AUTONOMUS LAND SURVEYING AND SEED SOWING VEHICLE

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ABSTRACT

This research model is basically designed as purpose for help in the agricultural field. In this research paper we are focusing on a practical model that can survey the field as required and also sow seed in a well-defined manner autonomously. We are using microcontroller AT2560 embedded with different sensors like moisture sensor, IR proximity sensor, metal sensor, DTMF module and dispenser mechanism to sow the seeds in well-defined manner. So here by this help of this technology we can improve the efficiency and save the time of formers .By the help of this model we can manage security of the field to protect it for the animals, fire and other climates.

Keywords At2560, Dtmf Module Ir Proximity, Dispenser Mechanism, Gsm Module Metal Sensor

I. INTRODUCTION

In the present days the agricultural economies plays vital role to growth any country and we all are known India is a country that 60% economy based on the agricultural output. But it is important to take technical aspect for improving efficiency and uses of any system. Here we are generally focused at land serving in farms and moisture level that is detection of salt values and seeding techniques (It is a Process by Which We Grow Plants From Land).Here we introduced different types of seeding .Seed Sowing ,Types, Merits ,Demerits: There are Like 6 major Methods By which We Sow seeds:

1.1 Broad Casting

In This Method We Scatter Seeds on The Ground On Already Prepared Ground. The seeds that we use to sow By This Method are: wheat, paddy, Sesame, methi, coriander, etc. This Method is Cheap but It Lost Uniformity of seeds On Ground.

1.2 Drilling or Line Sowing

We Drill/sow Our Seeds with The Help of Mechanical Driller so That There is contact Between Soil and Seeds. The Land Must be Ready by Covering of Wooden Plank or Harrow.in this method Sowing is done in proper Moisture Level but Uniformity of See in Queue is Lost.

1.3 Dibbling

In Dibbling We place a "Cross" Marks at Point Where Seed Have to sow, we use Dibbler [8]To sow seeds. Spacing between rows & plants is maintained But It is Time Consuming Method.

1.4 Transplanting

We Use Already Grown Seeds from Field and Sow in Field. This Method is used for paddy, fruit, vegetable, crops, tobacco, etc. [8]

1.5 Planting

In This Method we use Part of Plant and sow it Ground. Used for: Potato, Ginger etc.

1.6 Putting Seeds Behind the Plough

We Put Seed after Ploughing the Field. This Method is not Used Fequently.

1.7 Land Survey: Salt Detection

The main task of remote sensing is to retrieve soil salt components (SSCs) which includes

1. Image-interpretation via remote-sensing image techniques of treatment data to delineate and mark saltcontaining area.
2. Spectral-index methods, in this spectral feature analysis is applied using continuum-removal spectralfeature-fitting approach to mark soil salinization. Other method used partial least regression and artificial neural network to compute SSC from the reflectance data.

Using these approaches, we can detect change in current in salt-affected soil with remote sensing and it can be summarized as follows: 1) Change in the reflectance spectra of soil may be caused by the amount and mineralogy of salts, color and moisture when compared to others; 2) Maximum errors is detected remotely sensed data in SSC are due to hygroscopic water in salt minerals; 3) spectra response patterns of saline soil are dependent on the amount and mineralogy of salt quantity in soil. Therefore rate of retrieval of SSC requires knowledge on types of soil.

2. TECHNOLOGY IMPLEMENTED

2.1. Dispensor Mechanism

To show the seed in well-defined manner we use a type of dispenser mechanism made by gears and metallic box this mechanism attached with the system in both direction with the metallic or wooden rod .Here by the help of dispenser mechanism bot can show the seed after detecting the moisture level (moisture level sensor can be attached below both the mechanism.

2.1.1 Construction

The mechanism contains a number teeth gear in the circular hollow box shown in the figure .and above it a conical container is attached to hold the number of seeds. In the teeth of the gear a mechanism is in built for the purpose that to adjust the gap between two teeth according to the dimension of particular seeds. Ex. If wants to sow the wheat then user enters the area of field and name of seed like wheat then the bot execute the value of no. Of seed ,and adjust the teeth gape according to the universal dimension of teeth for that only one seed can adjusted in between the consecutive teeth.

