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A Survey Paper on Active Plant Wall for Green Indoor Climate Based on Cloud Computing and Internet of Things

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Abstract

Rapid refinement of cloud technologies has allowed the extensive deployment of applications based on cloud and services. Nowadays commercial companies, public organizations, private persons and universities like to migrate their applications, services and data storage to public cloud platforms such as Amazon cloud services, Azure cloud, IBM Bluemix or Google cloud platform. The amalgamation with IoT is an inevitable characteristic of any public cloud platform, due to the arriving IoT era and quick annual growth of connected devices.

Keywords: *Cloud Platforms, Internet of Things, Remote Control and Monitoring System, Plant wall system.*

INTRODUCTION

A plant wall system includes growing different types of plants on vertically sustained system that is added to an internal or external wall or is a standalone product.

A cloud platform consists of diverse services, including services that are enormously employed in IoT applications such as data storage, device management, data processing, virtualization and analytics. With the assistance of a public cloud platform, people are granted the flexibility to bind demanded services while escaping the necessity to build a private platform. Contributing from the enormous deployment of hardware, the total cost of utilizing a public cloud is lesser than the cost of implementing their own infrastructure from scratch.

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In addition, in IoT use cases, security is always prioritized concern since sensitive data leakage may lead to severe consequences. The security aspect is another benefit highlighted by public cloud platform throughout the entire software, infrastructure, storage and network.

Based on these merits we consider public cloud platform to build our remote monitoring and management solution for plant wall system.

LITERATURE SURVEY

Existing system

An active plant wall is designed to be integrated into infrastructure of a building for bio-filtering of indoor air and ecological air conditioning system. Plant wall have been delivered in public spaces such as airports, museums, universities and offices. Regularly managing the huge plant walls is time consuming and costly for the plant wall suppliers. Regular services of plant wall are also limited.

Existing system has many disadvantages like very difficult to maintain and measure frequency, it has high cost to making vertical plant wall system, some of the problems are occurred at the time of irrigation of plants, getting a soil to stay in place when planter is turned around 90 degrees, some of the times problems are occurs at the time of watering, rooting and growing of vertically plants.

Proposed system

To address the problem suffered by the plant wall suppliers, a remote monitoring and management solution that helps to speed up the universal implementation of plant walls is highly demanded. This system is aimed at contributing for controlling and monitoring indoor climate in private or public buildings. The proposed system consists of both a cloud service part and a local control part. The series of environmental parameters are monitored to recognize the indoor climate in the local part.

The data is continuously retrieved and directed to cloud using Wi-Fi protocol to assure availability and security. Our proposed solution consists of controlling functions for watering, lighting, and ventilation in a plant wall system. According to predefined settings these functions are directly monitored by a local microprocessor that are locally stored and remotely organized with cloud.

Proposed system has several benefits such as, improved indoor air quality, air

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purification; reduce noise, real time monitoring and timely feedback.

Architecture Design

The system is divided into two parts, i.e. the cloud server part and the control part and the local monitor. The local part consists of microprocessors, microcontrollers, actuators. The microcontroller is connected to the environmental sensors which include temperature, humidity, gas, PM, CO2, light and multichannel gas sensors. These sensors are sampled by the microcontroller.

These sensor readings are sent periodically to microprocessor by using a query. A microprocessor with an operating system and non-deterministic timing is used to run complicated tasks. A compatible microcontroller with sensors is used for sensor readings because of its deterministic timings. The robustness of the system is improved by separating he functions performed by microcontroller.

According to defined time schedules the light, fan, actuators in the plant wall are under control of the microprocessor. These settings are locally stored. Administrators are capable of scheduling and managing the ventilation, watering, and lighting of the plant wall.

