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Simulation and Analysis of Smart Animal Farm

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Abstract: ***A smart way of automating feeding process can be called as Smart Animal Farm. By implying an automated system we can eliminate possible threats to the feed by reducing the human intervention. Environment real time monitoring is an important factor in smart farming. There has been a strong relationship between humans and animals through- out the centuries. We depend on animals in many aspects of life such as sports, food, clothes and other product that support and facilitate our living. Therefore a good care of animals is very important. The livestock industry could greatly be benefitted from animals, aggregating the data and reporting the obtained results to owner and regional. Farming plays an important role in today's world and it requires proper environmental and diet care. A smart system is needed to operate and monitor animal farm remotely. This system should provide feed and water as required, exhaust the excess of biogas which is produced by the animals waste, and detect fire in the farm. Moreover, this intelligent system should also do surveillance of the entire farm. This kind of intelligent system can be designed cost electively by using microcontrollers, water level sensor, ultrasonic sensor, gas sensor, temperature, humidity sensor, and an IP Camera along with Internet or Intranet connectivity with the devices i.e. smart phones or computer. Automated feeding allows the farmer to ease his workload, save time and increase his flexibility. Automatic feeding systems deliver more feedings, less labour. This smart system can reduce the human intervention than the current scenario. This system will realize smart solution for feeding the animals and efficiently solve the issues related to farmers.***
Keywords : Smart Feeding, real time monitoring, sensors, IOT MQTT, Android app.

I. INTRODUCTION

As earlier we need lots of human interaction for animals such as monitoring, feeding, cleaning waste and other activities so to reduce work load of human idea is to develop smart system using IOT to monitor and control animal. A smart system is needed to operate and monitor animal farm remotely. This sys-tem should provide feed and water as required, exhaust the excess of biogas which is produced by the animals waste, and detect re in the farm. Moreover, this intelligent system should also do surveillance of the entire farm. This kind of intelligent system can be designed cost effectively by using microcontrollers, water level sensor, ultrasonic sensor, gas sensor, temperature, humidity sensor, and an IP Cam-era along with Internet or Intranet connectivity with the devices i.e. smart phones or computer.

The completely automated smart animal system can inform you about the requirements of the animals. The smart animal system concept can improve the time utilization and reduce the involvement of worker. The smart animal system can improve the farmer's life style and can completely change the face of farming. Better understand the opportunities of an resource saving of using wireless sensors and remotely monitoring device.

By introducing the IOT (Internet of Things) we can monitor the farms without the human intervention. We can manage the entire animal behaviour just on one click. The entire automated animal system can increase not only the farm production but also it can have well effect on economy as agriculture is one of the major economy sector. Smart Animal System will provide smart interface to farming techniques to increase the production

II. RELATED WORK

"Research on Animal Feed and Animal Waste Detection based on Computer Vision".

[Authors: Bin Hu, Qiuchang Tian, Zizhang Chen , Gang Xiong.]

In this paper, author presents the algorithm (animal feed detection algorithm and animal waste detection algorithm). In animal feed detection algorithm, author has used color features and canny's edge detection techniques to detect the animal feed. In waste detection algorithm, author has used the technique called median filter together with hough's straight line transformation to find out the contaminated area for the waste detection.

"Automating Monitoring of Cat Feeding Behaviour".

[Authors: Donald Bailey, David Thomas, Michelle Cho, Said Al-Souti.]

In this paper, author has proposed an economic way of monitoring the behavior of cats while feeding during palatability trails. Palatability is used in food selection as it depends on various factors includes taste, temperature, texture choice of food. Here author

has used food bowls with load cells to measure the quantity of food eaten by cats. Another feature used in this paper is video monitoring, it records the activity of animals and also eliminates period of animal inactivity by using adaptive background substraction technique.

"Automated Analysis of Feeding Behaviour in Small Animals".