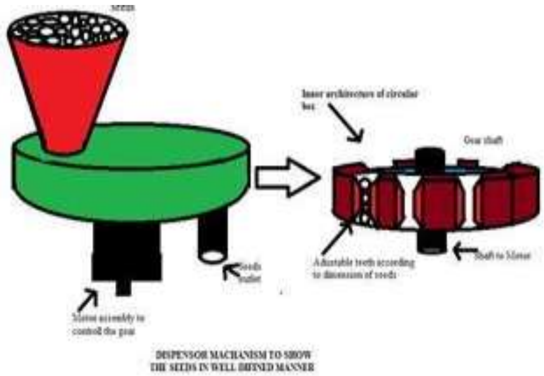


Fig. 1. Dispenser Mechanism

2.1.2 Working of Dispenser Mechanism

When user enters input in the bot by the help of keyboard like area of field, name of seed etc. Then microcontroller execute the information and fetch the value of some parameters like number of seeds distance between to seeds that can be sow particular distance etc. Then microcontroller sends the information to the dispenser mechanism and in this the mechanism it automatically adjust teeth according to the dimension of seeds .when moisture sensor detect the moisture level and stops the bot then motor of dispenser mechanism starts the rotation of gear and the seeds contained in the container fall between the teeth's and according to no. Of seeds that can be required the rotation of gear will be adjusted.

2.2. Sharp ir Sensor

Here we are using this sensor to avoid obstacles. Sharp IR range sensors consists of IR LED and linear CCD array, both encapsulated in the housing with precision lens assembly mounted in front of them. IR LED with the help of the leans transmits a narrow IR beam. When light hits the obstacle and reflects back to the linear CCD array, depending on the distance from the obstacle, angle of the reflected light varies. This angle is measured using the CCD array to estimate distance from the obstacle. It gives same response to different colored objects as measured distance is function of the angle of reflection and not on the reflected light intensity.

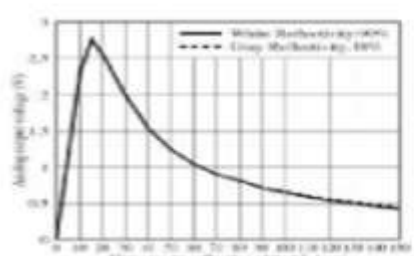


Fig. 2. Sharp IR Sensor **Fig. 3. Graph Between Distance V/S Output Gain**

When the Distance given by sensor is less than the threshold value then module gives high output to the microcontroller and it take further decision .the Distance measurement method and distance vs output graph is shown below.

2.3 Soil Moisture Sensor

Soil Moisture sensor is a sensor which is used to find the moisture content in the soil. This might be for the agricultural purpose as before plantation it is important to know the moisture content in the soil, horticultural and also it can be used in the bottle biology.

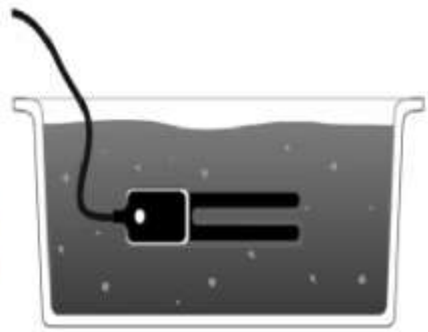


Fig. 4. Soil Moisture Sensor **Fig. 5. Working of Soil Moisture Sensor**

How it works: it actually measures the capacitances of the soil. And, what happens is that the moisture content of the soil changes the capacitances. And so, it's actually measuring the dielectric permittivity of the soil, and it is proportional to how much moisture there is i.e. moisture content in the soil. And the reading on the sensor is actually the reading in the volumetric water content of the soil. And it reads from 0 to 45 percent.

Now, the question arises how there is a moisture in the soil? For that firstly we must know "what is soil?" Soil is made up by minerals, some organic components and there are also some spaces and these spaces are called "pore spaces". It is not a solid piece, it is something like empty space and moisture is been added to these spaces and these spaces get filled. So we can't have the soil with 100% water as it is not possible. That's why we read from 0 to 45%.

To use the sensor we need to place it into the soil and we use it by putting it in horizontally because that way we get a better reading as shown in the figure.

