Design and Implementation of Smart Agriculture Management IntelligentThings Using NB-IOT

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***ABSTRACT* -Agriculture is very important since our early daysand we can call India as Land of Agriculture. More than 60 to 70 % of Indian population are farmers. This field contributesover 20% of our Gross Domestic Product. So that we are making the agriculture to be smart rather than Hard using Internet of Things. The main objective of these smart devices using NB-IOT makes this field not to be in backlogs. Hence we want to make this field to be more active by using some Internet of things and Machine Learning approaches. Hence we are designing an Intelligent Agriculture Management System using Narrow Band IOT which helps farmers to improve their productivity with latest innovative reforms. Our NB-IOT method uses multiple sensors and considers various environmental factors without wasting resources by using a innovative techniques called precision agriculture. All the data what we have gathered and theresults will be displayed as Graphs .**

Keywords-Internet of Things, Machine Learning, Agriculture, Intelligent Systems, Communication protocols

1 . INTRODUCTION

In recent days, the Agriculture System has been monitoring all knowledge with the rapid growth of the mobileInternet and the Internet of Things, such as smart devices. Different smart phone apps for seed control, prior field records, and finding findings are used in much of the agriculture system. Latest Agriculture equipment such as 3rdGeneration Rice transplanted [1], Gluco Shredder based on Infrared and Zigbee, Pit tracking systems such as smart Applications and a few other advanced appliances are available for use. Intelligence systems track past agricultural documents and eventually transfer the related information to the agricultural archive to safely preserve the records. The adoption of smart devices for agricultural systems will minimize practical expense, boost farming experience [2], andreduce farmers' labor force. These smart gadgets, though, are very demanding activities for a few days to accomplish their goals. The primary constraint role is the contact protocol. Both electronic devices donot support wired communications, so thatintelligent devices are linked by short and long-range wirelesscommunications. Therefore, designing the most advanced architecture of these devices is the main demanding challengefor the new.

Boudraet. al. The new agricultural tracking systems for farmers using wireless protocols and Bluetooth have been proposed. Catarinucciet. al. A three-tier network systemic architecture was implemented to track agricultural records[3], control and collect agricultural ecological records, consisting of three parts.HSN monitors antenna systems with Generation 2 Radio Frequency Recognition tags that can broadcast their records to the higher layers using the Internet or LAN. Alharbeet. al.New ways of using Cellular Networks [4] and Radio Frequency Recognition systems have been developed to develop a knowledge processing system for agriculture. To automatically classify the areas, Zig Bee was used to advancing the Recorded Crop Records to the cloud centers.

Nasriet. al Using 5G networking methods, data has been transferred again from terminal to mobile phones, and also thedata will eventually reach the cloud center immediately for yetmore information.Zhanweiet. al. To verify the data records and upload them tothe cloud portal, the Authors suggested organizing somesmart intelligent procedures for our crops. Wireless protocolshave several drawbacks and many separate types of intelligent instruments can not be linked in hospitalsunder the existing infrastructure. Wi-Fi just as ZigBee are restrictedreach remote conventions that have been limited by short correspondence space[5]. Contrasted with transient remote conventions with high-range remote conventions, high- volume remote conventions are energy-concentrated, andthese sorts of conventions are not appropriate in keen horticulture for all around planned brilliant frameworks.

In this way, it offers a new framework for integrating all mobile devices, needing far fewer details, long-range cycles, and smart meters than have been used in smart parking management. Narrow Band-IoT is a common technology for linking all smart devices in well-maintained agricultural areas. In specific, this study proposes a concept that uses NB-IoT to linkall mobile devices to smart agriculture networks. Narrow Band-IoT

II.LITERATURE SURVEY

Intelligent Agriculture Management System, for the most part, talks about versatile farming which alludes to the utilization .

