AUTOMATED GREEN-HOUSE

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***Abstract*—** Nowadays, green-house projects are widely being developed across the whole country. Since various components need to be checked in this kind of projects, it is very exhausting to visit the green house on regular basis. Moreover, sometimes it is confusing to monitor and maintain such activities. Automation in this field would help the owner to monitor such activities. This user-friendly mobile application would help owner to monitor temperature, water-level, humidity, soil-moisture without visiting the greenhouse. This application would sooth the work for greenhouse owner.

# INTRODUCTION

It is an app to provide automation in green-house. Components such as temperature, humidity, soil-moisture and water-level can be monitored using this app. This application will be developed using Java. To monitor the different components ESP8266 nodeMCU board and few sensors will be used in the project. This user-friendly app will help owner to reduce their work-load.

# Motivation

Watching over 3-4 parameters of green-house on daily basis can be tedious and confusing. One might mix-up or forget to maintain such parameters. To obtain more efficiency in this kind of work an android application would be a better option. Owner can maintain his/her green-house with much ease.

# Proposed system

The application is supposed to be user friendly. User can retrieve sensor-data from anywhere in the world. If user wants to observe these activities according to his time or requirement, it will be available for him. User can even use these applications for various number of crops and sections. The app also provides the list of profitable crops in green-house such as tomato, strawberry, rose etc (not accurate as per google search). This application would help owner to regulate his/her green-house even without visiting it regularly.

# ESP8266 nodeMCU & Sensors

To obtain values for selected parameters of the green-house is the first step of the project. Here, ESP8266 nodeMCU board is used to read various inputs along with few sensors.

* List of the sensors used for the project:

DHT11: Digital Humidity and Temperature Sensor

LDR: Light Dependent Resistance Sensor

HC-SR04: Ultrasonic Sensor

Soil moisture sensor

These sensors were connected to ESP8266 nodeMCU board. The values of the parameters were displayed on serial monitor.

# Firebase Connectivity

The Firebase Real-time Database is a cloud-hosted No-SQL database that lets you store and sync data between your users in real-time. Using firebase, we stored our sensor data to real-time database and then retrieved it to the application UI.

# Application UI/UX

The aim of the application “GOLDEN LEAF” is to display the sensor data of green-house. The user have to sign-in or register themselves to use the application. They can register themselves using e-mail id and password. Once user have signed in it will redirect them to main screen. The main screen contains two navigation tabs namely Home and Info. The main screen/home screen contains four tabs namely temperature, humidity, soil-moisture and water-level. User will be redirected to new screen on selecting any tab. Once the new screen appears, user will be able to retrieve real-time data for particular component. The info screen contains list tab, which includes some of the most profitable crops and its details of suitable environment conditions. The info screen also contains log-out button.

# Experimental Analysis

* Minimum software requirement at developer side

Sketch(Arduino-IDE):

* 10MB free hard drive space or more (only for PROGRAMINO IDE for Arduino).

Android Studio:

* Microsoft® Windows® 7/8/10 (64-bit)
* 4 GB RAM minimum (8 GB RAM recommended.)
* 2 GB of available disk space minimum, 4 GB Recommended (500 MB for IDE + 1.5 GB for Android SDK and emulator system image)
* 1280 x 800 minimum screen resolution.
* Minimum software requirement at deployment side

* Android version 5.0.0 Kitkat.
* With internet connection.
* Why we used particular software/hardware/programming language?

Arduino-IDE:

* Supports all arduino boards
* Built-in library manager

ESP8266 nodeMCU:

* Low price
* Fast
* Low power consumption
* High memory
* Built-in Wi-Fi

Android Studio

* easy-to-use drag-and-drop interface.
* Structured code modules.

# Conclusion

Any beginner green-house owner/farmer can use it to monitor remotely. Application user must install required hardware components on their own.

# Future works

Application can be improved to the level where user will be able to manage/control various components of green-house. Moreover, notification for pre-defined problems can be added. More basic green-house start-up information can be added in information tab.

# Refrences

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* <https://developer.android.com/studio>

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