Soil Moisture Sensor (SMS-BTA) , Specifications i.e

i Range: 0 to 45% volumetric water content in soil (capable of 0 to 100% VWC with alternate calibration)

ii Accuracy: ±4% typical

iii Resolution: 0.1%

iv Power: 3 mA @ 5VDC

v Operating temperature: –40°C to +60°C

Dimensions: 8.9 cm × 1.8 cm × 0.7cm (active sensor length 5 cm)

2.4. Salt Detection : Using Remote Detection

The main task of remote sensing is to retrieve soil salt components (SSCs) which includes

2.4.1. Reflectance Measurement

Analyzer spectral diameter, with a spectral range of 350-2500 nm and spectral sampling of 1.4nm in range 350 and 1050 nm, and 2nm in range 1000 and 2500nm, will be used to record the reflectance spectra.

2.4.2. Bidirectional Reflectance Model and Parameters

Hapke's model will be used to simulate soil surface reflectance and compare the size of plane surface at z=0 with the wavelength. The r (bidirectional reflectance) of a surface will be illuminated with a light zenith angle i when it will be viewed form zenith angle and normalized with respect to the reflectance of a perfectly reflecting Lambertian surface under the same condition of illumination.

2.4.3 Model INVERSION

In a normal approach for model inversion, the optimal set of variables that can minimize the distance between observation and the modeled can be calculated numerically using RMSC .The required model parameter will be fitted accordingly based on the least RMSC for each type of saline based on dry or wet condition. The continuous numerical approach will be used for calculating the best fit parameters that require initial parameter values. Use inversion method for each of the wavelengths. Generally phase function and roughness parameters vary with the wavelength .But, many researchers considered all the parameters in the Hapke model.

2.4.4. Regression Model and Model Performance

After retrieving SSA from the Hapke model inversion, correlation analysis will be performed between SSA and SSC, where the best wavelength will be determined through R^2 screening. For a given identified wavelength, a linear regression model can be set up between SSA and SSC using the formula

2.4.5. SSC= a + b.SSAλ

Where λ is the specified sensitive band, with the best performance of SSC and SSA correlations; SSAλ is the value of SSA at λ wavelength; and a and b are its coefficients of this model. For any specified wavelength SSC can be calculated using above equation

III. PROPOSED ARCHITECTURE

Device consists of some sensor module, mechanical structure like dispenser mechanism, fertilizer outlet etc. and some electronics circuitry to help perform task by the device. This device may be operated by 12 volt battery that can be rechargeable by solar plate or auxiliary power .The sensor used here Sharp IR range sensor (GP2D12) range of 150cm to 20cm and spot blind 20cm to 0cm to detect the obstacle in the path of bot when the sensor sense the obstacles then bot start turning left or right direction ,moisture detection sensor used here to detect the moisture level of the field at a particular distance .As discussed earlier the vehicle is autonomous then the DTMF here is used for some few tasks such as initiating the device.

Fig.6 Hardware of the Device

IV. WORKING, BLOCK DIAGRAM AND FLOW PROCESS

As discussed the device id autonomous so approx. functioning is fully autonomous but some is manually controlled by DTMF. To device work the step by step working is describe below

Step I. The device is firstly placed in the field and by farmer in a corner of the field and then enters the name of seedand area of field then the device fetch the amount of seed and fertilizer and distance(a) between the two seeds and display the values on the LCD display. It will initiated by the help of switch present in the device .After that it farmer give command to perform further task by the help of DTMF by pressing key “1”.

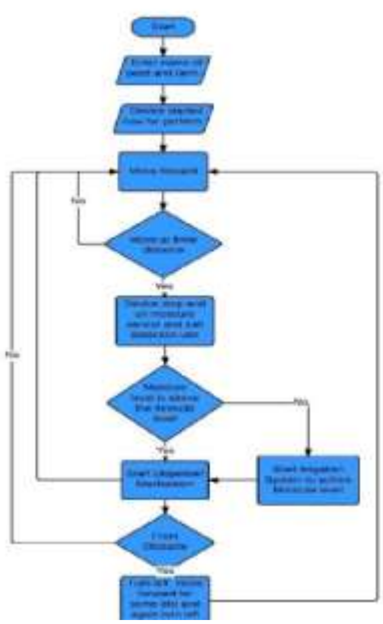
Step II. When device is initiated then its start moving in forward direction .when it achieve distance equal to thedistance (a) then it automatically start the sensing of moisture level when the moisture level of the soil at this particular distance is more than the threshold value then it starts the Dispenser mechanism automatically to sow the seeds in definite amount and also drop the amount of fertilizer in definite amount**.**

