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Institute for Home Science and Higher Education for Women

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(Estd. u/s 3 of UGC Act 1956)

Coimbatore - 6410 4243, Tamil Nadu, India



**UGC Sponsored**

**Two Day National Conference  
on Internet of Things  
18<sup>th</sup> and 19<sup>th</sup> February 2016**



Organized by

Department of Computer Science

&

Department of Information Technology

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## Table of Contents

1. <i>Challenges in Integrating Wireless Sensor Network and Internet of Things for Environmental Monitoring</i> S. R. Vijayalakshmi, S. Muruganand .....	8
2. <i>A Cloud Platform for the Internet of Things</i> K. Swarnalatha, Supriya N. Alankar, Y. Bhagyalakshmi .....	16
3. <i>Wireless Sensor Based Health Monitoring System for Co-Morbid Patient</i> D. Priyanka, A. Saranya, S. Selva Priyanka, S. Vinothini, M. Janani, S. Sangeetha ...	28
4. <i>An Approach to Secure Communication in IoT (Internet of Things)</i> G. F. Ali Ahammed, Reshma Banu, Nasreen Fathima .....	33
5. <i>Web Based Architecture for Internet of Things Using GSM for Implementation of Smart Home Applications</i> K. Swarnalatha, Amreen Saba, Asfiya Muhammadi Basheer, P. S. Ramya .....	40
6. <i>Cloud Computing and its Security Perspectives</i> M. Newlin Rajkumar, V. Venkatesa Kumar .....	51
7. <i>IoT and Big Data Towards a Smart City</i> Anand Paul .....	54
8. <i>Processing Big Data Collected from IoT and Provisioning Sources</i> S. Sriram .....	65
9. <i>A Survey on Resource Provisioning Heuristics</i> M. Gowthami, V. Suganya .....	69
10. <i>Social Internet of Things</i> S. Geetha .....	76
11. <i>A Survey on Privacy Preserving Data Mining</i> S. Bharanya, P. Amudha .....	82
12. <i>Information Retrieval System for Internet of Things: A survey</i> C. Indhu, S. Sivakumar, R. Praveena Priyadharsini .....	91
13. <i>Study: Protocols and Challenging Issues in IoT</i> G. Bhavani, S. Sangeetha, S. Sivakumari .....	98
14. <i>Anti-Spoofing Method: A Survey on Biometric Face Recognition</i> M. Saranya, P. Amudha .....	107
15. <i>A Study on Technologies User for implementation of Internet of Things</i> K. S. Sindhu, M. Aasha, S. Sivakumari .....	114
16. <i>Identity-based Encryption for device-to-device Security in IOT Environments</i> S. Mohana, T. K. S. Lakshmi Priya .....	120

