In most cases lots of factors have to be considered (i.e. atmosphere condition, land status, etc.) before the commencement of the task. The prototype – "GARNER DETECTOR AND SMART IRRIGATION SYSTEM" an autonomous agricultural gadget for determining pH levels, minerals and type of garner grow in soil entirely powered by power circuit. In chapter 1,2 the benefits and need of the gadget is demonstrated. Chapter 3 deals with how soil and the pH values are related and what is the need of pH in growth of crop. In chapter 4 the components used in this gadget is illustrated. In chapter 5,6 block diagram and method of implementation is defined. In chapter 7 combining of hardware and software and testing. In conclusion and output of the entire process is defined.

II. METHODS AND MATERIAL

1. Serviceable

At present scenario even though the agriculture is a mainstay of our country, but the GDP (Gross domestic product (GDP)) is the market value of all officially recognized final goods and services produced within a country in a year, or over a given period of time. It is often used as an indicator of a country's material standard of living is becoming devastated. Figure 1 shows the current GDP is 4.8; it is decreased 50% of the value of GDP in 200. If this stage continues after a decade there will be no standard for a crop. The major reason for this status is trailing of data's. To overcome such defect gadget will collect all the nutrients in the soil and be beneficial to for medley of the superior reap kind and also to store the data of the particular regions and send the status of the rural locations to the database in ministry of agriculture, agriculturists, and students.
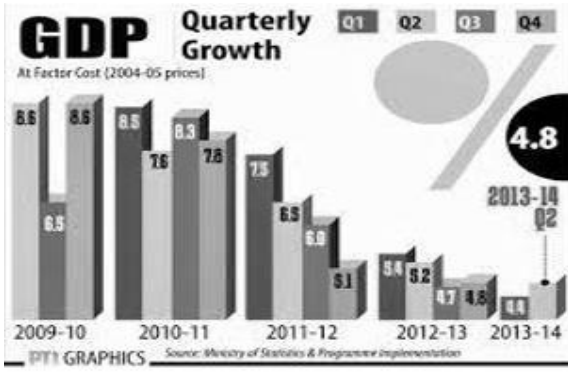
Figure 1. Gross domestic product

Figure 1 clearly states the GDP (Gross Domestic Product) of our country in the year of 2013 -2014 it's around 8.3 but past three years its decrease to 4.4 and below one of the major reason is losing of data's hence in order to overcome and information of that crop this gadget is required.

2. Revolution by A Gadget

The proposed system is a spark which fires the holy candle of our nation. In the event of perceiving the perfect crop at a Perfect time gives an acceptable yield and the backbone of our country gets strengthen. Nation's economy will leads one of a major role this is very helpful to the future employees who involved in agriculture for easy way for their yield. This is one of the unintended ways to stop the ruin of agronomy.

3. Factor's To Be Considered

The main objective is pH value of a soil. It is probably the single most informative measurement that can be made to determine soil characteristics. At a single glance, pH tells much more about assoil than merely indicating whether it is acidic or basic. For example, availability of essential nutrients and toxicity of other elements can be estimated because of their known relationship with pH.

3.1 Formulae to Calculate pH

Formula to calculate pH value from any solution or the compound depends upon the movement of hydrogen ions in that particular material.
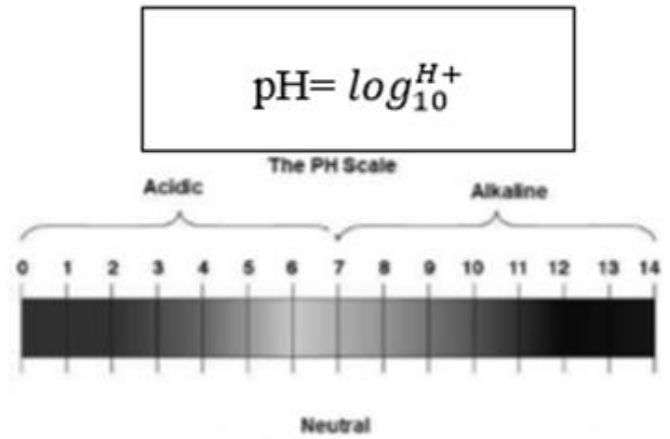

Figure 3.1. pH Meter

Table 3.1 refers the classification of the solutions according to their acid and alkaline property. This classification help in separation of minerals and sand according to crop growth and also in which the soil enrich. In above table the strong acids are from 3.0 to 5.5 and neutral acid are in the range of 7. The crop grows maximum at the pH range of 4.5 to 7.5.

