# Remote Monitored Agricultural Vehicle

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**Abstract**- *In the field of agricultural research, remote sensing has many advantages .Analysis of crop canopies provided useful information on agricultural aspects. All crop monitoring and yield assessments benefit from remote sensing. Remote sensing is required in the field of agriculture research because it is particularly susceptible to soil and climate change. Monitoring of agricultural production systems follows strong seasonal trends in relation to the biological life cycle of crops .All of these variables are very variable in space time . In addition, agricultural productivity can fluctuate sharply in the short term due to unfavorable growth conditions. The agricultural system should be monitored on a regular basis. Remote sensing is a technology for collecting information from dedicated vehicles that are connected to several assignable sensors and monitored by a Wi-Fi based system .The use of solar energy makes the entire system environmentally friendly.*

***Key Words:*** NPK-Nitrogen, Phosphorus, Potassium

## 1. INTRODUCTION

The main goal of a Remote Monitored Agricultural Vehicle is to monitor a certain field/area using a specifically constructed vehicle and sensors to detect a variety of parameters including temperature, moisture, humidity, NPK, and atmospheric temperature and humidity. As it is being monitored remotely, it will be able to determine the position where the car is present using GPS, and the premises will be reviewed in real time using the vehicle's built-in camera. A few other characteristics can be considered as part of the development toward this project in terms of the types of components that are useful in obtaining a proper yield. The use of solar energy would make the entire system more environmentally friendly and more effective in all aspects. Other aspect and a very important one which can be determined by is the water management which can be useful using moderate amount and wastage can be maximized through the values determined.

## 2. Literature Survey

An examination of the numerous instruments and vehicles utilized in agricultural fields. This study intends to detect a few characteristics that have a substantial impact on crop production, such as temperature, humidity, moisture, and NPK levels. A study of specifically constructed wheels that can move on any type of surface. A survey of seed sowing machines was conducted to develop the concept of dipping sensors into the soil surface. A study of the NPK sensor (TCS 230 color sensor) for detecting NITROGEN, PHOSPHORUS, and POTASSIUM.

Ming Li, Kenji Imou, Katsuhiro Wakabayashi, Shinya Yokoyama. Review of research on agricultural vehicle autonomous guidance. Describes about how to design an agricultural vehicle and track it down through GPS and other factors useful for designing.

Akriti Jain, Abizer Saify, Vandana Kate Describes how a Color sensor Detects the NPK values, the photo diode is designed to decide the additional contents of soil.

## 3. EXISTING SYSTEM

In the existing system the agricultural vehicles are maximum manual controlled mechanical working and other types are of seed sowers, weed cutters, Combined Harvesters etc., These are useful for reducing man power and time with respect to it Drones and other heavy load machines are in existence. Wi-Fi based systems are also in existence in terms of various kinds of uses.

## 4. WORKING

### PROCESS FLOW CHART

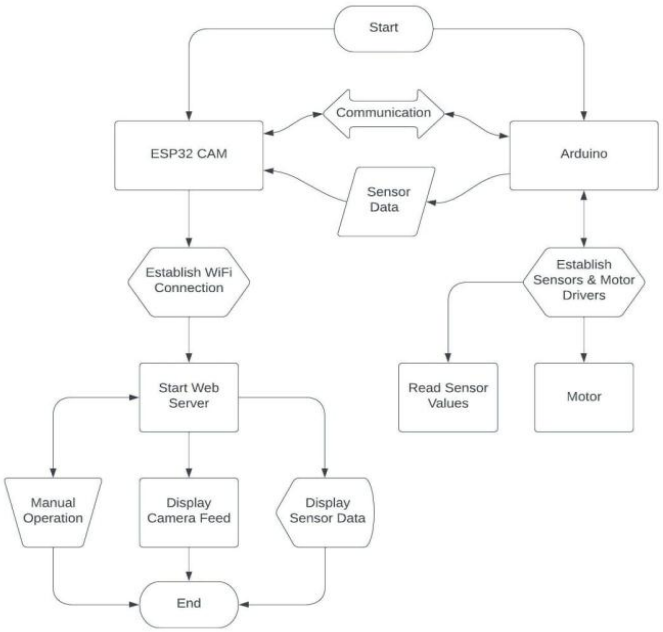


**Fig-1:** Flow Chart

The primary goal of this project is to design and to implement the Remote Monitoring system into the field of agriculture and share the values through cloud. Eventually, the Remotely Monitored Agricultural Vehicle can run in the fields and detect various values from attached sensors, which are displayed in the Wi-Fi app interface. It is eventually useful for assessing and quantifying the soil's water and nutrient content. The camera was quite successful in displaying the live feed, and GPS can pinpoint the location. This vehicle can be made more compact and sustainable by adding a few extra options. It is preferable to construct or implement more accurate sensors in order for the value to be shown appropriately. The precision of the sensors can be adjusted by adjusting the offset value. It is advised that the circuit be designed for a better circuit approach.

