

# A Survey on Autonomous Farming Robot

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**ABSTRACT:** Many advances in technology have made the agriculture business a much less labor intensive industry. Farmers are looking for new ways to implement technology to cut costs and reduce labor hours. One of the ways that farmers are beginning to explore new technologies in farming come from the autonomous tractor. The Dual Tone Multi-Frequency (DTMF) based robot is something that is very new to the agriculture industry, but is quickly gaining popularity from agriculture research companies around the world. When the DTMF based robot is moving on a surface, it is controlled by a DTMF remote. This can be moved forward and reverse direction using DC geared motor. Also this robot can take sharp turnings towards left and right directions. This project uses AT89S52 Micro-controller unit .A temperature sensor is also interfaced to detect the abnormal temperature and also to give a buzzer alert. A moisture sensor is connected to identify the soil condition so that the water can be sprinkled accordingly.

**KEYWORDS:** Robot, Farming Robot, Advances in farming

## I. INTRODUCTION

The autonomous farming robot is something that is very new to the agriculture industry, but is quickly gaining popularity from agriculture research. These autonomous tractors are rapidly becoming more of a reality than an idea [1]. When the tractor is moving on a surface, it is controlled by a Dual Tone Multi Frequency (DTMF) decoder. This can be moved forward and reverse direction using geared motors of 60RPM. The robot can move towards left and right directions using these geared motors. This project uses AT89S52 Microcontroller and comprises of performing ploughing and seeding via DTMF decoder commands.

This robot is also interfaced with the sensors. They are temperature and the moisture sensors. Temperature Sensor LM35 will detect the increase in temperature and buzzer will be ON. The robot has watering mechanism it will water the plants according to their needs by observing soil moisture. The moisture sensor helps the robot to sprinkle the water if the soil is dry and OFF the sprinkler if it is wet. This project uses 12V battery rechargeable through the Solar panel, thus using a renewable source of energy.

## II. RELATED WORK

DTMF is used which converts the desired frequency in to analog signals which is received by DTMF Decoder and given to AT89S52microcontroller.The microcontroller is used for controlling the robot according to the frequency received by the DTMF receiver. To control the devices from remote place we are using a DTMF technique [3]. Connect a mobile at the receiver end (Controller side which is fabricated on robot).

If we give a command from another mobile automatically it gets received by the DTMF decoder unit placed on receiver end. DTMF process that information which is received by the receiver. The movement of the robot depends on the instruction (commands) received by the receiver unit.

The H-bridge is an electronic circuit that enables a voltage to be applied across a load. It is used in robotics to run the motor forward & backward for robotic operations.

Micro-controller is a small computer on a single integrated circuit containing a processor core, memory and programmable input –output peripherals.AT89S52 which is typically 8051 microcontroller having 4 different ports ,each one having 8 input/output lines providing a total of 32 input/output lines.

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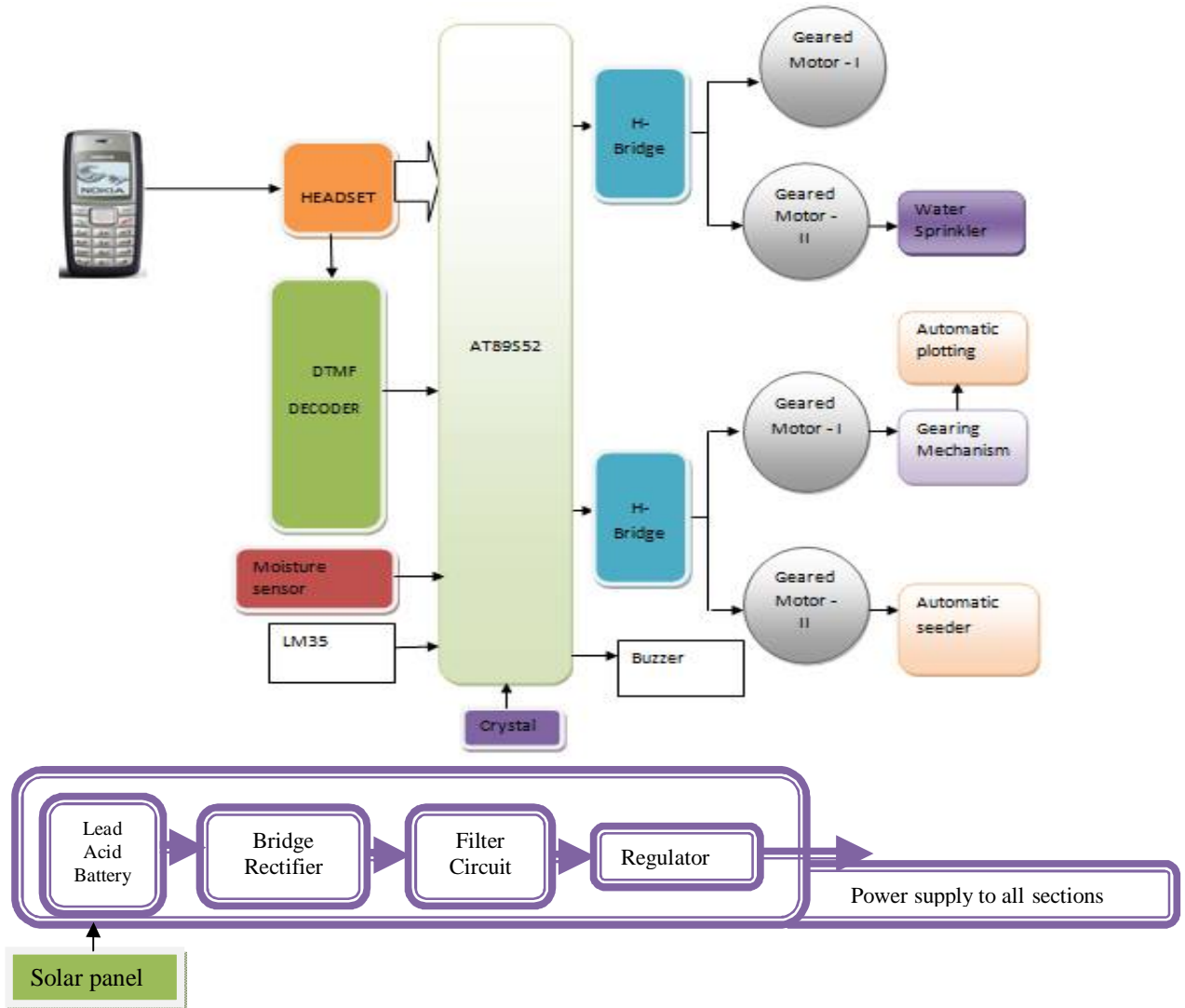