Table 3.1. Classification of the solution

DENOMINATION	pH range
Ultra acid	<3.5
Extreme acid	3.5-4.4
Very strong acid	4.5-5.0
Strong acid	5.1-5.5
Moderate acid	5.6-6.0
Slight acid	6.1-6.5
Neutral	6.6-7.3
Slightly alkaline	7.4-7.8
Moderately alkaline	7.9-8.4
Strongly alkaline	8.5-9.0
Very strong alkaline	>9.0

Table 3.2 refers the classification of crops according to the pH values. pH value is an interlink between the minerals and soil in the region of southern India the pH values will be in the range of 5.0 to 6.5 where the paddy kind crop growth is maximum whereas in north India it reach 4.5 around where wheat plays a lead role.

The pH values will be determined by taking samples from different part of the soils and mix along with the distilled water and a pH electrode is placed in the solution from the solution the output will be in the form of mV.

The small voltage may or may not amplify according to the device or controller device used.

Table 3.2. Classification of Crops

pH VALUE	CROPS
4.5-5.0	Azalea ,bilberry ,blueberry ,cranberry, heather, orchid, pin oak
5.1-5.5	Ferns , iris ,orchids , parsley ,conifers , maize , millet , rye , oat , radish , potato , sweet potato, pine apple
5.6-6.0	Aster , carrot , cucurbit ales , bean , crimson clover ,peanut , soya bean , rice , petunia , rhubarb ,violet
6.1-6.5	Cabbage , cauliflower , turnip ,cucumber , pumpkin , squash ,pea , strawberry , tomato , sweet corn
6.6-7.0	Beetroot ,spinach , onion ,water melon

These are the minerals important in the growth of crops hence this is the classification of minerals strength according to their pH values. And the table given below refers.

pH	K	P,B	N,S	Cu ,Zn	Ca , Mg ,Mo, M	Fe , Mn
3	L	M	L	H	M	H
4	M	M	M	H	M	H
5	M	M	H	H	M	M
6	H	H	M	H	>M	L
7	M	M	M	L	H	L
8	M	M	M	M	VH	VL

L=LOW
H=HIGH
VH=VERY HIGH
M=MEDIUM

Table 3.3. Minerals calculation according to Ph

3.2 Effect of Temperature on Crop Production

A Distribution of Plants: The most influential factors in the climate are temperature and moisture. Plants can grow only within certain limit of temperature. For each species and variety there are not only optimal temperature limits, but also optimal temperatures for different growth stages and functions, as well as lower and upper lethal limits.

Temperature determines which species can survive in a particular region. The dependence of the crop according to their temperature in shown in the table 3.3.

Cardinal temperature of different crop's seed germination :

Crop's Seed	Temperature (OC)		
	Minimum	Optimum	Maximum
Rice	11	32	41
Maize	9	33	42
Wheat	4	25	32
Soybean	9	30	41
Barley	4	22	36