17. <b>Scheduling Based Wireless Sensor Networks Integrated with IoT Environment</b> N. Mahendran .....	131
18. <b>GIS Enabled Internet of Things (IoT) Applications: An Overview</b> R. Vishnu Priya, S. Sivaranjani, S. Sivakumari .....	143
19. <b>The Internet of Things - A Survey</b> S. K. Anithaa, S. Arunaa, M. Dheepthika, S. Kalaivani, M. Nagammai, M. Aasha, S. Sivakumari .....	150
20. <b>A Survey on Internet of Things Architecture</b> T. Nandhini, M. Sajitha Parveen, B. Kalpana .....	159
21. <b>Going Green with IoT for Smart World - An Overview</b> N. Sanfia Sehnaz, L. Hemalatha, M. C. S. Geetha, I. Elizabeth Shanthi .....	167
22. <b>A Survey on Big Data and Internet of Things</b> Bhuvaneswari Ragothaman, M. Surya Prabha, Elsa Jose, B. Sarojini .....	174
23. <b>Applications and Challenges of IOT: Perspective Approach</b> M. Umadevi, M. Devapriya .....	180
24. <b>Surveillance and sequestration Issues of Internet of Things (SSIoT)</b> Reshma Banu, Ayesha Taranum .....	185
25. <b>Topology Based Routing Protocols in Vehicular Ad-Hoc Networks (VANET)</b> M. Newlin Rajkumar, M. Nithya, P. Hemalatha, R. Rajeswari .....	200
26. <b>Reversible Data Hiding with QR Code Application</b> V. Revathi .....	208
27. <b>Security Requirements and Mechanisms in Vehicular Ad-Hoc Networks (VANET)</b> M. Newlin Rajkumar, M. Nithya, M. Krithika .....	214
28. <b>Automatic Efficient Accident Detection and Emergency System Using Smart Phones: (Accelerometer Sensor)</b> M. Newlin Rajkumar, P. Hemalatha .....	223
29. <b>Internet of Things – An Overview</b> Ms. Sujithra, G. Padmavathi .....	227
30. <b>IOT Security Challenges and Issues – An Overview</b> Ms. Sujithra, G. Padmavathi .....	232
31. <b>A Study on Denial of Service Attacks in Cluster Based Web Servers</b> A. Poornima, D. Maheshwari .....	240
32. <b>Fast Data Collection in Tree-Based Wireless Sensor Networks</b> B. M. Parashiva Murthy, K. Tanuja, M. Rakshitha, S. Supretha .....	248
33. <b>Analyse the Metrological Data Using Data Mining Technique</b> P. Vanitha, M. Mayilvaganan .....	256
34. <b>High Speed Data Streams Using Data Mining Techniques</b> R. Sangeetha .....	264

35. <i>Exploiting Dynamic Resource Allocation</i> G. S. Geethamani, Dr. M. Mayilvaganan .....	270
36. <i>Duplicate Record Detection Using Progressive Sorted Neighborhood Method</i> R. Preyadharsini, K. Deepa .....	277
37. <i>IoT &amp; WSN based Smart Precision Agriculture</i> M. M. Jayashree, S. Sangeetha .....	288
38. <i>A Review on Data Mining Algorithms for Internet of Things</i> M. Bhuvaneshwari, K. Merlin Jeba, V. Srividhya .....	294
39. <i>Brewing Heterogeneous Devices for Monitoring Cerebrovascular Oxygenation</i> G. Geetha, S. N. Geethalakshmi, D. Mathivadhani .....	302
40. <i>Impact of Internet of Things on Future of Education - An Overview</i> N. Valliamal, V. Srividhya .....	307
41. <i>Mobility Management for Internet of Things</i> S. Shamala, Adnan J. Jabir .....	313



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## Going Green with IoT for Smart World - An Overview

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### ABSTRACT

Smart world is planned as an epoch in which objects (e.g., watches, mobile phones, computers, cars, buses and trains) can immediately and intelligently serve people in a coefficient manner. Internet of things links up everything in the smart world. Internet of things allows objects to be sensed and controlled remotely across exiting network infrastructure, creating opportunities for more-direct integration between the physical world and computer –based systems, and resulting in improved efficiency, accuracy and economic benefits. Each thing is exclusively different through its embedded computing system but is able to interoperate within the surviving internet infrastructure. Today's earth encloses a smart reminder that the internet of things can be made green- and green technology can be maximized with smart use of IoT. IoT implement the collection of data at finer levels of details, and deeper analysis of that data, business and individuals can drive bigger results from smaller changes to their immediate environment. Internet of things is that things can correspond to each other without human with each other and helps to save energy with user. This permits peoples and things to be connected Anytime, Anyplace, with anything and anyone, ideally using any path/network and any service. Green IoT forecast to familiarize changes in our daily life and would help realizing the vision of "Green ambient intelligence".

