# Robotic Groundnut Sower

Project Guide
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***Abstract*** - Robotics and automation does play a significant role in today's world meeting future agricultural production needs. In the recent few years, a similar trend has begun to take place in agriculture, for example GPS- and vision-based monitoring and self-guided tractors and harvesters already being available commercially in markets. Most recently, farmers have already started to experiment with autonomous systems which automate operations such as thinning, and harvesting, pruning as well as mowing, spraying, and weed removal. This would be just the beginning of what a revolution will be in the way that agriculture is growing, tendering, and getting harvested.
Our device would include android based application which would operate movement of device through Bluetooth module and operate excavating pistons which would dig hole and seeds would automatically fall into excavated hole.

**Keywords:** automation, microcontroller, harvester, seeding

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## I. INTRODUCTION

Agriculture in India is the means of livelihood of almost two third of the peoples in the country. It has always been India's most important and prioritized economic sector. Agriculture can be defined as an integrated system of techniques which would be used to control the growth and harvesting of animal and vegetables. It has a noticeable stakes in India's Gross Domestic Product as most activities are agriculture based.
The agricultural sector has critical importance in any developing countries economy and so it is in India, where it contributes almost 20% of GDP. Here 60% of the population income depends on agriculture, either directly or indirectly. Small-scale producers of agriculture products, who make up the major portion of Indian farmers, are often are not able to gain information which would increase yield of crops and lead to better prices for their crops. The major growth of mobile telephony and the recent introduction of mobile enabled application information services provide a means to overcome conventional information and facilitate timely information exposure. It also helps for bridging the gap between the availability and delivery of agriculture inputs and infrastructure.
The wide increasing piercing of mobile networks and Smartphone mobile phones in India therefore present an opportunity to make useful information more widely available. This would help agricultural markets operate

Even more efficiently and also overcome some of the other challenges faced by this sector.
The main objective for such project is to develop a device which would be integration of mobile phone based application and robotics that helps to agricultural yield improvement and helps in catering to the farmers' needs.
Android, the open-source mobile operating system developed by Google, is quickly becoming the smart phone of choice for activists. Latest and Popular Android's open-source nature has encouraged a large number of developers and enthusiasts to use the open source code as a foundation for community-driven projects, which helps to add new features for advanced users or also bring Android to devices which were officially released running other operating systems than android.
Android had a worldwide Smartphone market share of 85% during the third quarter of 2014, with over a billion devices activated in total and 1.3 million activations per day.

## II. METHODOLOGY

The microcontroller will be interfaced with the sensors and Bluetooth module. The sensors would measure the different parameters, since we need all values in digital domain these sensors are followed by signal conditioning which is already present in microcontroller. The parameters are then processed by the microcontroller and the mode of controlling action is decided through the algorithm in the microcontroller. The Block diagram as given in fig2.1 illustrates the same.

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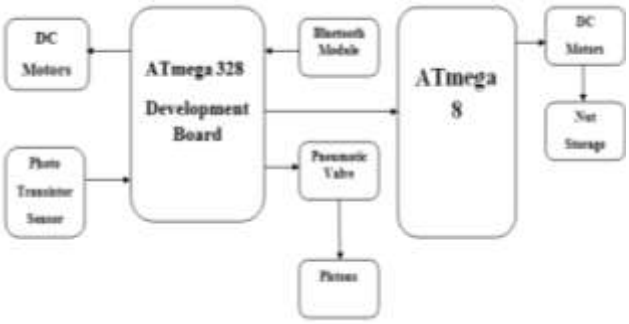


**Fig.: Schematic Block Diagram**

**A) Photo Transistor:** The silicon photo transistor sensors respond to the entire visible radiation range as well as to infrared. In fact, all diodes, transistors, Darlington's, etc. have the same basic radiation frequency response. This response peaks in the infrared range. However, note that response is broad and virtually any light source will work. since we would not be observing the sunlight we have chosen phototransistor, as we are using it to detect light illuminated from white portion as its response is relatively better. The detected analog signal that is the incident light into electric response would be converted using Atmega 328. We would be using pair of phototransistors and LED to detect left and right hand sides of white strip.