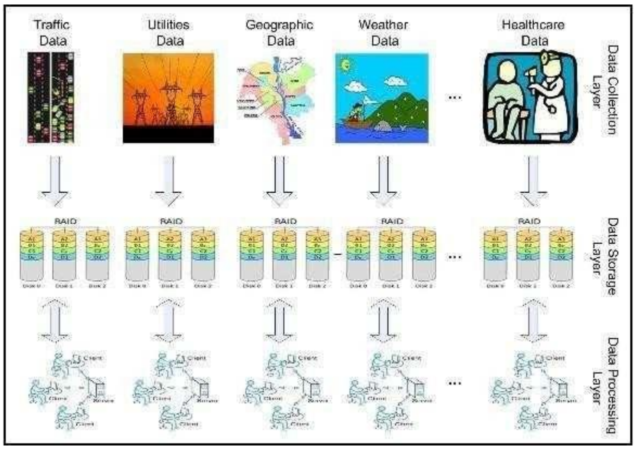

Fig 1: Agriculture Management

gathers Real-time crop information from fields, and stores theinformation into network workers by means of the web.The put-away harvest records can be gotten to by various gatherings of ranchers. For instance, Farmers, seed Managers, and so on Today the greater part of the ranchers want to utilize canny horticulture information to analyze the yield infection and treat the harvest illnesses appropriately. The accessibility utilization of the Intelligent Agriculture Management System for crops builds the soundness of the field.

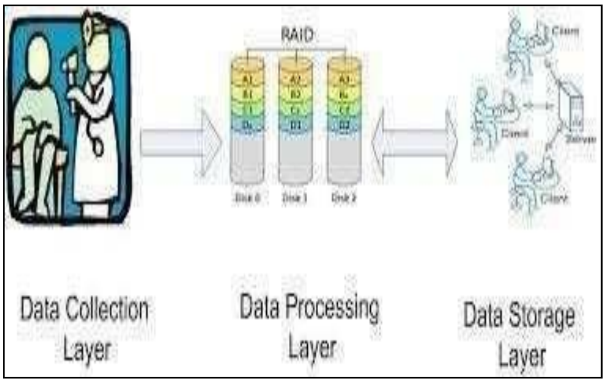

Fig. 2. M-Agriculture structural design

This infrastructure, which is a part of the architecture of the Internet of Things, is supported by theIntelligent Agriculture Management System. It requires multiple levels, along with data collection, data storage, and data processing layers. Largedata such as seed information, data on weather variability, datawith traffic, survival can also be accessed from various data sources. [7] can be stored at the data storage stage. The complete architecture of an IoT device is presented in Fig.1, while Fig. 2 Implements m-agriculture.

Growing the productivity of crop infrastructures including agricultural equipment is the most difficult priority for days. Apart from this one, some of the key challenges are providingquality of service to low-cost farmers and addressing the challenge of seed shortages[8]. Mechanical recognition, human control and smart machinery in agriculture, real-time monitoring of crops using physiological criteria, accurate identification of plants, rapid recognition of environmental threats are only a few instances of smart policies in smart agriculture. Intelligent Wearable Representatives [9] are the most important innovations in the application of the Intelligent Agriculture Management System. Energy-assisted smart devices, actually called tags, are made up of RFID.If an electromagnetic field is created by radar, BAP devices transmitthe data.. The key downside of RFID tags is that they are unable to work solely within the province of radar penetration. The scale is from 8m to 32m. Dinesh et.al[9] proposed IoT and cloud based Health care system for smart agriculture management.

Agriculture Management System is one of the most demanding targets for both government and citizens. The challenges faced by farmers and their expenditures are very serious problems, according to a study by the Food and Agriculture Organization. Therefore, the challenge is to detectcrop diseases at the right time and solve them at a low cost. Inthis study, several problems are raised. The key problemis that most IoT system nodes have insufficient disk capacity and networking capacities to keep them from linkingto Internet Protocol-based networks.

The secondary problem is that all the systems do not have standard protocols. The mobile Agriculture Management System, the IoT environment has collected biometric information. In able to acquire proactive steps to save crop life in emergencies and crucial circumstances, the intelligent portable agricultural device suggests and informs farmers andtheir assistants in real-time concerning crop issue knowledge

