# Smart Plant Nursery Management System using AI and IoT

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*Abstract—* **Nursery management system can be useful to overcome a lot of challenges coming in the farming and nursery field. Physically every operation is not possible to perform smoothly. Therefore, it is need of today to implement technology in this field. We are using technology like, Augmented Reality, Machine Learning, IoT in this project. Due to this, smooth operations in efficient way can be performed. In this, there are multiple operations like, managing nursery, handling operations, accounting & online shopping these types of operations are implementing, which are required for any business. Installation of data into Nursery Management System is done by taking as much data as you are able to find within the nursery databases currently available & converting it into data which is easy to understand, use and manage. This saves hours of unnecessary wasting hours. It can be developed with the assistance of nursery owners, specifically with the Wholesale Nursery Industry. Nursery Management System help you manage your business by better efficiencies within your nursery, making use of the many modules available in the software. Nursery Management System is user friendly and accepts the hard work out of running your business by fixing up facilities to remember all the things that are important to your business. Nursery Management System collects important data and useful data, accesses information, targets markets, increases staff productivity and improves customer's satisfaction. Nursery Management System reduces multiple databases, manual integration, IT costs and administration overheads**

*Index Terms—* **e-commerce, AI (Artificial Intelligence), IoT (Internet of Things), Augmented Reality, Machine Learning–z**

## I. INTRODUCTION

This project is the combination of hardware, software and technology. It includes various parts and modules. Here, project is being implemented with respect to 2 sides of the user. This project is applicable and implementable in nursery and farms.

It is helpful for not only farms and nurseries but also, agriculture related products retailers and traders/wholesalers are benefitted. To apply/implement this project, one need to cover the area of crops using various sensors like, temperature sensor, moisture sensor, humidity sensor, etc. where these sensors will gain/capture the data like temperature, moisture level, humidity, etc. This will give alert/hint of the real time situation in the nursery/farm. By using various algorithms, our system will show message and also will suggest precautionary needful actions or actions to survive from the situation. For Example, if, temperature goes to 40 Degree Celsius, where some plant can survive maximum up-to 32 Degree Celsius. Then, the system will give alert message on the dashboard of the nursery owner's or farmer's account. Second function is, farmer/trader/nursery owner can simply add/edit/delete various crops/agricultural products through their dashboard, which will appear after login. Also, simultaneously this dashboard will inform how many products are currently available and their revenue/cost. In the other tab of seller's/farmer's/nursery owner's dashboard, some reports of revenue generation and statistics will be shown in various forms and for various duration.

It will give the idea of progress status in current situation as well as in history. While showing all this data, ratings and feedbacks by customer will be shown to the same dashboard. This will give idea of a product's popularity/demand also, suggestions and feedbacks for the improvement of the service/product. Next part is with respect to end user's/customer's/buyer's side. Buyer needs to login, then using Machine Learning, list of crops and agricultural products will be shown in user's account. User can simply choose one option of getting imaginary view of his/her campus/area after planting particular plant/s. In this, one need to just give one

photo of his/her area/campus and then our system will suggest him/her plant/s and one can see how they will look like after planting also, simultaneously one can have details and importance of every plant, which is suggested. Next step after choosing plant/s and/or other relayed agricultural product/s is to checkout and pay through secure payment gateway.

Scalability:

This project can affect thousands of people after fully functionally available on the web through web portal/website. It will save/avoid some part of damage to plant/s in the nursery/farm using alert system of Internet of Things. This system will surely increase sell of plants through easy way of feeling plants in the one's own campus. This system is saving huge load of paper work and marketing work of a nursery/farm. Its scalability can be measured through real time implementation in nursery/farm.

## II. LITERATURE SURVEY

1. "Manage system for internet of things of greenhouse based on GWT"

In order to fit the different demands for internet of things system of greenhouses environment monitoring and control, the greenhouse environment monitoring and control management system based on Google Web Toolkit (GWT) was developed. Using remote method call (RPC) AJAX as the communication method between browser and web server, the system realized the functions such as: configuration of acquisition and control parameters, the adaptive match of database between gateway and server, the adaptive diagnosis of monitoring parameters, the warning of monitoring parameters, the adaptive generation of interface, and so on. The functions of the system was tested the results shows that the WEB browser application and Android App can adaptively realize the greenhouse environment monitoring and control according to the information configuration.