[Authors :J. P. Stittl, R. P. Gaumond1, J. L. Frazierl, and F. E. Hanson]

In this paper author has described the implementation and operation of an apparatus that is designed to record and analyze the feeding behavior of a small animal such as a caterpillar. The behavior studied here is driven by input from taste receptors; changes in peripheral sensory input will induce observable behavioral changes. Author has implemented a system capable of modeling the chemosensory induced behavioural changes of a plant-feeding caterpillar, the larval Muncu sextu. Eight taste neurons provide primary input to the feeding decision center of the CNS which produces the observable behaviour response. A mathematical model encodes the relationship between the activity levels of peripheral taste receptors and the observable feeding behaviour.

"Smart Farm Computing Systems for Animal Welfare Monitoring".

[Authors : Marcel Caria, Jasmin Schudrowitz, Admela Jukan and Nicole.]

In this paper, author has designed the open and low cost computing system for animal welfare by making use of the techniques like fog computing and low cost edge devices (Raspberry Pi). This smart system creates the fog computing layer connected with cloud computing system and a mobile app and Raspberry Pi is used to monitor the animals and the farm. Author mainly focuses on two parameters i.e. stable temperature and animal movements

III.PROPOSED SYSTEM

We in this paper proposed an efficient smart system which can be designed by deploying sensors (water level sensor, temperature sensor, motion sensor, biogas sensor) and microcontroller (ESP8266) in the animal farm, all the sensors are connected to the microcontroller. The objective of the proposed system is to provide feed and water as required, exhaust the excess of biogas produced, detect fire in the farm. This intelligent system should also do surveillance of the entire farm, Real time monitoring. We aim to design an automated system which monitors and controls the environment of the animals.

This system uses sensing and inbuilt Wi-Fi capabilities of the ESP8266 chip to connect to cloud. It is a cloud enabled solution which helps in remote monitoring, alerting and decision making. An app, developed using MIT App Inventer helps in mobile monitoring and alerting of animal behaviour below threshold level. This facilitates us with smart system of animal farming.

A. The SMART management can provide benefits as follows:

1) It delivers animal care with less labour.

2) Concept is with less human intervention

3) Smart farm allows the farmer to ease his workload, save time and increase his flexibility.

Ultrasonic sensors can both sense and transmit hence they are also called as transceivers. Ultrasonic convert ultrasound waves to electrical signals or contrariwise. They can solve even the most advanced tasks involving object detection or level measurement. When ultrasonic sensing elements generate high-frequency sound waves then an echo is generated that is received back by the sensor. The distance to an object is measured by measuring the time interval between sending the signal and receiving the echo. Once the ultrasonic wave is launched, the timing is begun and ultrasonic transmitter emits an ultrasonic wave in one direction. As soon as this wave, encounters an obstacle, it bounces back. Once the ultrasonic receiver receives the reflected wave it will stop timing.

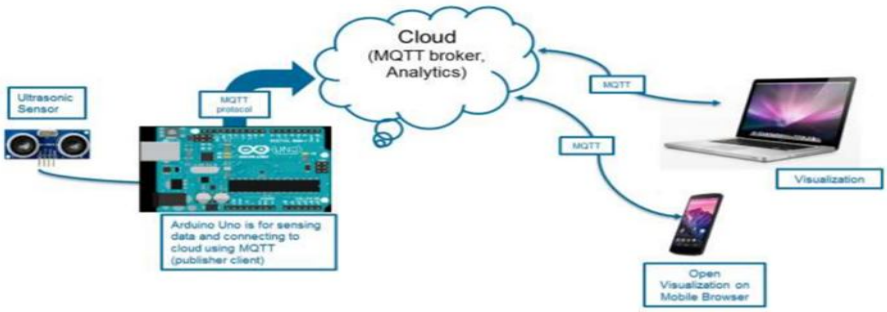


Fig – Working of ultrasonic sensor

B. Operation Mode

The time period taken by ultrasonic waves to reach the surface of the medium and back is used to determine level measurement. The modified angle during filling and emptying granulated solids and also the rough liquid surfaces influence the reflection of the ultrasonic pulse. Chemical and physical properties of the medium don't influence the measurement result. Hence the abrasive and aggressive, viscous and adhesive media will be easily measured.