Figure 1: Block diagram

LM35 temperature sensor is arranged to detect if the temperature of agricultural land is higher [2]. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (centigrade) temperature. The output of sensor is converted to digital which is easily connected with micro controller. The soil moisture sensor is used to measure the volumetric water content of soil. This makes it ideal for performing experiments in agricultural science, horticulture botany.

It is also used to measure the loss of moisture over time due to evaporation & plant up take. The soil moisture sensor uses capacitance to measure dielectric permittivity of the surrounding medium, which is function of water content [2]-[3]. The sensor creates a voltage proportional to the dielectric and therefore the water content of the soil is easily detected.

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Sl. No	Parameter	Manual	Tractor	Farming robot
1.	Man power	More	Moderate	Less
2.	Time required	More	Less	Less
3.	Sowing technique	Manually	Manually	Automatically
4.	Seed Distance	Not Fixed	Not fixed	Fixed
5.	Wastage of seed	Moderate	More	Less
6.	Energy Required	High	Very high	Less
7.	Pollution	No	More	Less
8.	Alarm & Display	No	No	Yes
9.	Ploughing efficiency	Less	Moderate	High
10.	Wastage of water	Moderate	High	Less

Table 1: Comparison of farming robot with traditional techniques

### III. ADVANTAGES

- 1) This fully autonomous robot which works on open architecture principle and does lot of work in farms, so it reduces human labour.
- 2) It works faster than human efforts which definitely save the time.
- 3) The system observes different environmental conditions and take actions accordingly which humans can't do accurately.
- 4) The sensors and electronic drives for making this system are easily available in market and cheap which reduces the cost of system.

### IV. APPLICATIONS

- 1) It is used only for agricultural purposes: - plough the field, seeding mechanism & watering the crops.
- 2) The system observes different environmental conditions (temperature, soil moisture) & take actions accordingly which humans can't do accurately.
- 3) An autonomous robot works on open architecture principle and does lot of work in farms so it reduces human labour.
- 4) The system works very rigidly, highly effective and within short period of time period. The robotic operation can be governed by using wireless DTMF (dual tone multi frequency) technique.
- 5) The robot is capable to do the ploughing work with a reduced time interval than the time required for doing it manually [4]. The robot while operating the watering mechanism, first senses the soil condition with the help of moisture sensor, if the soil is dry watering action is initiated by the robot on the other hand if the soil is wet enough there will be no watering action.

### V. CONCLUSION

This work presents the Implementation of farmer friendly agricultural tractor with ploughing, automatic seed sowing and pesticides sprinkler arrangement using DTMF has been designed and implemented with Atmel 89S52 MCU in embedded system domain. Experimental work has been carried out carefully [5]-[6]. The result shows that higher efficiency is indeed achieved using the embedded system according to requirement of the user.

The proposed system is open architecture so any one can make this type of system using any way or path. The system uses image processing to observe the leaf color which increases further accuracy of the system as it identifies color very accurately than human [1].

The system also observes different environmental conditions such as humidity, soil moisture and temperature which human cannot measure accurately by open eyes to decide the plant health so the accuracy of the system is high[1]. It

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also involves watering mechanism and cutting process which reduces human labor and we can reduce labor further by modifying the system further for other agricultural work such as picking, harvesting and weeding.

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