Internet of Things (IoT) for Smart Village

P.Abinash¹, J.Josephine²

¹UG Student, GKMCollege Of Engg & Tech Chennai, (India) ²Assistant Professor, Gkm College Of Engg & Tech, Chennai, (India)

ABSTRACT

The purpose of this project is the creation of a Smart Village. Model of a smart village following the concept of a smart city is presented in this manuscript as the effect of integrated technological changes which can be realized in a place which has none. Thus a remote and isolated village location is chosen where the modern civilization has not touched. The design makes the village self-sufficient with respect to electric power, water supply, street lighting, security, education and communication. Application of non-conventional methods of energy generation is the key for betterment as discussed. Renewable and non-polluted power is generated from solar heat. The heat energy is captured and stored in water for use at night and in absence of sun.

Internet of Things(IOT) is controlling embedded devices through Internet. Energy efficient street lamps with controlled light intensity as per the requirement have been designed. Water is provided to houses in cold and hot forms. Computers, mobile application for individual and educational places will enrich the place. Many sensors were used to detect the input and produce the following output.

Index Terms—Smart Village, Developed Area, less man power, easy monitoring, live updation.

I.INTRODUCTION

This project is divided into 5 different sections : AGRICULTURE HEALT H CARE, SMART SURVEILLANCE SYSTEM, SMART BUILDINGS, SMART EDUCATION, SMART DRIVE WIND TURBINE, WATER HARVESTING.

A. AGRICULTURE FIELD :

Agriculture Field plays a major role in Agriculture were all the crops are grown. To sense the soil, a **soil moisture sensor** is used. Soil moisture sensors measure the volumetric water content in soil. It measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content. The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity.



Fig. I(a)

B. SMART HEALTH CARE:

It tracks the health of each and every second of a human. The recorded value is stored in the database of each person's (patients) unique ID. For viewing the database of the person's history, **Cayenne app** is used where all the details are stored. **Arduino Nano** is used in this project to

store the values like Heartbeat, Blood Pressure, step count ,etc of a patient.



viewing the captured photo. This is placed in public places like temple, Bus Stop, Agriculture field. In field it is used to detect whether any animals get into the fields. If it detects an animal, it makes a phone call to the owner of the field through GSM module.









This is how the smart band works. The recorded value is sent to the **Cayenne** app and is stored in the cloud for future view.

C. SMART SURVEILLANCE SYSTEM:

Smart security is a major concern in villages as there is lesser number of lights, police stations are far off and the villages are located away from the main cities.Smart Surveillance system is used for monitoring of intruders movement in the village. **PIR SENSOR** is used for the detection purpose in the particular area.When the PIR sensor detects the person, the camera gets turned on and captures the intruder.Here we have used mobile instead of a monitor for

Fig. I(c)

D. SMART BUILDINGS:

The houses and buildings can be made smart by the use of sensors and cameras. This will produce real-time data which can be analyzed to take necessary actions. For example, **Gas sensors** installed in a home can detect smoke and hence start the water sprinklers automatically to combat the fire. Similarly, the sensors can monitor the usage of electricity in the house or building and switch the lights off when not in use. The water levels and pressure of water tanks and pipes can be measured using sensors and used to refill the tanks when necessary as well as it detect any faults in the pipes.



Fig. I(d)

E. SMART EDUCATION:

Smart Villages has launched an exhaustive educational programme that can ensure the development of a child. Since each child is unique and has a smartness inside, Smart Village Programme aims to understand the hidden potential and utilize the smartness of a child. So, using **Raspberry Pi** and Makey Arduino based board smart learning system can be developed which will further enhance the way of students learning in classroom.



F. SMART DRIVE WIND TURBINE:

Wind is one of the most underutilized energy sources currently available. While only about 4 percent of the world's energy resources comes from wind energy, the potential for its usefulness is nearly five times greater. When wind turbines are properly installed and used, they can provide huge stores of potential power. The construction of wind turbine is made by wood. The motor shaft is connected to the battery storage device through a circuit for energy storage purpose.





The Raspberry Pi is the combination of both CPU and microprocessor. It reduces the space and cost.

Fig. I(f)

G. WATER HARVESTING:

Water harvesting is saving water which plays the major role in Smart Village concept.For water saving purpose, olden days methods were used which were the best methods to save water.The land is buried 15m depth and 10m length as shown in the figure.By this way the rain water can be saved without wasting them.