**Keywords:** Internet of Things; Smart World; Smart homes; Smart city; Smart grid; Smart health care; Green IoT; ICT technology; GPS

## I. INTRODUCTION

When people talk about “the next big thing,” they’re never thinking big enough. It’s not a lack of imagination; it’s a lack of observation. Generally speaking, IoT refers to the network paired of everyday objects, which are prepared with global intelligence. It is opening tremendous opportunities for a large set of novel application that promise the quality of our lives. In recent years, IoT has gained much attention from researchers and practitioners from around the world. Living in such a smart world people will be collaboratively and immediately served by the smart devices (e.g., mobile phones, laptops), Smart environments (e.g., apartments, malls), Smart transportation (e.g., cars, trains), etc. For e.g., GPS helps a person’s locations can continuously transmitted to a server that tells us the best routes for the travelers destination, keeping the person stuck in traffic. As the next significant stage in human history, smart world is receiving various attention from government, academic, industry, etc [1].

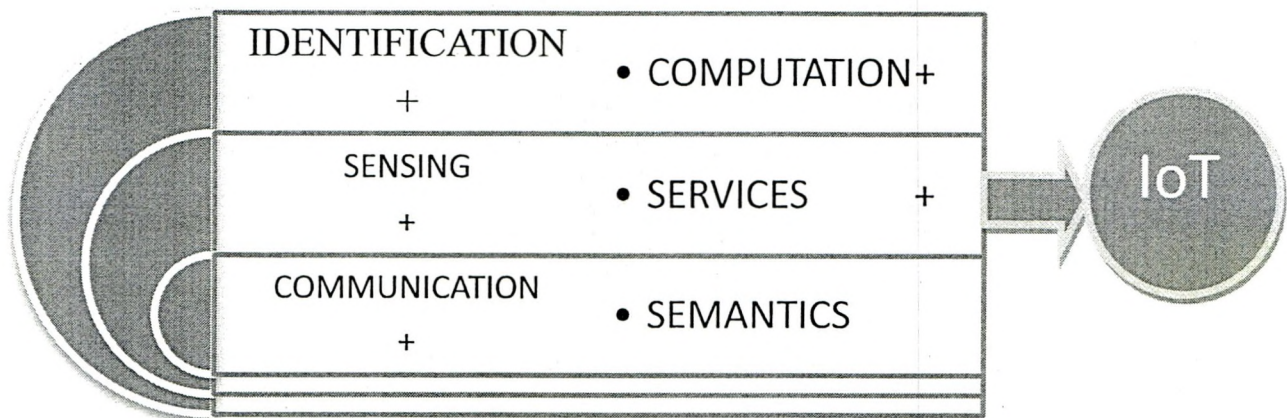


Fig. 1. Elements of IoT.

## II. OVERVIEW OF IoT AND GREEN IoT

### A. IoT

The Internet of Things is the network of physical objects, devices, vehicles, buildings and other items which are embedded with electronics, software, sensors and network connectivity, which enables these objects to gather and replace data [2]. It allows objects to identify and organize remotely across existing network infrastructure, creating chances for mode-direct incorporation between the physical world and computer-based systems, and resulting in improved efficiency, accuracy, and economic benefits; when IOT is accelerated with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also includes technologies such as smart grids, smart homes, intelligent transportation and smart cities.

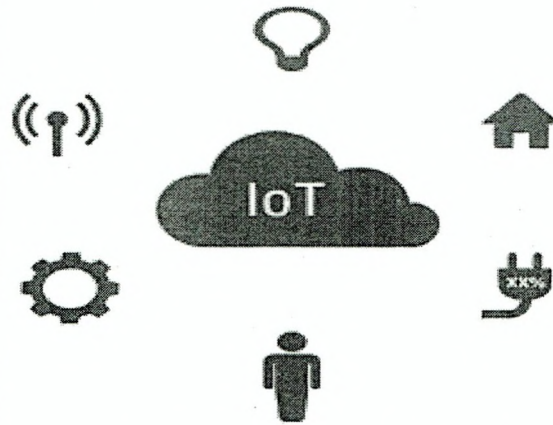


Fig. 2. Examole for IoT.