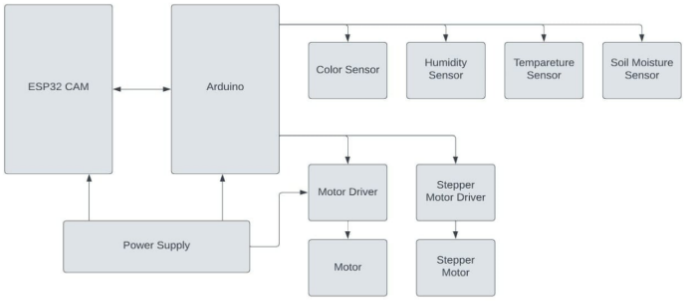


**Fig -2**: Block Diagram

**MEASURING TEMPERATURE**

We measured the ambient temperature with an external DS18B20 probe. It communicates with the microcontroller through a one-wire protocol. To be successfully read by our board, one-wire devices require a pull-up resistor connected to their signal line. As a pull-up resistor, we chose a 4.7k resistor in this case.

**MEASURING MOISTURE**

Soil moisture sensors measure the quantity of water in the soil and can be used to calculate the amount of water stored in the soil horizon. Soil moisture sensors do not directly detect water in the soil. They instead track changes in another soil parameter that is related to water content in a predictable fashion.

**MEASURING NPK CONTENT**

An optical transducer is developed to measure and to detect the presence of The N, P, and K value of the sample are determined by absorption light of each nutrient. The optical transducer is implemented as a detection sensor which consists of three LEDs as light source and a photodiode as a light detector. The wavelength of LEDs is chosen to fit the absorption band of each nutrient. The nutrient absorbs the light from LED and the photodiode convert the remaining light that is reflected by reflector to current Nitrogen (N), Phosphorus (P) and Potassium (K) of soil. The system utilizes an Arduino microcontroller for data acquisition therefore the output from the transducer is converted into a digital display reading, the optical transducer can evaluate the amounts of NPK soil content as High, Medium and Low.

**MEASURING ATMOSPHERIC TEMPERATURE AND HUMIDITY**

By detecting the electrical resistance between two electrodes, the DHT11 detects water vapor. A moisture-holding substrate with electrodes on the surface serves as the humidity detecting component. To measure the ambient air, it employs a capacitive humidity sensor and a thermistor, and outputs a digital signal on the data pin. It's easy to use, but data collection necessitates precision timing.

**LIVE STREAMING**

The ESP 32 cam works with a simple code whatever it has a Wi-Fi system installation in it. It can be linked to a microcontroller or act as a controller in its own right. By providing Wi-Fi System details, it creates own IP address and streaming will be viewed in web browser or other system apps, based on the Wi-Fi range the frequency of streaming varies

**GPS TRACKING**

The NEO-6M GPS module is a high-performance full GPS receiver with a built-in 25 x 25 x 4mm ceramic antenna for effective satellite search. The module's status can be monitored using the power and signal indicators. Google Maps can be used to view the GPS location immediately.

**Fig -3**: Front view

## 5. SOFTWARE USED

ARDUINO IDE

BLYNK APP

GOOGLE MAPS

**Fig-4:** Back view

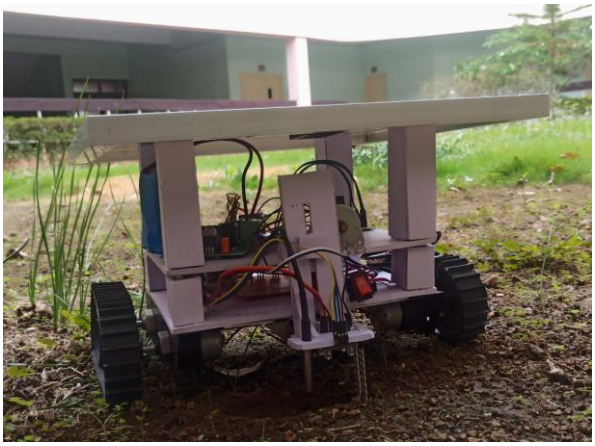

**Fig-5** Testing in Soil

## 6. RESULT

The Arduino Nano and ESP-32 Camera Module are linked to various sensors, and a solar panel will provide power. Sensors connected detect values based on their working circumstances, gathered data is communicated through Wi-Fi and may be viewed in mobile apps, and controlling and camera live streaming is done in the same process as data collection. The data acquired makes sense in terms of the plants individually, as parameters differ from one plant to the next, as well as the location of the plant within the same field.

## 7. CONCLUSIONS

The project's main goal is to remotely monitor and detect values of the given sensors temperature, moisture, atmospheric temperature and humidity, and NPK values, which will help farmers monitor their fields on an individual plant basis, and the data collected is viewed through the cloud and stored for future use. The main focus of the project has been remote monitoring, which has been completed, and the live feed may be watched over Wi-Fi. GPS tracking has been accomplished as well, and the location can be pinpointed and viewed in Google Maps.

## 8. ACKNOWLEDGEMENT

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## 9. REFERENCES

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