C. Arduino Uno

Arduino is an open-source platform. That is incredibly easy-to-use for hardware and software. Arduino boards take inputs like light on a sensor, a finger on a button, and switch it into an output - activating a motor, turning on an LED. All this can be defined by a group of instructions programmed through the Arduino software (IDE). This board differs from simple 8-bit boards as they are used for IoT applications and embedded environments. Arduino Uno is a microcontroller board based on the ATmega328P .The output from ultrasonic sensor is connected to the board, and the board is connected to a computer with a USB cable this board is used for sensing data and connecting it to cloud using MQTT protocol (publisher client).

D. Mqtt Protocol

The need to manage the communication between these connected devices is a focus of the Internet of Things. Most web traffic is carried using a protocol called Hypertext Transfer Protocol (HTTP). But HTTP has a number of limitations that make it a poor choice as an Internet of Things protocol.

MQTT is Message Queue Telemetry Transport it is a publish/subscribe protocol, which enables easy broadcasting of messages from one publisher to several subscribers. As MQTT offers a number of significant advantages over HTTP such as improved user experience, more flexibility and scalability, lower running costs, lower development costs and insanely efficient, hence MQTT protocol is used for internet of things.

By sending a message to the broker the connection is initiated through a publisher. Once the message is received the broker provides response to that with a status code. MQTT clients are behind routers. To translate from a private network address (like 192.168.x.x, 10.0.x.x) to a public they use network address translation (NAT). After establishing the connection the broker has to keep it open as long as the publisher doesn't send a disconnect command or it loses the connection. It is very simple and lightweight messaging protocol, with low bandwidth, unreliable networks or high-latency. The principle of design aims to reduce network bandwidth and device resource needs. MQTT provides a scalable and cost effective way to connect your devices over the internet. MQTT additionally provides security by permitting to send a username and password for authenticating the client and also authorization. Then as shown in fig, we can get open visualization on our mobile or computer through the cloud.

IV. IMPLEMENTATION OF PROPOSED TECHNIQUE

Each animal is detected using RFID tag. This system consist of five modules. Each module work independently,here we use idea of agile model. Depending upon their output, levels are periodically updated on the cloud, which will further send it to the application. Application will then analyze the data, detect behaviour and performs the task. After an appropriate algorithm is performed . The user will be able to set the threshold for every item.

A. The Application Will be Able to Perform Following Tasks

1) Notify if any value has reached below a threshold level.
2) Allow user to set the threshold value for different modules.
3) Enable user to know the status of animal.

B. Algorithm

1) Attach the ultrasonic sensor to Ardunio board. Here we are using four GPIO pins of Arduinouno – vcc, ground, trigger and echo.
2) Calculate distance by using trigger and echo pin of ultrasonic sensor.
3) Send/publish this distance data by using PubSubclient library by using Jason format and MQTT protocol to cloud server.
4) Get the data at cloud server and visualize the data in the form of graph by using visualizer. As per the data make the decision whether we want to order the product or not.

V. RESULTS

The data sensed by the sensor is given to the board and the USB connection from the board is given to computer. The output data is displayed on serial monitor, through the cloud using MQTT protocol.