### B. GREEN IoT

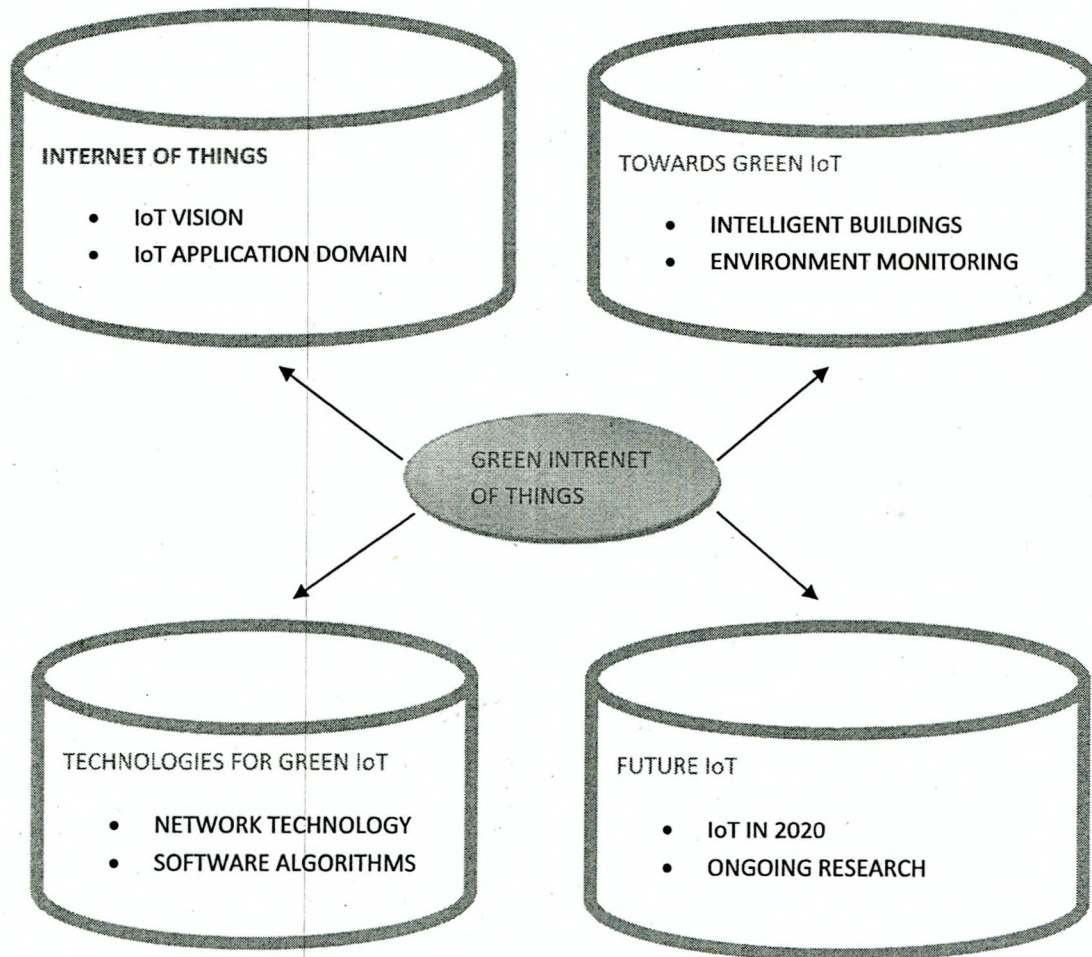


Fig. 3. Green Internets of Things

Green IoT is predictable that any object will have a unique way of identification in the upcoming years. That is commonly known in the networking field of computer science as “Unique address”, creating an addressable continuum of computers, sensors, actuators, mobile phone. In future we will be surrounded by a huge amount of sensors, devices and “things”, which will be able to be in contact via IP, act “intelligently”, and provide green support for users in managing and maintenance of everyone’s tasks. These new smart objects will be able to perform certain functions autonomously such as calling for new forms of green communication between people and things and between things themselves, where power consumption is optimized and bandwidth utilization is maximized. These developments would not only be relevant to researchers, but also to corporations and individuals alike.