2. "An IoT-based greenhouse monitoring system with Micaz motes"

The wireless sensor network is one of the most significant technology in the 21st century and they are very suitable for distributed data collecting, monitoring in tough environments such as greenhouse. The other most significant technologies

in the 21st century is the Internet of Things (IoT) which has rapidly developed covering hundreds of applications in the civil, health, military, agriculture areas. In modern greenhouses, several measurements points are required to trace down the local climate parameters in different parts of a large scales greenhouse in order to ensure proper operation of the greenhouses automation system. Cabling would make measurements system expensive, vulnerable and also difficult to relocate once installed. This paper presents a WSN prototype consisting of MicaZnodes which are used to measure greenhouses' temperature, light, pressure and humidity. Measurement data have been shared with help of IoT. With this system farmer can control their greenhouses from their mobile phones or computers which have internet connection.

3. "Information Technology Controlled Greenhouse: A System Architecture"

The technological level of greenhouse cultivation, especially in the Mediterranean countries such as Italy, Turkey, Greece and Spain, is low, despite protected crops are of considerable importance both for extension and for the production of fresh foodstuffs and for exported ornamental plants. The project "House Garden High Tech" intends to increase the technologies of greenhouse cultures by the creation of an integrated network of sensors and automation technologies, controlled by an ICT (Information and Communication Technologies) approach, for the agronomic development of horticultural crops. In the –High-Tech greenhouse, innovative technologies will be tested, in order to stimulate the growth and development of plants with optimized use of chemical products.

4. "Mobile Nursery Construction with Alignment of Sensors for Orchids Breeding"

Nowadays production improvement of orchids in flower nursery is relying on intelligent environmental management. Such objective can be realized by cooperating with automation controls, computer science, and sensing technologies. In this paper, we introduce our orchid nursing system involving sensors' alignment processes. Here an enclosed mobile nursery is equipped with a low-cost embedded system for monitoring and control applications. Environment's information is then detected by peripheral sensors, which are picked out from coarse ones using efficient error convergent

algorithms. According to our elimination result of sensors, proposed alignment mechanism can efficiently converge the deviation between sensors and is promising for real-life nursery construction in the future.
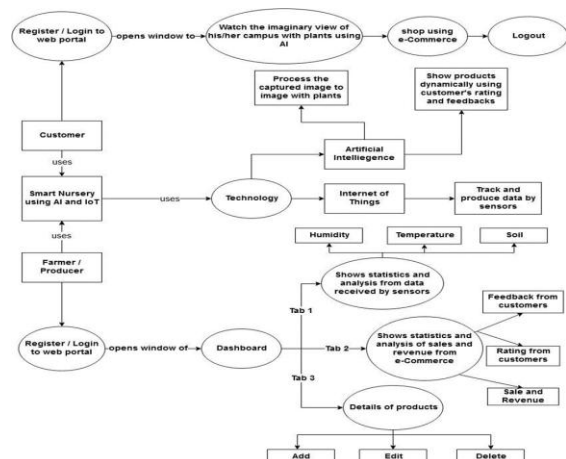
### III. PROPOSEDSYSTEM



*Fig. 1.1 Architecture Diagram of Proposed System*

The Main platform of the system that encapsulates models such as e-commerce, IoT, Recommendation Engine, Augmented Reality. E-commerce web portal being the main platform which integrates all the above models which helps the user to communicate with the system efficiently. For this, our project is working for farmers, nursery owners using above mention technologies. As a result, we are getting smooth operation, monitoring, tracking of nurseries and farms management.

Our system is mainly aiming for helping farmers and increasing awareness and usage of natural or nature-friendly plants and agricultural products. We gathered related information of nature-friendly products, systems related to Artificial Intelligence, ecommerce portals, Augmented Reality/Virtual Reality/Image Processing which are currently available. Currently, there is a website of Nursery Management System, which includes overall operations and information regarding Nursery Management. It includes only the basic operations, which are done on actual farm/field. Our projects basic operations are similar to this.