Fig. I(g)

II.MATERIALS AND METHOD:

Wireless Sensor Network (WSN):

Wireless network refers to the technology to communicate and access the internet without cable connection between computers and other electronic devices. Sensor Network has contributed to several applications, and awareness has expanded to implement the technology into the agriculture environment. WSN is one of the most important technologies in the 21st century (Mendez & Mukhopadhyay, 2013). WSN is an assembly of a number of low-power, low-cost, multipurpose sensor nodes communicating wireless upon a short distance. The difference between a WSN and a RFID system is that RFID devices have no cooperative capabilities, while WSN allows different network topologies and multihop communication (Ruiz-Garcia et al., 2009). WSN can cut down the effort and time needed for monitoring environment (Mendez & Mukhopadhyay, 2013). As a result, money, water and labour costs can be reduced. The technology allows for remote measurements such as temperature, humidity, soil moisture and water level (Mendez & Mukhopadhyay, 2013). This seems to be increased development towards wireless outcomes in comparison to wired-based systems.

III.FUTURE DEVELOPMENT

The Smart Village will be developed in the future by the following ways.

1) upgrading school infrastructure/ digital literacy.

- 2) provision of piped water supply
- 3) Solid and liquid waste management.
- 4) Sanitation, sewerage and street lights
- 5) Health-care system
- 6) ATM/ Rural banks
- 7) Rural industries for value addition, agro- food processing, storage/ warehousing.
- 8) Information with Wi-Fi / Internet, cyber cafe service.
- 9) Community center with library

10) Skill development training center for creating jobs under self-employment through the cluster approach.

The microcontrollers used in this project can be used in many controllable projects. **Arduino UNO** and **Nano** has 14 digital pins and 8 analog pins. Arduino is the open source platform used worldwide for many purpose because of its cost and performance. Some of the example projects which can be done using this microcontroller are Home Automation, Robots, etc.

Raspberry Pi is also called as Mini CPU since it replaces it by its cost and size. The cost of Raspberry Pi is much less compared to CPU. It is used in educational purpose, Hacking, Robotics, etc.

Wired technology has many drawbacks, so to overcome this drawbacks usage of Zigbee is one of the solution for it. **Zigbee** is used as data communication device. It is designed for low power consumption. Zigbee provides network security and also application support services. It is based on mesh networking standard. Mesh networking provide higher reliability and wide range of application. Zigbee is the standard based technology which needs control and network application. It uses less power, so it has long battery life. It provides scalable network which makes it suitable for controlling and monitoring system.

IV.CONLCUSION

This study is significant in outlining general information about IoT, such as definition, market size, and status of IoT, which has become a hot IT topic nowadays, and in presenting applicable IoT business models to help business entities and research institutes participating in related projects build a smart city as part of the future vision of local governments by reflecting the new information paradigm of IoT. A limitation of this study, however, is the lack of available data in Korea that hinders the required empirical analysis on the benefits of IoT technology. Lets hope that more research in this field will be conducted in the future.

REFERENCES

[1] David Niewolny. How the Internet of Things Is Revolutionizing Healthcare. https://cache.freescale.com/files/corporate/doc /white paper/IOTREVHEALCARWP.pdf

[2] Paula Fraga-Lamas, et al., A Review on Internet of Things for Defense and Public Safety. Sensors (Basel) 2016 Oct., 16(10), 1644.

RELATED WORKS

[3] Bagula, A., Castelli, L and Zennaro, M.: On the design of smart parking networks in the smart cities: An optimal sensor placement model, Sensors, (2015), Vol.15, No.7, pp.15443-15467.

[4] D. Giusto, A. Iera, G. Morabito and L. Atzori, editors. The Internet of Things, Springer, 2010.

[5] John A. Stankovic, —Research Directions for the Internet of Things IEEE Internet of Things Journal, Vol.1, No.1, pp. 3-9

[6] IoT for Embedded systems : The new Industrial Revolution. Retrieved from http://www.micrium.com/iot/overview/

[7] J.Gubbi,R. Buyya, S.

Marusic, M. Palaniswami - Internet of Things

(IoT): A Vision, Architectural Elements, and

Future Directions || Future Generation Computer

Systems Volume 29, Issue 7, September 2013, Pages 1645–1660.