Fig.:

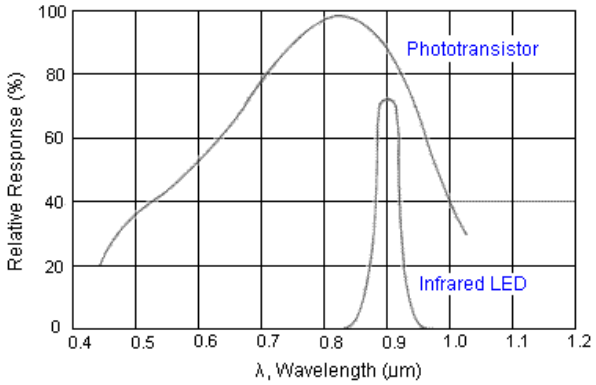


**Fig: Response of phototransistor and Infrared LED**

**B) DC Motors:** A DC motor in simple words it is a device that converts direct current (i.e. electrical energy) into mechanical energy. Here we are using 2 pairs of four DC motors. Out of which four motors would be attached to wheels and it would be used to drive the device.

Other four motors would be mounted at top to manage the flow of seeds into excavated holes.

**C) Bluetooth Module:**

Here we are using HC-05 Bluetooth module which would be paired to android operating system based mobile phone

And it will receive commands from mobile application

And accordingly microcontroller would operate and control the movement of dc motors and pistons.

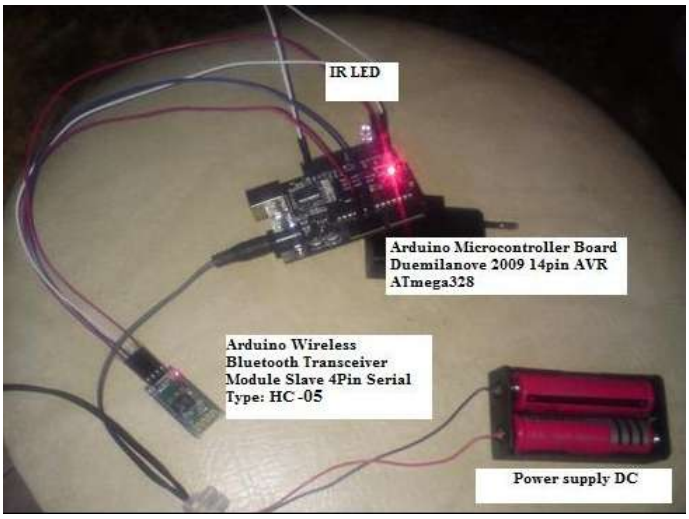


**Fig.: Bluetooth Module interface with ATmega 328 development board**

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR manufactured Blue core External single chip Bluetooth system with the use of CMOS technology and with Adaptive Frequency Hopping (AFH) Feature. It has the miniaturized footprint which makes it simple for implementation and it will simplify overall design and also development cycle required for it.

**D) Microcontroller:**

Here we are using ATmega 328 and ATmega 8 microcontrollers. The program memory of ATmega 328 is 32K Words while it is 8K words in ATmega 8. RAM memory is 2K bytes and 512 bytes respectively. Both has three kinds of timers, Analog Digital converter, Universal communication port and so on. Also The microcontroller's runs at 20 and 16 MHz clock respectively using an external resonator connected between OSC1 and OSC2 pins. The timing information will be used to calculate the width of the received data pulse from the sensor so that we could identify if it is carrying a 1 or 0.

The ATmega 328 would be used for controlling the DC motors and Pneumatic Valve also it would collect signals from Bluetooth transceiver and signals from Phototransistor pair. The ATmega 8would be controlling the DC Motors which are used to control the flow of seeds into excavated holes.

**E) Pneumatic Valve:** A Pneumatic which is used converts energy (mostly in the form of compressed air) to the mechanical motion. This motion can be rotary or linear, depending on the type of actuator used.

