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Talking Plant using IoT and Machine Learning

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Abstract - *The aim of this work is to bring the Artificial Intelligent (AI) concept in a new level by introducing it to living organisms like plants. In this system we provide a concrete scenario where an augmented plant, an ePlant can be incorporated in a ubiquitous computing environment in order to work together with other augmented objects, artefacts, in order to provide to the environment status of its condition. Machine learning is the scientific study of algorithms and statistical models that computer systems use to perform a particular task without using explicit instructions, relying on patterns and inference instead. It is recognize as a subset of artificial intelligence. Machine learning algorithms construct a mathematical model depend on sample data, called as "training data", in order to make predictions without being explicitly programmed to perform the task. The system presents the enabling infrastructures that are used to make by using application and sensors, we are creating communication between user and plant. The IoT is the addition of Internet connectivity into physical devices and everyday objects. Embedded with electronics, Internet connectivity, and other forms of hardware (like sensors), these devices can interact with others over the Internet, and they can be remotely examined and controlled.*

Key Words: Artificial Intelligence, ePlant, Machine Learning, Internet of Things, sensors.

1. INTRODUCTION

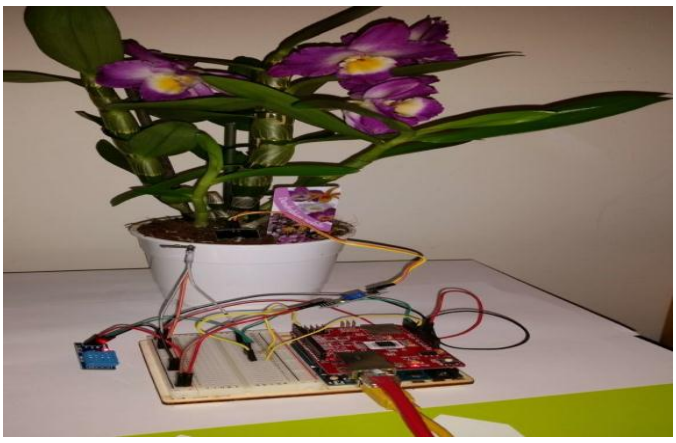
Especially relevant in an IoT project is the IoT cloud platforms that store data arrived from dev boards like Arduino, Raspberry and so on. Using this data, IoT cloud platforms construct charts and they have a built-in system to make some business rules on this information. In the first part of this IoT project, we will search how to use sensors to collect environment information using Arduino and how to send this information to the cloud. In addition, in the second part of IoT project, we will search how to enable triggers on the sensor values stored. Moreover, we will send alert to user smartphone when some parameter value is out of the range. This project is useful in several frameworks whenever we have to monitor the soil and plant status. We can expand this project adding new features so that we can easily combine it with other systems. For example, we can implement a notification system using Firebase so that we can send an alert when some parameters are out of the specified range. Additionally, we could add an Arduino API interface so that we can read the plant status parameters using external systems. Finally, at the end of this IoT project tutorial, you gained, hopefully, the knowledge about reading data sensors and sending the values to the server.

This project describes how to build a smart plant monitoring system that controls the plant health status. This IoT monitoring system checks some environment parameters such as:

- temperature,
- light intensity
- soil moisture

All these parameters have effects on plant health. This Smart plant monitoring system based on IoT can be accessed remotely using a browser so that it is attainable to verify the plant health remotely.

1.1 Connecting sensors to Arduino to monitor the plant health



This IoT project uses Arduino Uno as dev board and a set of sensors:

- DHT11
- YL-38 + YL-69
- TEMT6000

DHT11: Temperature humidity sensor

DHT11 is a sensor to calculate temperature and pressure. It is a cheap sensor and suitable for Arduino, you can use a more perfect sensor but the way to use it is the same.

YL-69: Soil moisture sensor

YL-69 is a sensor to calculate the soil moisture. It has to be inserted into the plant soil.

TEMT6000: Light intensity

TEMT6000 is a sensor to calculate the light intensity so that we can know how light the plant is receiving.

2. LITERATURE SURVEY

Sr. No.	Title	Author	Year	Published	Limitation
1	Fuzzy logic based moisture control in sinter plant	Ahmet Beşkardeş	2018	26th Signal Processing and Communications Applications Conference (SIU)	Complex
2	Temperature control experimental plant for moisture model assessment in power transformers	Wilver Correa	2017	IEEE 3rd Colombian Conference on Automatic Control (CCAC)	Its only concentrated on moisture level
3	IoT enabled plant soil moisture monitoring using wireless sensor networks	A.M. Ezhilazhahi	2017	Third International Conference on Sensing, Signal Processing and Security (ICSSS)	WNS difficult to understand
4	Impact of Different Substrate Moisture Levels on Lettuce Plants during Ground Based Experiment in SVET-2 Space Greenhouse	Iliana Ilieva	2007	3rd International Conference on Recent Advances in Space Technologies	It just a concept

