



IOT for Agriculture and allied areas

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Abstract: “Agriculture” is one of the major occupations in India. Often the fields of agriculture and its allied areas face a lot many problems in spite of the importance given to them by the political parties and by the government. IOT is the abbreviation of “Internet Of Things”. This paper introduces IOT and intends to discuss and summarize various IOT solutions to the problems in the areas of agriculture and its allied areas like aqua culture, dairy farming, etc.

Introduction: The traditional agriculture mainly depends on natural resources and hard labor. Using merely traditional methods in agriculture could not guarantee required yields and quality. As India being the second largest populated country in Asia, it needs to support its population with food security. Lot of changes have been taken place in areas of agriculture since its inception from the good olden days. Last century has been marked as an era of information and this information revolution also had its impact even in the areas of agriculture and its allied areas. Now, with the advent of “Internet of things”, agriculture can even be transformed and in fact is being transformed to attain high productivity and quality which in turn changes the lives of rural population of India.

What is IOT? : Connecting people over internet is called as Internet of people. But along with people we have many things around us both embedded with electronics and without electronics. Thus IOT could be understood as connecting physical objects to internet [1].

The Internet of things is the networking of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors and sometimes items not ordinarily considered to be computers having network connectivity that enable



these objects to collect and exchange data [5]. The IOT allows objects to be sensed and/or controlled remotely across existing network infrastructure.

“IOT” is defined as the extension of network connectivity and computing capability to objects, devices, sensors, and items not ordinarily considered to be computers, require minimal human intervention to generate, exchange, and consume data, and are amenable to remote data collection, analysis, and management capabilities [7]. [4] discussed about a system, In this proposal, a neural network approach is proposed for energy conservation routing in a wireless sensor network. Our designed neural network system has been successfully applied to our scheme of energy conservation. Neural network is applied to predict Most Significant Node and selecting the Group Head amongst the association of sensor nodes in the network. After having a precise prediction about Most Significant Node, we would like to expand our approach in future to different WSN power management techniques and observe the results. In this proposal, we used arbitrary data for our experiment purpose; it is also expected to generate a real time data for the experiment in future and also by using adhoc networks the energy level of the node can be maximized. The selection of Group Head is proposed using neural network with feed forward learning method. And the neural network found able to select a node amongst competing nodes as Group Head.

Components of IOT:

The following are essential components to form an IOT node [6]. In order to survive for longer periods of time on a single battery charge, an IOT node should exhibit low power consumption.



TABLE I
 COMPONENTS OF IOT

IOT Components	Description
Physical Objects:	Things
Sensors	Sense the physical environment
Actuators	Affect the physical environment
Virtual Objects	Electronic tickets, Agendas, Books, Wallets
People	Ex.: Humans can control the environment via mobile apps
Services	Ex.: Cloud services – can be used to: <ul style="list-style-type: none"> • Process big data and turn it into valuable information • Build and run innovative applications • Optimize business processes by integrating device data.
Platforms	Type of middleware used to connect IoT components (objects, people, services, etc.) to IoT. Provide numerous functions: <ul style="list-style-type: none"> • Access to devices • Ensuring proper installation/behavior of device • Data analytics • Interoperable connection to local network, cloud or other devices.
Networks	IoT components are tied together by networks, using various wireless and wireline technologies, standards, and protocols to provide pervasive connectivity.



Applications of IOT:Internet of Things has its applications in various fields like smart homes, smart cities, personal security, health, agriculture, transportation, environment monitoring, livestock maintainance, etc.

IOT in Agriculture:Along with many other advantages, IOT has its applications in the field of agriculture. With the help of various sensors, farmers can remotely monitor their crops related to water supply management, soil moisture, soil nutrients, crop yield, crop growth,pesticides management,etc and can automate certain tasks or can handle them easily remotely from their homes. For example: if the soil moisture is not sufficient in a particular field, and if there is a moisture sensor installed in that field which is connected to the internet, the concerned farmer can get an alert on his mobile about the less soil moisture condition. The farmer can turn on his water motor which is placed in the field, from his cell phone right from his home. Similarly getting dynamic rainfall prediction information, farmer can save his power and water by turning off his water motor in the field prior to hand thus finally preserving the natural resources.Pest control is also one of the major concerns of cultivation. There are sensors available which can monitor the growth of the crop, environmental conditions, pests intensity, etc which when effectively used can help the farmer to a greater extent[2].