**Table 3.4.** Cardial temperature of different crop's seed germination

4. Components Required

✓ MSP430 CONTROLLER
✓ LCD DISPLAY
✓ pH SENSOR
✓ TEMPERATURE SENSOR
✓ HUMIDITY SENSOR

- ✓ SOLAR PANEL
- ✓ MPPT CHARGE CONTROLLER
- ✓ 8 GPS
- ✓ GSM
- ✓ 10.RS232

5. Block Diagram and Block Illustration

Fig (6.1) shows the circuit diagram for the sensors and power supply unit. The sensor unit collect all the information about the sensor we use and report to the farmer which help him/her to know the knowledge about type of garner he/she can cultivate.
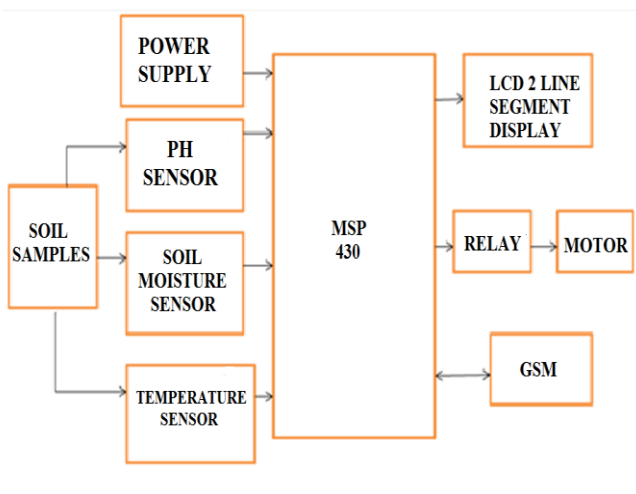
5.1.1 Sensor Unit

The sensor unit contains pH sensorLMP91200to detect the soil pH values, temperature and humidity sensors to detect the climatic stipulation. The ph sensors are need to calibrated manually and into the usage.

The temperature (fig6.2) and dampness sensors used in this gadget are LM35 used for faultless sensing. Amplifier using op amp (OPA333) is need for boosting a weak signal and feed the signal into the commanding unit. The pH values are shown in the figure 6.2.
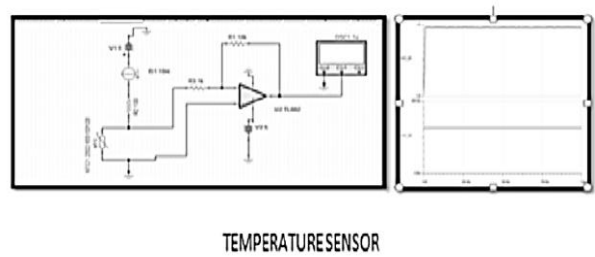
TEMPERATURE SENSOR

Figure 6.2. Displaying Ph value

III. RESULTS AND DISCUSSION

Control Block

The total gadget is control by controller MSP430. MSP low-power microcontrollers (MCUs) from Texas Instruments (TI) are RISC-based, mixed-signal processors that include smart analog and digital peripherals and offer a number of additional options such as low power embedded RF and security such as AES encryption.

(fig 6.3) MSP microcontrollers offer the ultimate solution for a wide range of low-power and portable applications. TI provides robust design support for MSP MCUs including technical documents, training, tools, and software. In these along with the MSP430 is used to interface.
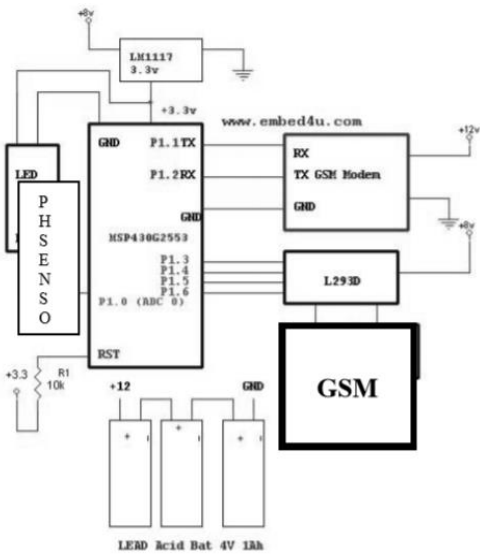

Figure 6.3. Control Block

IV. CONCLUSION

This results a new development of automation in the agriculture field. It is a farmer friendly device. It plays major role in the development of nation's economy. And it creates a benefit data's to the future agriculturists about the present crops. It prevents the destruction of garners.

V. REFERENCES

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