A. Code Snippet On Arduino

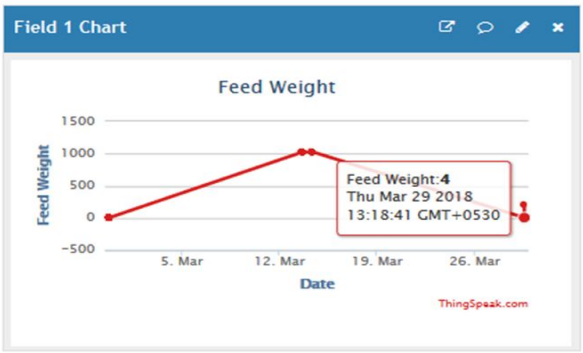
B. Pet Authentication

Created: 10 days ago
Updated: 6 days ago
Last entry: 6 days ago
Entries: 15

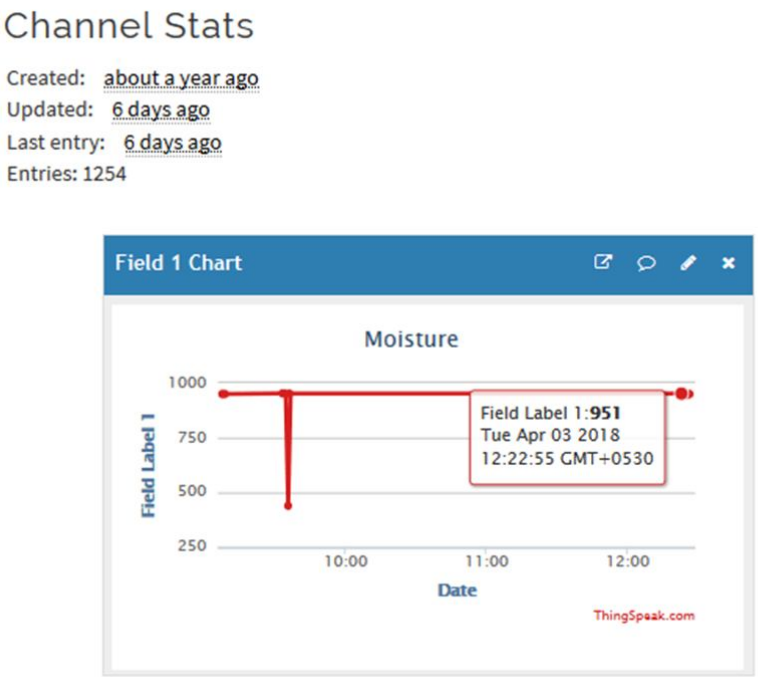
C. Feed Weight Sensors Status

Channel Stats

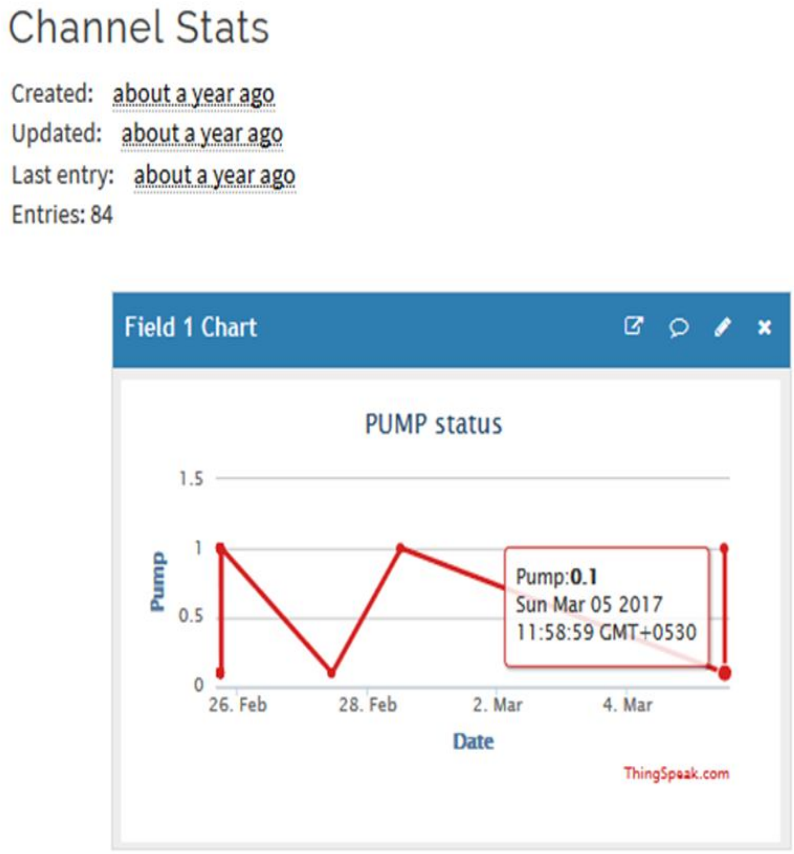
Created: 6 months ago
Updated: 11 days ago
Last entry: 11 days ago
Entries: 798



