

# Iot Implementation in Farming

Mohammed Inuwa Ali

*Lovely Professional University (India)*

*Department of Computer Science*

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## ABSTRACT:

According to the United Nations department of Economic and Social Affairs, in its 2019 world population prospects report bearing publication identification of ST/ESA/SER.A/423. It is projected that the world global population will reach 8.5 billion by 2030, 9.7 billion in 2050. As at 2021 the world's population stands at 7.9 billion, the staggering increase indicates a 3.66% increase between 2021 and 2030, a 6.59% increase between 2030 and 2050. Collectively, between 2021 and 2050 it can be assumed there will be a 10.22% increase of population. This alarming pattern proves to be a challenge for nations when it comes feeding their growing population. A country like India which has a population of 1.3 billion that makes up 16.46% of the current total world population has unveiled advanced methods and applications to farming by the help of IOT (Internet Of Things). Companies like SatSure and QZense are using space based sensor and advanced algorithms to improve not only the harvest of crops but also the health state of the crops. This elevated platform of innovation has further led to automated irrigation farming and advanced indoor farming which makes it close to not impossible to plant any type of crop so far as the soil, climate and temperature can be manipulated through technology. India's initiative has led to the country having one of the lowest costs of feeding an entire household. The authors' system AgriDoc is an IOT (Internet Of Things) system that uses sensors and software solutions to automate, improve and advance agriculture in the 21<sup>st</sup> century and beyond.

**Keywords:** AgriDoc, IOT (Internet Of Things), Arduino Uno IDE, Sensor.

## I. INTRODUCTION

The traditional methods of practicing agriculture in developing countries has created a food pricing instability, an increase in the equilibrium prices creates a decreasing demand. The less demand for agricultural products means a high level of malnourishment and economic hardship for citizens. These problems can further

permeate the administrative structures of a country creating lawlessness, instability and contribute to a declining labor force. A declining labor force will also affect debt to GDP ratio of a developing nation. With all these factors considered. The future of farming is driven on the precipice of using advanced technology in agriculture to make farmers work a bit easier and fruitful and help reduce the cost of food.

Achieving this objective will drive a nation's development plan on the positive path.

## II. BACKGROUND

Africa, the world's second largest continent which has some of the most fertile and uncultivated lands with abundant water supply in the world is also the victim of the smallest yields from its crops globally. Africa imports half of what it consumes, this trend has hammered countries on the continent with large trade deficits and an over reliance on foreign currencies like the U.S. Dollar and the European Euro to conduct global trade. In juxtaposition with India, India is a major agriculture powerhouse which enjoys a high yield from its crops globally due to the application of advanced technologies and methodologies to help boost output.

According to Daniel Workman, in 2019, India enjoyed a 19.5 billion trade surplus in its trade with the United States of America alone. In India, food is relatively cheap compared to the African continent. The use of IOT (Internet Of Things) is making farming worthwhile and a bit more convenient and attractive for the youth to get involved. Projects like automated irrigational systems based on temperature, soil PH detectors based on sensors has enabled farmers to plant crops that are meant for certain soils and yields harvests that exceed projected expectations. If a nation is to develop to its fullest potential then it has to possess a strong back bone which is agriculture and the goal of a strong backbone is only sustainable through IOT Implementation which is the future of farming.