Here we are using 3/2 pneumatic valve which will feed compressed air to pistons.

**F) Pistons:** It is the part of pneumatic cylinder which is contained by cylinder and is made gas –tight. Its purpose is to transfer force from expanding gas in cylinder to connecting rod.

Here we have made digging tool which is situated at the tip of piston rod and as force through compressed air is given the rod

will expand and digging tool would excavate hole into soil. And later seeds would fall into those holes.

**E) Others:** Seed Storage: It is trapezoidal shaped metal structure which would be used for storage of seeds.
Also it will have attachment of DC motors to control the amount of seeds for a excavated hole.

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## III. RESULT

Machine sensors and Bluetooth control systems to regulate what happens during field operations. It is quite difficult to implement but on field it achieve the desired levels of accuracy. Also it achieves Zero compaction is the ability to carry out field operations without compacting soil, thus negating the requirement for more energy to reinstate soil structure.

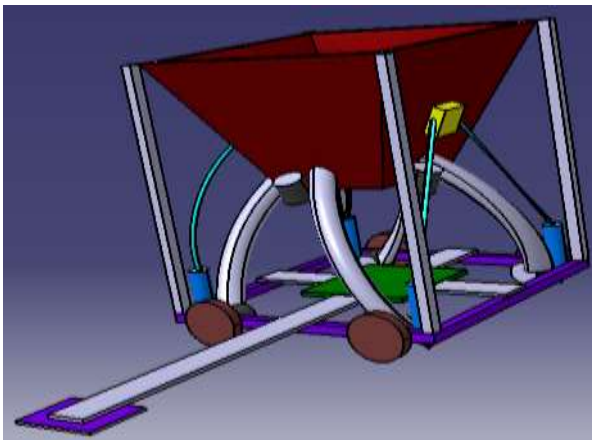

**Fig: Model designed in CATIA**

It is an autonomous machine which is able to carry out a range of well defined field operations, such as seeding.

If implemented, this system would improve the way agriculture is done all over the world by helping the farmer to save money, time and energy, by doing some of the tasks the farmer usually does or for which he needs workers.

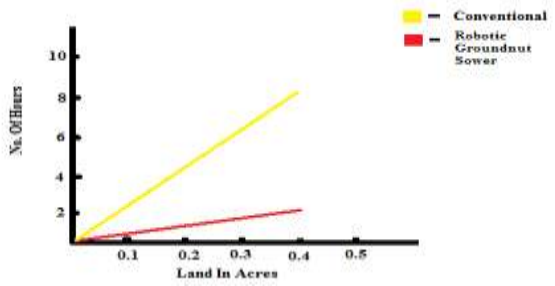


**Fig. Comparison of device with conventional farming technique**

In conventional farming method the seeds are buried in a matrix form, it becomes difficult and increases manpower.
Also as shown in above Fig. our study proves that it would reduce time required to perform seeding operation with comparing it to the conventional farming method. This system will sow seeds in farm in an accurate manner and the famer's mobile will be used to monitor the movements of device.

## IV. DISCUSSION

Based upon the various aspects and observations regarding the whole process of automation the following advantages and disadvantages are listed out.

**Advantages:**

1. Easy to operate as now-a-days more and more peoples are getting familiar with Smartphone and Smartphone based applications hence they are easy to understand.
2. Less manpower will be required, as we are using all in one device hence the required man force will be very less even a single guy can operate and carry out the operations of seeding.

**Disadvantages:**

Initial cost of the device is high and also we need to have air compressor in order to perform continuous operations.

## V. CONCLUSION

Agricultural automation is a continuous development. Today's research technologies gives access to the possibility of developing a completely new mechanism system to support the agriculture system based on small and smart machines. This above mentioned system replaces conventional farming methods with intelligently accessed inputs thus reducing the cost of the inputs while increasing the level of care of crops. This would improve the crop production as well as having minimum environmental impact.

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