### III. APPLICATION OF IoT AND GREEN IoT

With honor to IoT and green IoT, there are a lot of applications. We list some application scenarios as follows [5],

**SMART HOMES:** Personal life-style of every people is going on improvers, at homes by making it more time-saving and simpler to monitor and operate home appliances and systems (e.g., microwave, oven, air-conditioned etc.) remotely.

**INDUSTRIAL AUTOMATION:** This IoT and Green IoT technology plays a vital role in the industrial automation. Human participation, robotic devices are computerized to finish completion tasks sooner. The machines operations, functionalities and productivity rates are spontaneously coordinated and monitored.

**SMART HEALTHCARE:** Healthcare applications are improved in many countries and paying more attention for every citizens, by embedding sensors and actuators in patients and their medicine for monitoring and tracking the patient’s details.

**SMART GRID:** Smart grid mainly help in Power suppliers which are assisted to control and manage resources so that power can be offered proportionally to the population growth.

**SMART CITY:** Smart city gives the Quality of life in the city improvement by making it more convenient and easier for the residents to obtain details of interest.

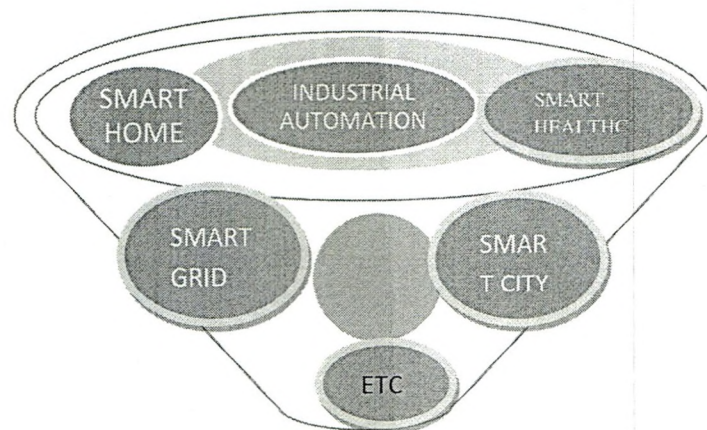


Fig. 4. Applications of IoT and Green IoT.

#### IV. ICT ENABLING GREEN IoT

The term ICT that relates to any technology, application such as hardware, software, satellite systems, radio, television, cell phones etc., about its details and communication information of users' access, transmit and manipulate various information's.