III DESIGN AND IMPLEMENTATION

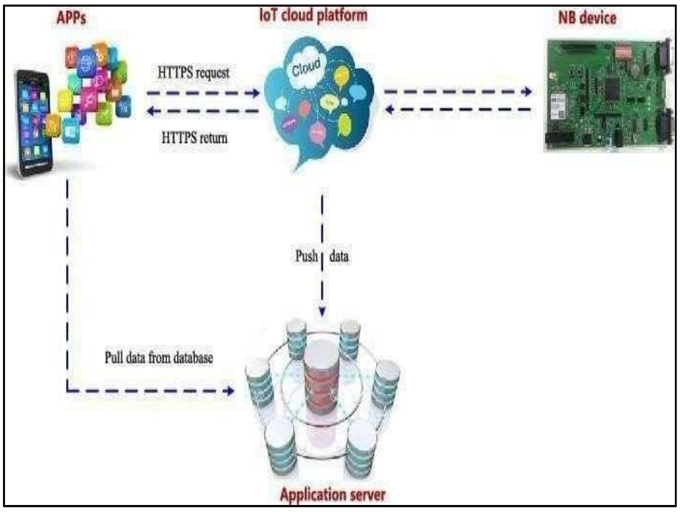

Fig.3: System design

Figure. 3. Describes the architecture of an IoT framework that involves an application server, cloud level, NB-IoT computers, and consumer software. The suggested approach offers Narrow Band-IoT communication only to purchase and update the NB-IoT SIM in the implementation panel for consumers

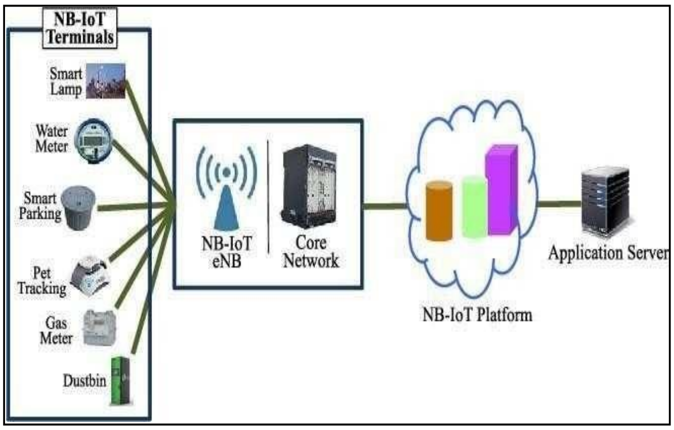

Fig 4: NB-IOT Terminal

Four elements of the NB-IoT Technology Architecture:

NB-IoT terminals—water or gas meters, smart lamps, dustbins, etc. Examples of NB-IoT terminals which are all connected to the a group of Narrow Bandinstruments. Data transmitting and broadcasting networks- Associated terminals will pass the stored records tooneof the closest mobile base stationsNB-IoT cloud network- Data are passed to theCloud Server from the cellular Base Station. Application Server: The records obtained will be moved From the NB-IoT cloud platform to a standalone program server. Take the Smart Meter as anexample.

IV NARROW BAND IOT ARCHITECTURE

This protocol replaces the terminal quantity statement monitoring function commonly used with traditional mobile communications,. The suggested design of the protocol consists of a lot of equipment for entry and low power consumption. In a consolidated center, vast numbers of devices are often affected by data transfer interference, which allows the system to use more resources In such a way that only the NB-IoT could not have power over delay in communication. It could be a very challenging job in some programs.

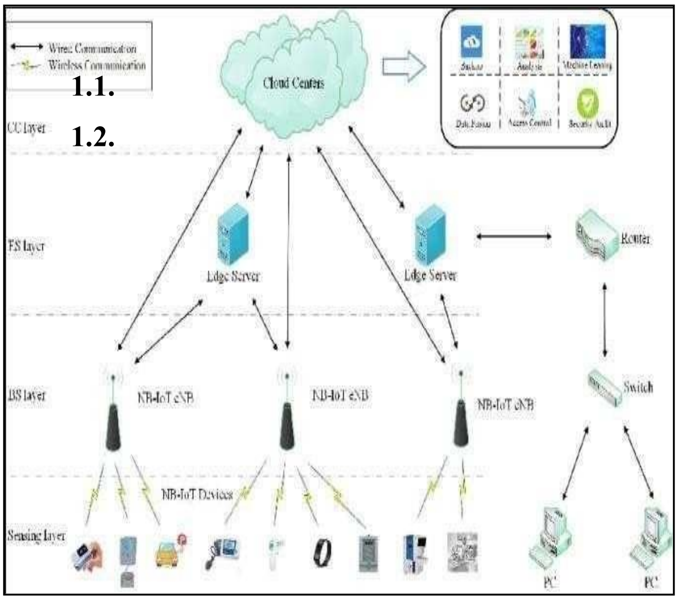

Fig. 5. Architecture For Terminals In SmartAgriculture Management System.