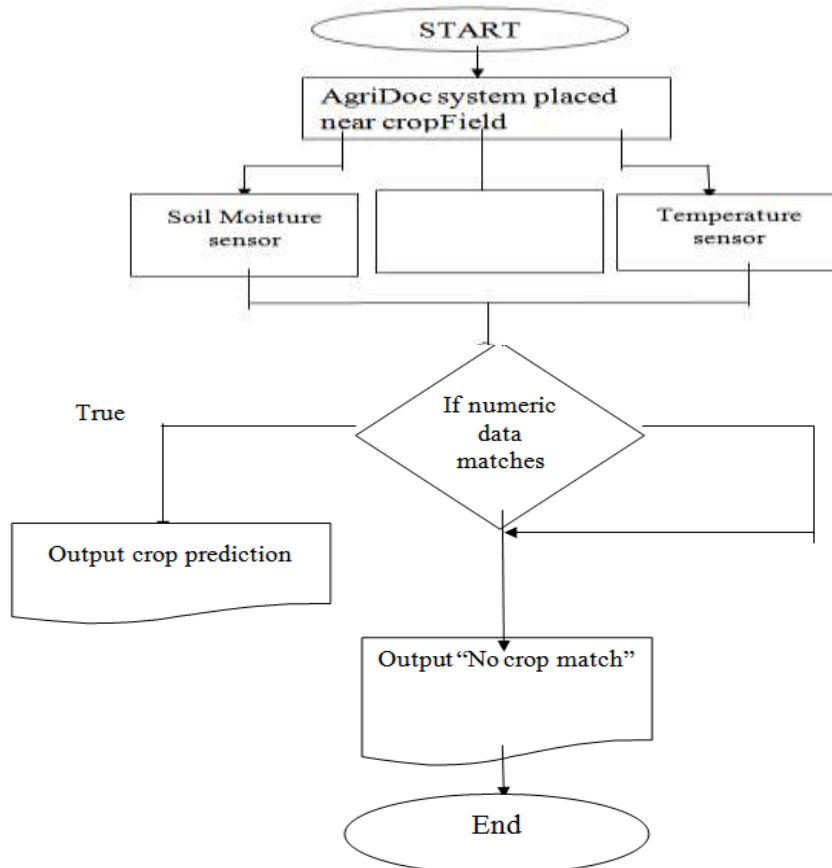
### III. LITERATURE REVIEW

AgriDoc which stands for agriculture doctor is an IOT (Internet Of Things) system built on Arduino Uno technology. AgriDoc consists of an Arduino Uno micro controller, FC-28 soil moisture sensor, DHT-11 digital humidity and temperature sensor, TMP-36 temperature sensor, an OLED, a USB cable connecting the micro controller to a computer system and an Arduino Uno IDE. The sensors are connected to the micro controller, these sensors emit numeric data to the micro controller, and the micro controller in turn relays the numeric data to the Arduino Uno IDE via the USB chord. The request is triggered by the Arduino Uno IDE and the signal is carried to the micro controller. The micro controller triggers the sensors to pick the numeric data, this numeric data transmits the micro controller and is sent to the Arduino Uno IDE. Data signal flow is bi-directional. The Arduino Uno programs makes comparisons between the transmitted data and

customized data set using if statements. When the compared transmitted data falls within a category of the data set the crops that are classified within those data parameters are displayed as a prediction of crops that are feasible for the sampled soil. This methodology is a form of classification, each crop in the data set is classified based on the soil's moisture, soil's humidity and temperature, and the environment's temperature.

Analyzing the farming methods in Africa as a case study, it is evident that most of the people who enter farming are mostly peasants with least to no education. In light of their academic deficiencies they stick to the traditional methods of farming that is intuition, ancient practice and superstition. Such traditional methods are not scientifically proven and creates seasons of low crop yield. AgriDoc seeks to at least put farmers in the right direction to profitable farming, seasons of low crop yield can be a thing of the past with AgriDoc. AgriDoc is highly scalable and has the capacity to upgrade for further advancement in technological farming.

Fig 1: Flowchart of system operation



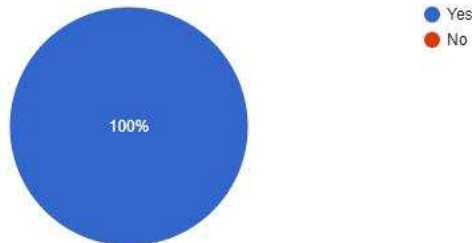
### SURVEY

An online google form questionnaire was administered to targeted respondents globally. Quantitatively the responses indicate the

respondents would welcome AgriDoc which is an IOT based farming technology if the ascertained objectives of the system are achievable.

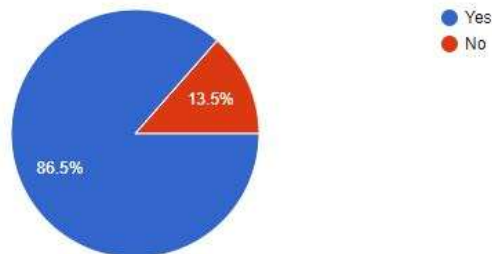
1. Do soil conditions and soil types affect farming and it's overall output?