IOT in Aquaculture and fisheries:In Andhra Pradesh, coastal area is more and hence there is much scope for aquaculture and fisheries. IOT proposes solutions to many of the problems of aqua farmers. Water quality monitoring, water quality controlling, fish behavior, etc could be achieved through IOT. For eg: Oxygen levels may drop in water suddenly and farmers can not predict when oxygen levels could drop. This is a serious condition in aqua culture as many prawns or fish die due to lack of oxygen. To cope up with this situation, few sensors which could sense the oxygen level in water could be employed at the site and can connect those sensors to internet. When ever there is a drop in oxygen level in water, farmer can receive an SMS on his phone so that he can remotely switch on the fans at the site to increase the oxygen level. Similarly the chemical properties of water can also be sensed with a different sensor to act accordingly.



Presence of chlorophyll could also be sensed to identify the areas where more fish could be found.

IOT in dairy farming: In general, Cattle rearing and agriculture goes hand in hand. IOT has its solutions even in live stock protection and in dairy farming. Cattle can be tagged with RFID sensors which come in many forms like stickers, rings, etc so that they can be easily identified. When cattle are left for grazing there are chances for getting missed. If they are tagged, farmers can easily know where the animal is and can easily catch them. Also there are sensors which can monitor the health of the live stock. A small sensor in the form of a small tablet can be given to the cattle. With the help of this sensor, the cattle general health condition, breeding times, etc can be monitored. Spreading of contagious diseases can also be controlled by monitoring the health of all live stock and separating the diseased cattle from other cattle at right time.

IOT in Food production and safety: IOT extends its applications even in the areas of food production and safety. With the help of IOT devices, pathogens could be identified much earlier before they cause heavy damage. IOT devices could also be employed during the phases of food package and transportation. Also food quality could be monitored from any point of place remotely and at any point of time.

Challenges of IOT: As many devices are predicted to be connected to internet in future, big data explosion is going to be a greater challenge. Also, security and privacy of data could be another threat. Connectivity standards are yet to be established and high speed internet connectivity has to be attained.

Conclusion: As it is estimated that by 2050, crores of number of devices will be connected to internet, we can understand the importance and intensity of IOT usage in future. Andhra Pradesh government is taking so many initiatives for the development of IOT. As government has rightly predicted the revolution of IOT, it is trying to create the necessary infrastructure like fiber grid to give internet connectivity to every nook and corner of the state. As IOT proposes so many solutions to various problems of agriculture and its allied areas, it should be brought to the field level. All farmers must be introduced to this area and must be acquainted to this new technology. When understood properly



and if used with awareness definitely IOT helps farmers a lot and our country will be ready to take up future challenges .

References:

- [1] Kavitha.A.V.,K.Bhagyalakshmi : “Waves of IOT in higher education”, IN “International Journal of Innovative Research in Advanced Engineering (IJIRAE)”, Issue 12, Volume 3 (December 2016) , pg no: 59-61. ISSN: 2349-2763.
- [2] YaoShifeng,FengChungui,HeYuanyuan,ZhuShiping : “Applications of IOT in agriculture”, IN “Journal of Agriculture Mechanization Research”, 2011.
- [3] Kevin Ashton: That 'Internet of Things' Thing. In: RFID Journal, 22. Juli 2009. Abgerufen am 8.
- [4] Christo Ananth, A.Nasrin Banu, M.Manju, S.Nilofer, S.Mageshwari, A.Peratchi Selvi, “Efficient Energy Management Routing in WSN”, International Journal of Advanced Research in Management, Architecture, Technology and Engineering (IJARMATE), Volume 1, Issue 1, August 2015,pp:16-19
- [5] “Controll systems and internet of things” magazine of IEEE.
- [6] www.getgds.com/internetofthings.
- [7] <https://www.computer.org/web/sensing-iot>.
- [8] 2016 Wikipedia website, [Online]. Available.:https://en.wikipedia.org/wiki/Internet_of_things