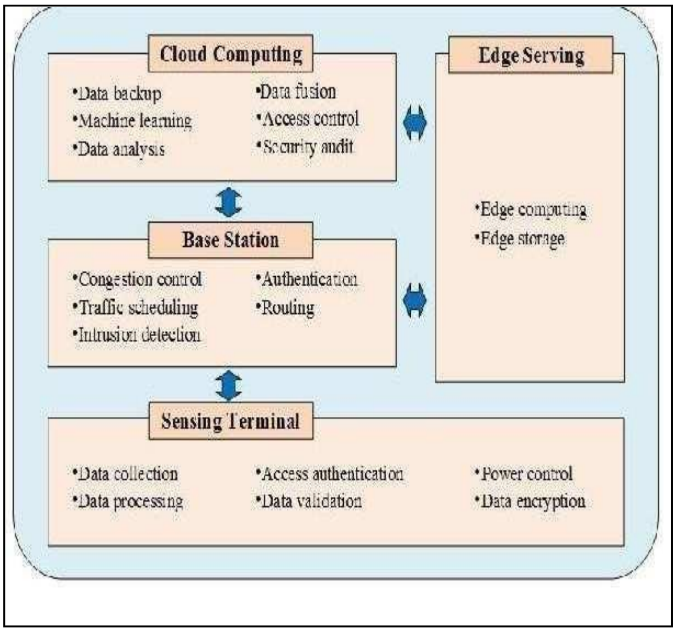

Fig. 6. Proposed Architecture Layer.

A.Base Station Layer:

The Base Station Layer contains a significant number of NB- IoT Base Stations that can also be deployed on a network. In reality, routing, congestion management, network traffic scheduling and protection are also the features of this layer which ensure secure data transmission. Data from the sensingshall be obtained by the base station sheet, setting a fair transmitting route mostly on basis of the data specification. The base station layer which schedule traffic where there is congestion to prevent congestion. Base Station Layer ensures data protection, as authentication and intrusion prevention must be known. The Base Station is very vulnerable to hacks. We, therefore, need a reliable form of Intrusion Identification (IDS) tends to capture and analyze network behavior, access logs, data inspection, and a variety of other key factors to validate those security policies.

B..*Edge Computing Layer:*

Conventional computation and big data storage can be taken out by the cloud infrastructure, resulting in higher broadcast bandwidth and reduced network latency, with the most latency specifications for available records within the Intelligent Agriculture Framework, a new approach called edge computing server is applied here to minimize latency andachieve real-time data processing. The data transfer to servers, computers, routers and other associated devices are mirrored. Using edge cloud computing, terminal records collected access data directly from servers without even being migrated to any other network computers, ensuring the reliability of the data. The primary purpose of edge server computing is to reduce terminal things of energy consumption. This has a powerful computational capability to allow these edge computing servers to position

V.RESULTS AND DISCUSSION

The proposed system includes sensor data imagined through charts. Additionally, the information collected is broken down using comparison diagrams of data fluctuation, light pointers, and custom measures including snappy and efficient arranging. Besides, the data obtained is signed into a CSV record because it is signed further into Real-time stockpiling Firebase Log. Figure 7 indicates the variation of dampness information obtained by the dampness sensor that is present in the soil. This is used anytime the dampness levelsfall beyond the cap to turn the engine on.

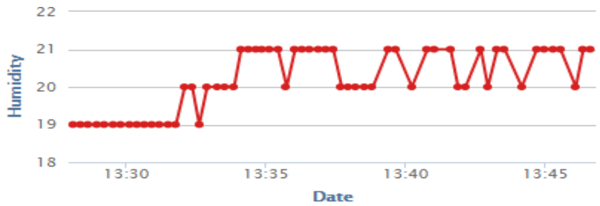

Fig. 7. Dampness information composed from NB-IOT

The temperature difference in the atmosphere from DHT-11 sensor is seen in Figure 8. The graph was plottedto use all the Thing Interact IoT Cloud mechanism beingused by client at the front of the system.