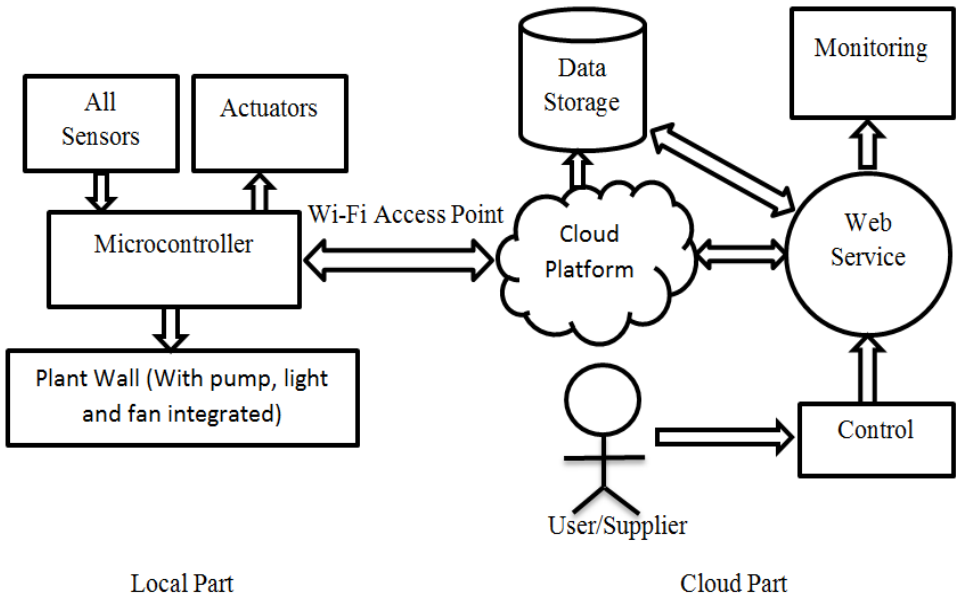

Figure.1. System overview of cloud and IoT based remote monitoring and management system for plant wall

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To enable the communication with remote cloud a Wi-Fi module is integrated with microprocessor chip. The local part works in two modes, i.e. offline mode and online mode. When the Internet connection is off it runs with the predefined local settings. When the cloud connectivity is enabled it operates according to the settings in the device twin. A website interface is used by administrators and users to perform management of the system.

COMPARATIVE RESULT

The growth of urban population also increases the rate of construction. With the growing of structure, the green areas or places in the urban areas are disappearing, so different environment problems occur. The result of the studies of various disciplines trying to find a solution to this problem, the concept of "vertical wall system". In this system, the nature of integrated into the vertical plane and the urban areas that are becoming increases day by day, which are able to achieve the greenery that it misses.

As the part of this study, vertical plant wall systems not only have advantages but also have some risks. Considering the scope of vertical garden advantages it can be said that vertical wall system are vital for urban areas and they contribute to the energy efficiency. So, vertical plant wall system is the key factor of development. When considering the risks of vertical wall system it is gathered that if there is enough time for regular maintenance work and apposite financial support many of these risks will be disappeared. It should be noted that the application areas should be chosen at right place to contain expected profit from vertical wall system applications.

CONCLUSION

This system is developed completely from hardware to software and from local control unit to the remote cloud According to user scheduling the system is capable to perform plant care functions like watering, lighting and ventilation. For data storage and real time virtualization several environmental sensors are integrated and the data is continuously transmitted to the cloud. By using a web-based interface users and administrators are able to perform maintenance and remote monitoring.

REFERENCES

I. "Vertical Garden – An Innovation Element of Green Building Technology" by Piyush Sharma [Department of civil engineering

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and, Amity School of Engineering & Technology].

II. "Vertical Gardening: for Present Age Environmental Protection" by K.K. Sahu and M.Sahu [Department of Genetics and Plant Breeding, IGKV, Raipur Chhatisgarh, India].

III. "Requirements for Designing Living Wall System – Analysis System Studies on Hungarian Projects" by Alexandra Tamasi, and GergelyDobszay. Received - 17 June 2015.

IV. "The Green Wall as Sustainable Tool in Mediterranean Cities: The case study of Limass of Cyprus" [Department of Architecture, Land & Environmental Science Neapolis, University of PafosDanaes 2, 8042 Pafos CYPRUS]

V. "GREEN ROOFS AND VERTICAL GARDENS" published by International Specialised Skill Institute, Melbourne.

VI. GREEN PLANTS for GREEN BUILDINGS, LIVING WALL, April 2014 edition.

VII. "Green Walls in High – Rise Buildings by Antony Wood", by PayamBahrams and Daniel Safarik by IMAGE publishing.

VIII. "Renewable and Sustainable Energy Review, Green Wall System" - A review of their characteristics, article – January 2015.

IX. https://www.naava.io/editorial/what-are-green-walls

X. https://livewall.com/frequently-asked-questions/

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