We found that, multiple systems/solutions/programs/applications which supports only one or few among: i. e-Commerce Portal ii. Recommendation System

under e-Commerce portal iii. Accounting of a Nursery iv. Product Management v. Tracking operations vi. Management of Agricultural firm vii. Weather Detection using sensors

Algorithms
1 Visit Web Portal
2 Log in with registered credentials
3 If, not registered then register as buyer or farmer or nursery owner
4 If buyer, then visit products and go through details
5 To get the imaginary view, capture one image of area, where plants are to be planted and upload it
6 Drag and drop the auto-suggested plant's images on actual image
7 Select the plants to be planted
8 Pay with secure and easy payment gateway
9 Checkout
10 If, want to explore more, go through web portal and repeat 6 to 9
11 Log out
12 If, farmer or nursery owner, go through dashboard
13 Tab 1: Analyze and monitor current weather situations using data by sensors
14 Tab 2: Generate sales and revenue reports as per required duration
15 Tab 3: As per requirement, add, update or delete product details
16 Log out

Apriori algorithm
1. Calculate the support of item sets (of size $k = 1$) in the transactional database (note that support is the frequency of occurrence of an item set). This is called generating the candidate set.
2. Prune the candidate set by eliminating items with a support less than the given threshold.
3. Join the frequent item sets to form sets of size $k + 1$, and repeat the above sets until no more item sets can be formed. This will happen when the set(s) formed have a support less than the given support.

### IV. IMPLEMENTATION

In our proposed system we are providing a system which would address all the problems defined above in an encapsulated manner, The GUI of the system is

a web application which will provide e-commerce, augmented reality and act as a centralized database/ inventory management system. The system can be sub divided into 4 modules:

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1  E-commerce (main platform/ main module)
2  Augmented reality (sub module 1)
3  Database management system (sub module 2)
4  Botanical Information portal (sun module 3)

Working
Customer:

1  Log in or Register
2  Take imaginary view of his/her campus
3  Shop easily and securely

Nursery Owner / Farmer:

1  Log in or Register
2  Track current weather conditions in Farm/Nursery
3  Generate & analyze sales & other reports of certain duration
4  Add, update or delete details of products

At customer end, customer can login or register then he/she can take imaginary view of his/her campus also can shop easily and securely.

At Nursery Owner/Farmer end, he/she also can Log in or Register then he/she can Track current weather conditions in Farm/Nurseryalso can Generate & analyze sales & other reports of certain duration and can Add, update or delete details of products.

V. CONCLUSION

Smart Plant Nursery Management System can be useful to overcome lot of challenges coming in the farming and nursery field. Physically every operation is not possible to perform smoothly. Therefore, it is need of today to implement technology in agriculture field. We are using technologies like, Artificial Intelligence (Machine Learning), Augmented Reality and Internet of Things in this project. Due to this, smooth operations in efficient way can be performed. Most of the sensor devices are quite difficult to use by elderly people due to lack of knowledge about the technology. So, we can develop advanced version with support to multiple languages and voice control-

based commands and operations. It will help elder people for easy and smooth operations.

REFERANCES

[1] G. Vox, M. Teitel, A. Pardossi, A. Minuto, F. Tinivella and E. Schettini, "Sustainable greenhouse systems," in Sustainable Agriculture, Nova Science Publishers, 2010.

[2] TIMMONS N F, SCANLON W G. Analysis of the performance of IEEE 802. 15. 4 for medical sensor body area networking [J] . IEEE Wireless Communication, 2004.

[3] Maman, Ujang and Sugiarti, Yuni. 2016. The Need of Agribusiness e-Commerce to Support staple Food Self Sufficiency: The Experience from West Java. International Journal of Applied Agricultural Research 11(2): 115-128.

[4] Nursery Stock and Houseplant Production RWF Cameron, University of Sheffield, Sheffield, UK 2017 Elsevier Ltd.

[5] Neef, A., 1999. Land Tenure and Soil Conservation Practices: Evidence from South Africa and Southeast Asia. In D.E. Stott, R.H. Mohtardan G.C. Steinhardt (eds.), Sustaining the Global Farm (Purdue University and USDA-ARS National Soil Erosion Research Laboratory)

[6] Li PP, Wang JZ. Research progress of intelligent management for greenhouse environment information. Trans Chin Soc Agric Mach 2014;45(4):23643