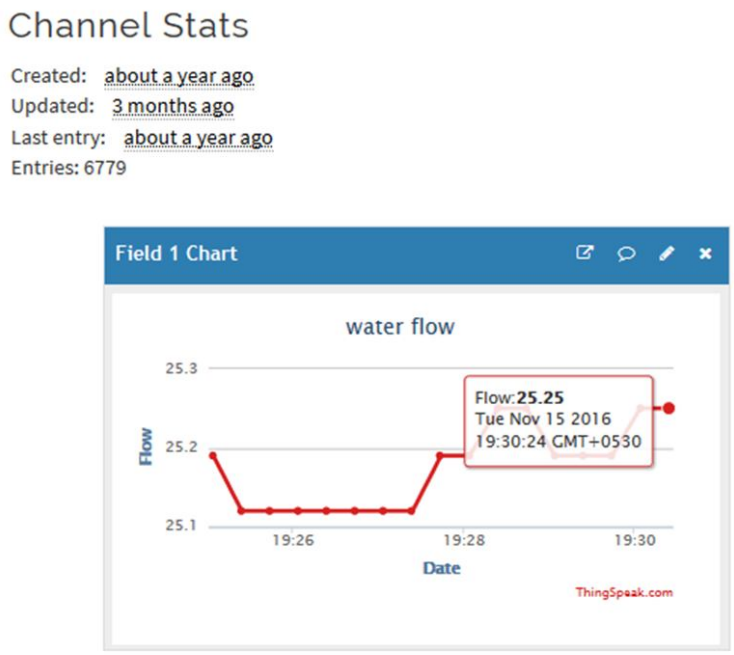
D. Moisture Sensors Output



E. Pump Status



F. Water Flow Sensor Level



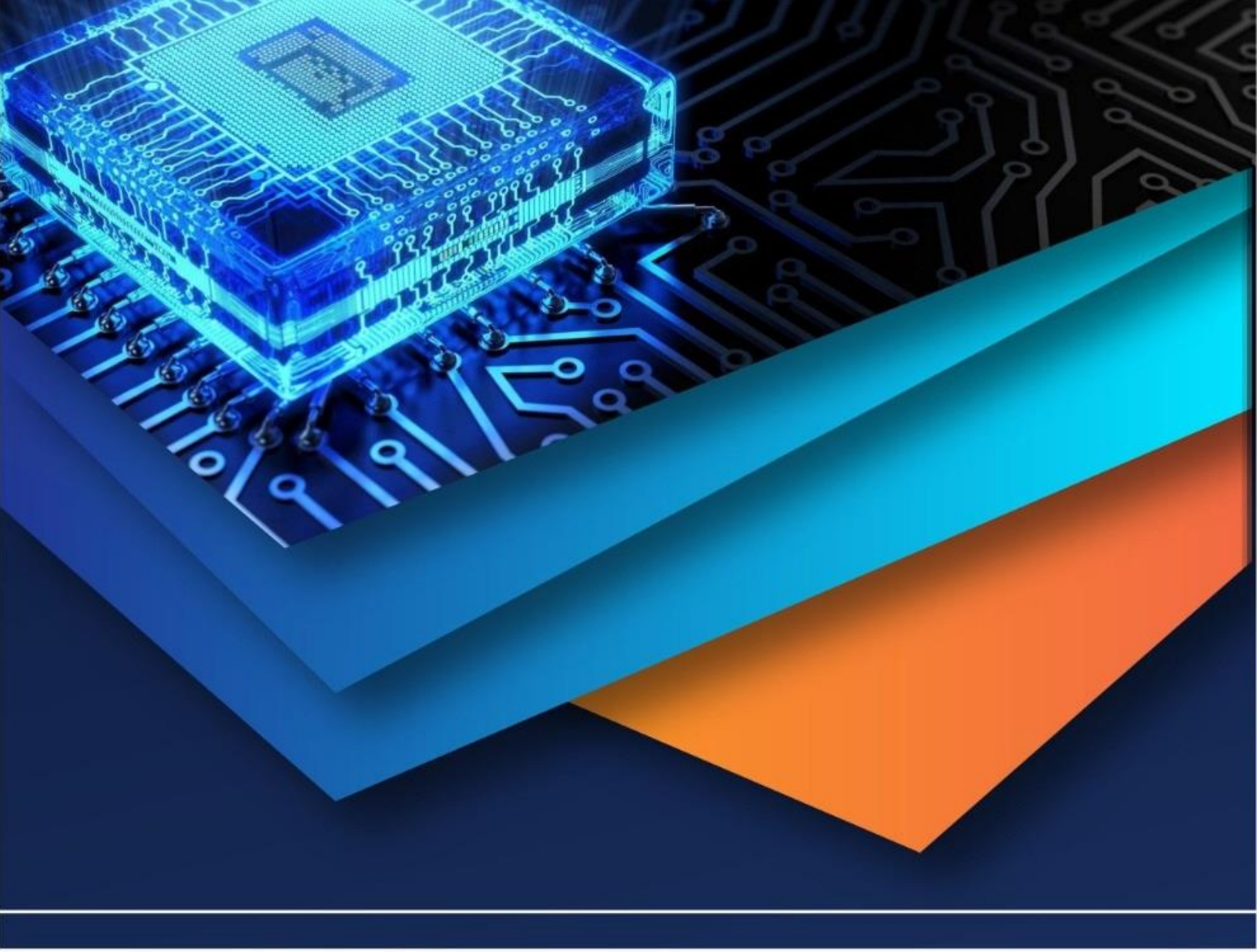
VI. CONCLUSIONS

We proposed a cost efficient IOT enabled smart system which is comprised of feed filling system, water filling system, biogas exhaust system, fire detecting system. It continuously monitors the physical parameters of an animal farm. It can be controlled manually as well as automatically. This system considers almost all parameters such as diet care, cleanliness, farm surveillance which are important for an animal welfare. Smart farm allows a farmer to ease his workload , save time and increase his flexibility. There is a long and prosperous future in smart farming and to sustain it each nation must become more food dependent.

Future work: It is the technology of today which is touching and transforming every aspect of our real life. IOT has given a concept of Machine to Machine (M2M) communication. Extended by camera.

REFERENCES

[1] J. Gubbi R. Buyya S. Marusic M. Palaniswami ”Internet of Things (IoT): A vision architectural elements and future directions” Future Generation Computer Systems vol. 29 no. 7 pp. 1645-1660 2015.
[2] L. Atzori A. Lera G. Morabito ”The Internet of Things: A survey” Computer Networks vol. 54 no. 15 pp. 2787-2805 2015.
[3] Applications of IoT [online] Available: http://www.libelium.com/top50iotsensorapplicationsranking/.
[4] P.K. MashokoNkwari S. Rimer B.S. Paul ”Cattle monitoring system using wire- less sensor network in order to prevent cattle rustlingIST-Africa Conference Pro- ceedings pp. 1-10 79 May 2015.
[5] T. Robles R. Alcarria D. Martin A. Morales M. Navarro R. Calero S. Iglesias M. Lopez ”An Internet of Things-Based Model for Smart Water Management” 28th International Conference on Advanced Information Networking and Applications Workshops (WAINA) pp. 821-826 13-16 May 2014.
[6] ActiveX and LabVIEW Report published on Oct 2014 [online] Available: http://www.ni.com/white-paper/2983/.



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