37 responses



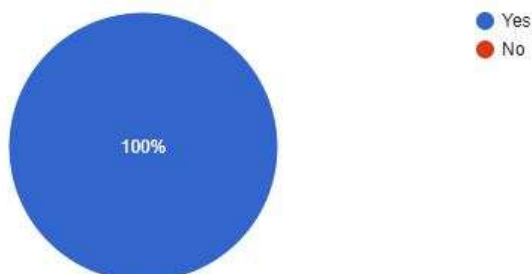
2. Would your ministry be open to using a system that can help predict the type are suitable for certain tested soils?

37 responses



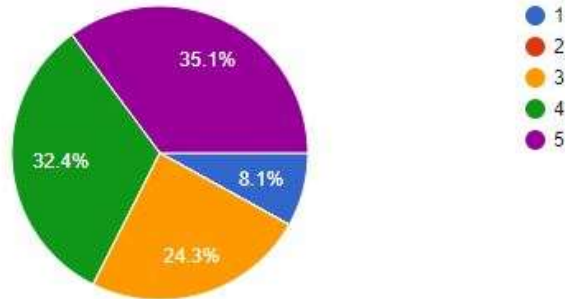
3. AgriDoc is system being proposed to advanced technological farming in mostly peasant areas , do you think it can help your country achieve an advancement in crop yield?

37 responses



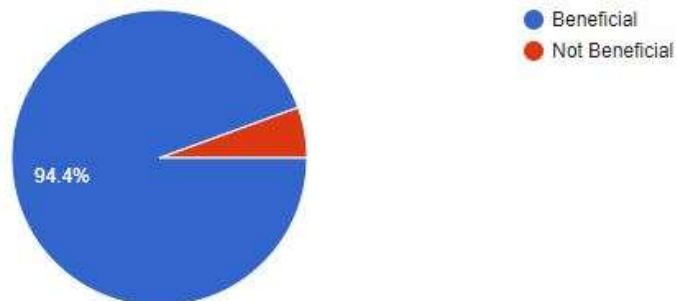
4. On a scale of 1-5 how does soil conditions and types affect farming

37 responses



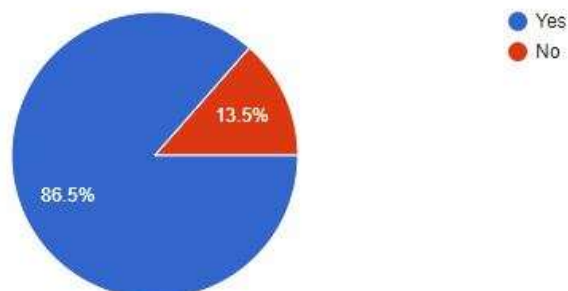
5. How beneficial will this system be for farming and planting for food and jobs?

36 responses



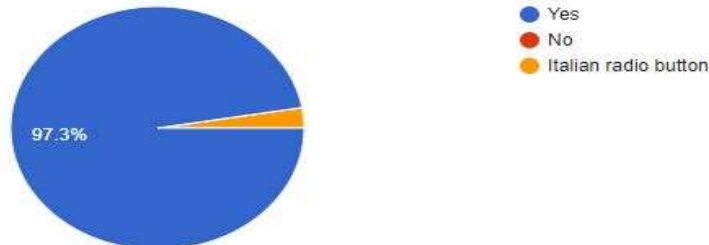
6. Do you think the ability to determine which soil are suitable for certain types of crops can ameliorate the problem of seasonal harvest of certain crops to cause a shift into all year round harvest of those seasonal crops?

37 responses



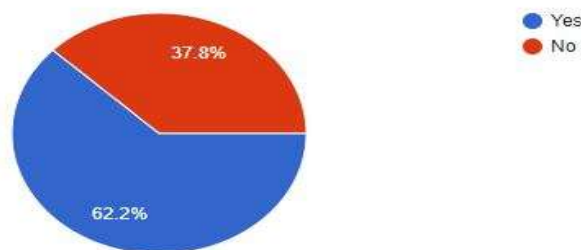
7. In your perceived conception will such a system be beneficial to the agriculture sector of your country?

37 responses



8. Does your country practice all year round the clock farming?

37 responses



#### IV. FUTURE SCOPE

On the basis of product perspective, this system is the first build (version 1.0) for a future envisioned system that will inclusively capture the PH of a soil and use machine learning algorithms to classify the types of soil. It is further envisioned that the future upgraded versions of this system will be able to take input of the types of crops users intend to plant in the sampled soil and the system will make recommendations on what the soil will need to grow those types of crops, the system will be able predict if the intended crop will survive in the sampled soil or if it will not survive.

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