3. SYSTEM ARCHITECTURE

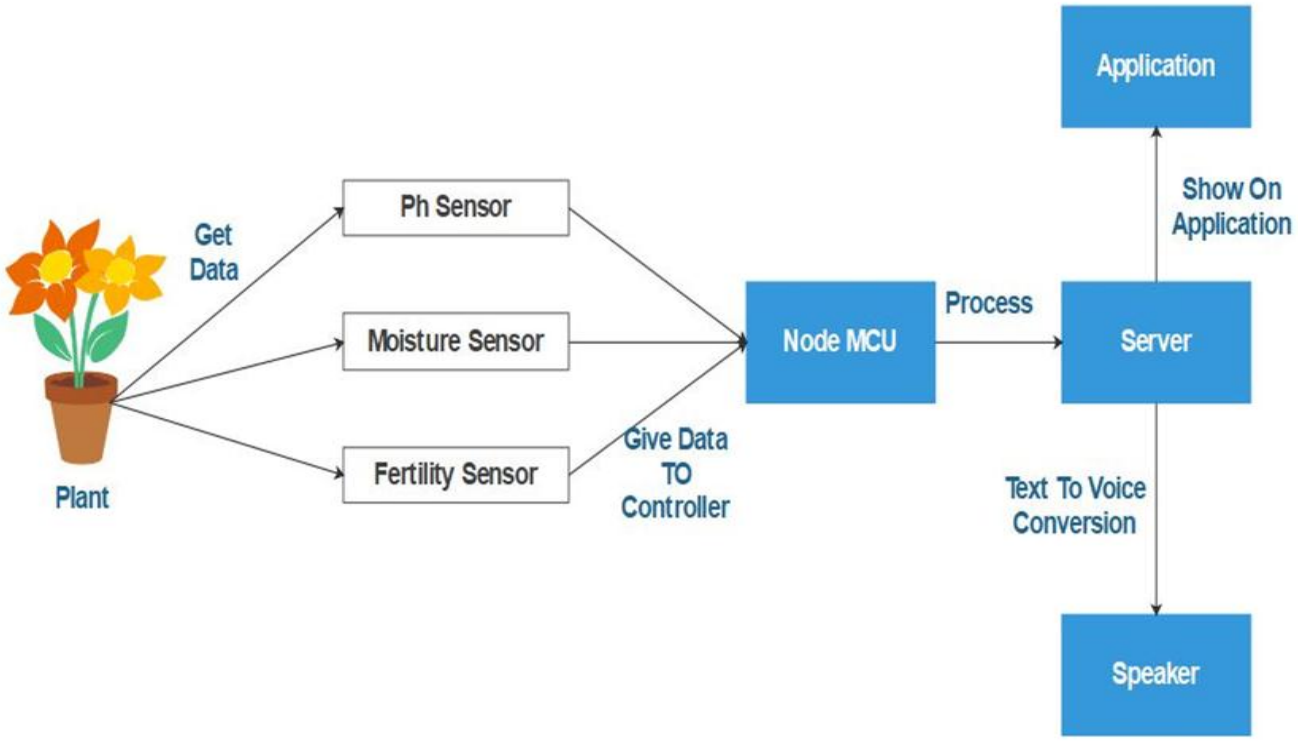
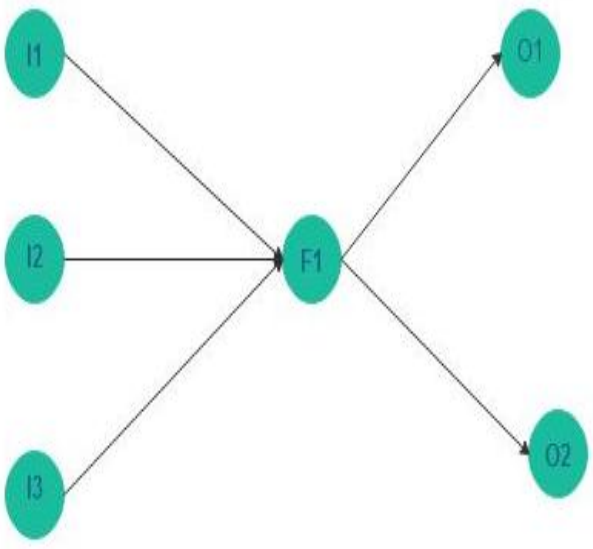


Fig. 1 : Talking Plant using IoT and AI

4. MATHEMATICAL MODEL



System Description:

S = (I,O,F)

Where,

- **S: System.**
- **I = { S1,M, T, WL}** are set of Inputs

  Where,

  1. S1: Sunlight
  2. M: Moisture
  3. T : Temparature
  4. WL: Water Level

- **F = {F1, F2, F3, F4}**are set of Function

  Where,

  1. F1: Moisture calculation

2. F2: Ckeck Sunlight

3. F3: Water Level calculation

4. F4: Check Temparature

- **{ O1 } are set of Output**

Where,

1. O1: Communication with Plant/Plants Requirement

- **Success Conditions :**

Sensor embedding, Location details, proper database.

- **Failure Conditions:**

No database, internet connection

5. CONCLUSION

Our system is making a drastic change in technology which is transforming the living things who can't express their needs to make them express. Hence our is system is making the new way of communication in which user will directly asked plant what they need, we are overcoming the drawback of existing system.

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