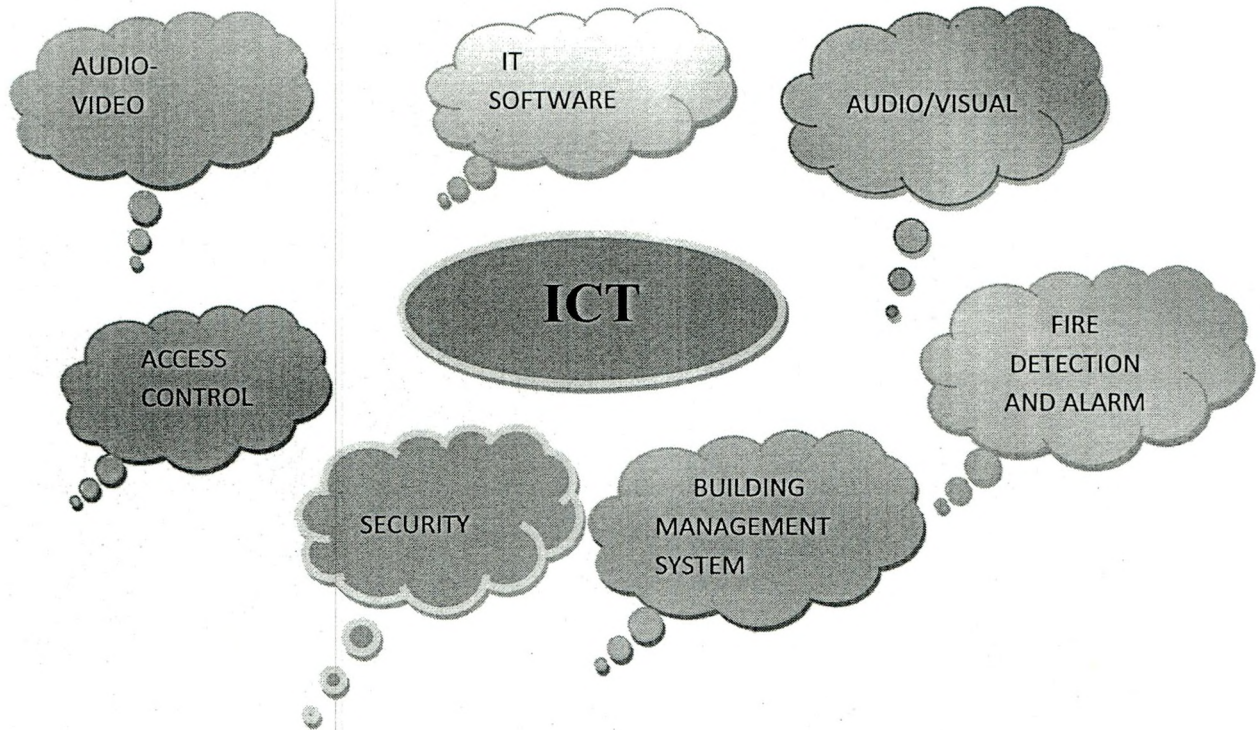


Fig. 5. ICF features.

ICT mainly describes about five hot green technologies (i.e., Green dc, green RFID, green M2M, green CC, green WSN).

ICT scheme	Techniques
Green M2M	a) Adjust the transmission power b) Efficiency communication protocol design c) Mechanism of joint energy-saving d) Advantages of employing energy harvesting
Green RFID	a) Reduce the non degradable material used in manufacturing; b) Adjusting transmission power c) Protocol for optimizing tag estimation
Green CC	a) Decrease energy consumption by adoption of hardware and software

	<ul style="list-style-type: none"> <li>b) Green CC scheme based on cloud supporting technologies.</li> <li>c) Virtual machine techniques for power saving</li> </ul>
Green DC	<ul style="list-style-type: none"> <li>a) Green source of energy</li> <li>b) Novel energy-efficiency data center architecture design</li> <li>c) Accurate and effective data center power models construction</li> </ul>
Green WSN	<ul style="list-style-type: none"> <li>a) Data reduction mechanisms</li> <li>b) Radio optimization techniques</li> </ul>
General green ICT	<ul style="list-style-type: none"> <li>a) Data path length minimization</li> <li>b) Needed data are to be sent.</li> <li>c) Green power sources renewable</li> </ul>

Fig. 6. ICT Scheme and Techniques.

### V. SURVEY OF IoT DEVICES AROUND THE WORLD

The following is a list of countries uses IoT devices around the world:

Korea is the first ranking country around the world for IoT devices online with 37.9. They mainly involves in remote health monitoring of country peoples, helps in the integration of sensing and actuation systems, in the manufacturing of the material and so on. Other countries IoT devices are given in Fig. 7.



Fig. 7. IoT devices used around the world.

## VI. CONCLUSION

As an motivating and latest guidance for research concerning smart world. Various technologies and issues with respect to green IoT, which plays a significant role in achieving a sustainable world. Green IoT mainly helps for the development of the world, with its smart sensors. The sensors such as unnecessarily turn off facilities that are not needed, it removes the unwanted data and sends only which is needed. The smart sensors help in communication to the world. In coming future years let us wait for the smart world for more betterment of citizens.

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