DESIGN OF SMART VILLAGE USING INTERNET OF THINGS AND CLOUD COMPUTING

S. Subhakala 1, S. Muthulakshmi 2, A. Geetha 3, Dhanya K 4, Meenakshi Sundara Nath T.M. 5

Department of Information Technology, Sri Krishna College of Technology, Coimbatore – 641042, India.
s.subhakala@skct.edu.in1, s.muthulakshmi@skct.edu.in2, geetha.a@skct.edu.in3, dhanya.k@skct.edu.in4, 15tuit053@skct.edu.in5.

ABSTRACT
This paper concentrates on implementing smart village through Internet of Things (IoT) and Artificial Intelligence (AI). IoT is used to control the working of great things with our free hands. It enables the path to connect anytime, anywhere, with everything and everyone can use. Meaning of “Smart” represents useful information which is analyzed through sensors used with the Internet Technologies. To improve the agriculture and to create the world optimization in all the fields, anything can be connected through internet. This in turn connects to smart irrigation as smart farming and converging into a Smart Village through IOT. Sensors related to moisture of soil and humidity of temperature are used to record the values. The data stored can be retrieved using cloud technology. The proposed result of the project is to make the village wholly connected through internet.

KEYWORDS: IOT, GSM, Soil moisture sensor, Temperature and humidity sensor, cloud computing, Artificial intelligence.

INTRODUCTION
Internet of Things (IoT) is the technology to share information and to produce new information through which anyone can analyze with the previous data. IoT gains it’s potential by using the Smart objects which use sensors and devices to aware of the data, and also they can form a network through which data must shared securely, access the open source Internet services and connect with the human world. Smart Village is an advanced and efficient technology used in agriculture for solving many technical hurdles in information technology for wide area, secured with reliable data transmission under integrated system. It used to convert the tradition farming to modern farming in an efficient way. The architecture of this approach consists of subsystem GSM module and sensors.

OVERVIEW
The system revolves around the technologies of IoT, Cloud and Artificial intelligence. First module of this system represents the prediction of irrigation using different sensors. In second module, cloud storage is used to preserve the predicted data. In third module the automatic system will respond to the field based on predicted data.

IRRIGATION SYSTEM
This paper deals with implementation of smart village use IoT, AI and cloud computing. Smart Irrigation System: Smart irrigation (Damodar, 2015) system consists of sensors associated to soil and temperature. Soil wetness is important for agricultural applications to support farmers to manage their irrigation.

1. Detecting the nearby local agricultural conditions.
2. Spotting the location of data gaining.
3. Transmitting the data to the corresponding control system manager.
4. Depending on obtained local data, decisions are made.

Figure-1: Overview

Figure-2. Irrigation System Architecture
SOIL MOISTURE SENSOR
In Smart cultivating (Ranade and Londhe, 2015), for determining plant growth the major factor is moisture content. Moisture sensor is resistance which identifies the replacement in soil resistance between two instruments which depends upon water capacity in it. Moreover, water increases the content of electrolytes in the soil which automatically increases the conductivity of the soil. This sensor plays a vital role as a Decision Tool for farmers by giving soil information and field variation.

![Soil Moisture Sensor](image)

**Figure-3:** Soil Moisture Sensor

TEMPERATURE SENSOR: Temperature sensor (Duan and Yane, 2011) is the important environmental parameters which work with a simultaneous change of climate, soil type, etc. The temperature in the soil is closely related with some methods which includes crop planting time and winter safety. The variation of coolness and heat content in the soil which describes the agricultural production and scientific research is observed using the sensors. Here, the temperature is directionally proportional to humidity. The accurate measurement could be more useful for good working of temperature sensors together with moisture sensors.

![Temperature Sensor](image)

**Figure-4:** Temperature Sensor

ARDUINO: Arduino is an open-source (Kaur and Karandeep, 2016) platform used for building the electronic and electrical projects (Delgermaa, 2010). Arduino contains microcontroller and software. The arduino board is connected with a power source. It has an ability to understand the environment by receiving the inputs from different sensors. Arduino programming language controls the microcontroller is controlled with the help of Arduino development environment.

GLOBAL SYSTEM FOR MOBILE COMMUNICATION (GSM): GSM is used in telecommunication methods. It consists of General Packet Radio System and High-Speed Circuit-Switched Data. GSM is the method of telecommunication system which includes Universal Mobile Telecommunications Service (UMTS). Applications related to short message service control, transfer of data, remote and logging can be reinforced. The modem gets connected with port or to any microcontroller.

CLOUD COMPUTING: Cloud computing is an internet based computing and it provides demand computing resources and services (Sirisha, 2015). It is evolved from virtualization, distributed and utility computing and parallel computing and from grid computing. Cloud computing is classified into various methods as Private, Public, Community and Hybrid cloud. This technique offers various services like software as a service (SaaS): SaaS refers to the software available on the internet. It includes youtube, facebook and few google applications. Platform as a service (PaaS): In PaaS customer can install the software application. It consists of network, hardware and an operating system. Services by PaaS include Amazon DB/S3, Google App Engine. Infrastructure as a service (IaaS): provides only hardware and network; the customer can install or develop their own operating systems, software and applications. Examples IaaS providers: Amazon EC2, Flexi Scale. There are several causes for organizations to move towards IT solutions that includes payment for resources on the basis of consumption.

Cloud storage: The data collected from the respective agricultural fields are stored using cloud computing. Therefore, huge data can be collected from different fields and stored without any faults and with much accuracy which can be used in future.

![Cloud storage Architecture](image)

**Figure-5:** Cloud storage Architecture
ARTIFICIAL INTELLIGENCE
The agriculture AI decision support approaches includes planning, monitoring, predictions and diagnosis problems.

CONCLUSION
IoT is a powerful, reliable, cost effective technology to implement the idea of “Smart Village” which aims at empowering villages with advance rural connectivity through web service, measurement of environment factors like soil moisture, temperature, humidity and with real time monitoring using GSM system.

REFERENCE
Delgermaa, C., Introducing new technologies for sustainable agricultural development in Mongolia: towards a collaborative and effective extension system (2010). http://hdl.handle.net/10388/etd-05242011-204647
Jat, Avnish Singh, Suma Dawn, Abhinav Mishra, and Amit Kumar, Asperger’s Disorder: Application for its Treatment through Emotion Detection (2016)
Ranade P. and S. Londhe, Smart Villages Through Information Technology, Need of Emerging India. IIJIT 3(7): (2015).