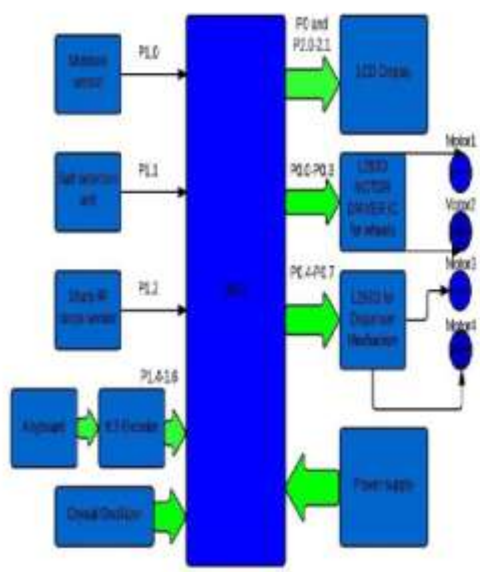
Step III. If the moisture level is less than the threshold level then it automatically starts the irrigation system toachieve the threshold level .when the sowing of the seeds is completed at this particular point then it achieve this goal again and again.

Step IV. If at the front of the bot a wall is present (sense by Sharp IR sensor) then it automatically knows that fieldis end and then it take left or right turn and move some distance and again it starts left or right turn resp. And perform task again.

Step V. When the bot is perform the whole task then a long buzzer is wept and device stop working automaticallyand by the help 0of DTMF farmer stop the device and adjust it at the required place.

Now the Flow Process of the device is as shown in Fig.7. i.e. Also the Block Diagram of the device is shown in the Fig. 8. i.e





7. Flow Process of Device Fig. 8. Block Diagram of Device

V. SPACING BETWEEN ROWS AND PLANTS

Distance Between Seeds Basically Depends on Type of seed and the type of method we use Corps: While sowing corps We use Thumb rule i.e. " A general rule of thumb to calculate the space required between different crops is to add the recommended row spacing for each crop together and divide the total by 2." Thumb Rule is Efficient Way to do spacing. Another is Tool Lengths for sowing i.e. these are some standard distance between most common corps: Third is Drilling: While using drilling methods: For Seed like wheat , rain fed wheat crop is sown at 30 cm distance and irrigated wheat crop is sown at 22.5cm distance between two rows. Depth of hole for Seed sowing: Planting Seeds on Right Depth Worth in Plant Production.

A It is found that, if We Plant Seeds 1.5 times of their Size, It will Be Healthy Cropping

B In Certain Condition, Ex: After Rain, Soil Get Moisture. We put Seed 2 or 2.5 times Depth than Seed Size.

C In Summer Days, Ideal Depth to Sow seed 1.5 or 2 Times than its Size found to be good.

In More Dryer plant 2-2.5

Seeds	Along The Row[Cm]	Between The Row[Cm]
1.Potato	30 cm	45 cm
2.Onion	15 cm	30 cm
3.Radish and Baby carrots , Baby leaves	10 cm	15 cm
4.pumpkin and courgette, climbing beans	90 – 120 cm	90 – 120 cm

Name seedsof	Amount of seeds per unit			Potas(K
Wheat	10	10	5	3
Maiza	2	9	4	-
Masoor	2	10	5	-
Sarso	1	8	3	2
Arhar	1	8	3	1
Urad	1	7	4	1.5

Fig. 9 Tables Specifying Layout for Productivity

5.1. Fertilizer Application

Getting Good Production of We Need To Use Fertilizers on Time and In Proportion.Type of Fertilizers that are generally applied in 3 Basic Variables:

1 Nature of Fertilizers

2 Soil type

3 Nutrient Requirements of Soil.

5.2. Methods

1 Broadcasting: We generally spread Fertilizers Uniformly on The Sowing Area.

There are 2 Types of Broadcasting Done i.e Firstly Broadcasting at planting: We Generally Use This Method While Sowing/Planting plants. We Put Fertilizers in Uniform ratio and secondly, Top dressing: Used for Standing Corps: We generally use These Fertilizers: Sodium Nitrate, Amm. Nitrate and urea.

VI. CONCLUSION

The core purpose of this device was to enhance a technique via which the efficient output can be produced with an implantation of Modern Technology which is mushrooming everywhere. It also discusses the basic methodology which must be utilized during Farming with amount of seeds required for better productivity. Also the research deals with the working phenomenon of AT2560 Microcontroller which is the key holder of the device and can be modified as per the atmosphere.

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