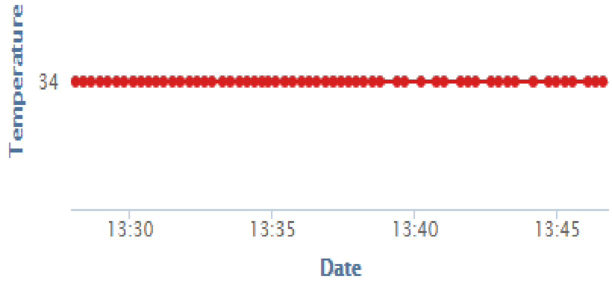

Fig. 8. Temperature information composed from NB-IOT

The extent of mugginess in the climate, obtained from the DHT-11 sensor, is shown in Figure 9. To leverage the Thing Speak IoT Cloud process, the qualities are plotted. It is shown in front of the application

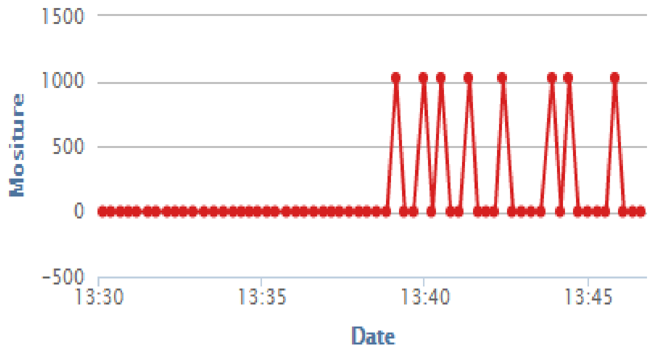

Fig. 9. Moisture information composed from NB-IOT

In the CSV log, the information calculated from the sensorsare obtained and are then stored in the Firebase. This information is later used throughout the yield prediction module to foresee a fair harvest. Infigure 10, showed

	A	B	C
1	Time	Humidity	Temperature
2	2019-03-10-19:05:34	53	32
3	2019-03-10-19:05:37	53	32
4	2019-03-10-19:05:40	53	32
5	2019-03-10-19:05:43	53	32
6	2019-03-10-19:05:45	53	32
7	2019-03-10-19:09:38	53	32
8	2019-03-10-19:10:09	53	32
9	2019-03-10-19:10:09	53	32
10	2019-03-10-19:10:09	53	32
11	2019-03-10-19:10:09	53	32
12	2019-03-10-19:10:09	53	32
13	2019-03-10-19:10:09	54	33
14	2019-03-10-19:10:09	53	32
15	2019-03-10-19:10:09	54	33

Fig. 10. CSV data logging of DHT-11 sensor

The characteristics plotted for X data set estimations asseen in Figure 10.

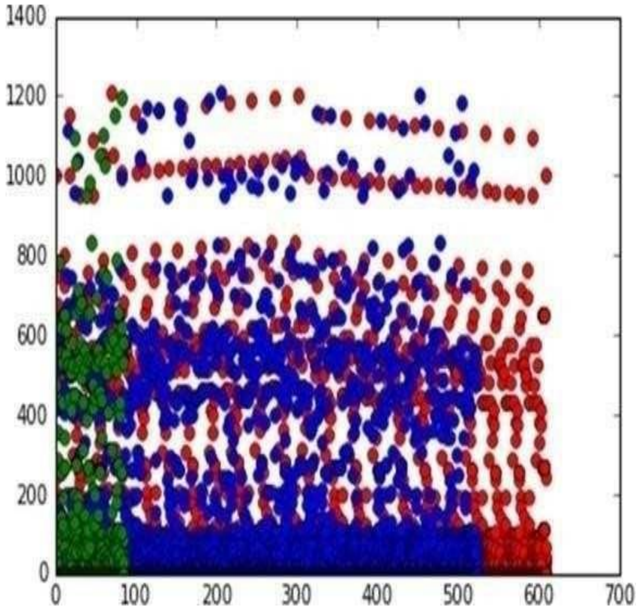

Fig. 11. Output Values for Crop Prediction

The X characteristics illustrate the data on the SVM classifier towards preparing the model. The red focuses capture the actual dataset,the train dataset characteristics are shown by blue focuses, and green focuses show the test datasetvalues

V.CONCLUSION

This work primarily presents the NB-IoT architecture for joining all smart devices in the Agriculture Management System. In formulating the state of latency in the crop data, theproposed NB-IoT implements edge computing. formulate the necessary latency specifications for diagnostic establishments in agriculture.

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