

Internet of Things & Li-Fi: Smart Things under the Light

Ibrahim Mutasim Ibrahim¹, Dr. Amin Babiker A/Nabi Mustafa²

^{1,2}Department of Telecommunication, Faculty of Engineering, AL Neelain University, Khartoum, Sudan

Abstract: *Imagine things billions of things or you can call them objects can sense, communicate and share all the ins and outs. All interconnected over Internet protocol (IP) networks. These interconnected objects collect data analysis data and uses the data to initiate action that leads to decision making. This what we call the Internet of Things (IOT). IOT will make a sweeping change in our life, in this paper we will cast the light in li-fi role in this emerging topic.*

Keywords: IOT, LIFI, LED, TED.

1. Introduction

The impact that will be exist when the IOT implement it's indescribable, a lot of issue's in our life like efficiency, business growth and quality, health care and all essential issues in our life will improve even farther. All things in the world of IOT will sense, collect data, actuate and make actions. IOT its intelligent connectivity of physical devices that will improve our life.

Each object will have one or more embedded sensors that will capture potentially enormous amounts of data, which need to be transmitted as quickly as possible requiring more bandwidth. LIFI is one potential solution for this. [1] Li-fi stands for light fidelity, it is very unique technology that uses the light emitting diode for data transmitting. LI-FI introduced in 2011 TED global talk by proof harald haas, he grabbed the attention of the attendee by streaming HD video from a stander LED lamp. [2]

2. Internet of Things

In 1999 a British pioneer named Kevin Ashton describe the IOT as a system where objects in the physical world could be connected to the internet by sensors.[3] Things mean everything's and anything's like goods, objects, machines, appliances, vehicles and even ourselves will become a part of this internet of things. To turn things into smart things in the internet of things .firstly we have to give them unique identity (IPv6 give us this unique identity), secondly we need to give them the ability to communicate, and in addition to that we need to add sensors.

3. Why the Internet of Things

We always look for the things that facilitate our life .so we want to make everything's faster and we are always eager to receive more data to keep abreast with the sticky situation. We want to automate everything's to control everything's in our life. So we can't park easily if we don't have parking sensors and we can't go outside if we don't see the weather on the phone so I think this is why we will use the IOT.[4]

Plus that, IOT immensely increases the amount of data available for us to process. The more data that is created the more knowledge and wisdom people can obtain and that will enable people to advance even further. [7]



Figure 1: Internet of things

3.1 Internet of things for health and well-begin

IOT is expected to offers optimal solution for food supply chain (FSC) and in-home healthcare (IHH). That may contribute on massive scale to human health and well-being. [8]

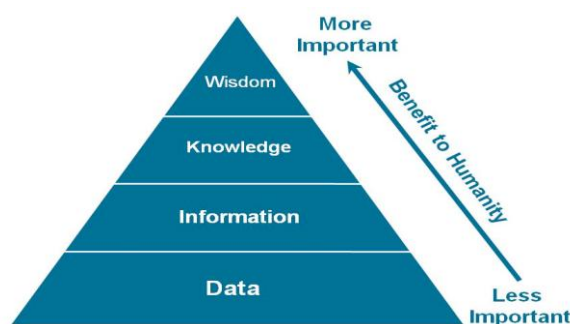


Figure 2: Humans evolve

4. Main Parts of the Internet of Things

In order to turn things to smart things in the internet of things. Firstly we need sensors which is small devices that detects or measures a signal or stimulus. Sensors collects information from the real life. Sensors usually uses low power because they work for long time .usually sensors have analog input and convert it into digital data. Sensors do little processing so they need local processing device .so sensors collect data and then send them to local processing device .local processing is a device that collect data ,process some data and make decision. Therefore local processing device should have the necessary power to collect data, process data and make decision.

We need to store data in local storage just in case of debugging or fail save. There will be incalculable number of data collected form sensors and it going to store locally. To provide connectivity for the internet of things we need internet and network. The main thing in internet of things that is interconnected things. Internet connect local processing devices and send data over to the cloud processing .cloud job is aggregate sensors and make inferences and store the data on long term.so this is the main parts of internet of things . [4]

5. Challenges of the internet of things

5.1 Sensor energy

Sensors are devices collected data from the real world. Sensors will need to be self-sustaining .in order for IOT reach its full potential.

5.2 Deployments of ipv6

ipv6 makes the management of networks easier due to auto configuration capabilities and offers improved security.

5.3 Standards

While much progress has been made in the area of standards, more is needed, especially in the areas of security, privacy, architecture, and communications. [7]

6. LI-FI

LI-FI introduced in 2011 TED global talk by prof harald haas, he grabbed the attention of the attendee by streaming HD video from a stander LED lamp. "It was a moment of eternal joy" says harald haas. Li-fi uses LED light due to its many advantages such as Long life, small volume, low power consumption and low heat radiation. Plus that LEDs can switch OFF or ON in very high speed that a human's eyes can't noticed, so this gives a great opportunities for transmitting data. LI-FI is now part of the visible light communications (VLC) PAN IEEE 802.17.7 standard.

To explain how this unique technology works firstly we uses data from the internet and it send to the server to LAM driver which have software code on it that confers the data to

binary light flickers. LAM driver connects to LED .LED's have a unique advantage that can flicker "OFF" or "ON" in very high speed .so "ON" signifies a binary "1" and "OFF" signifies a binary "0". The frequency of these "ON" and "OFF" sequences is so high that the human eye can't see the light changing, so for us the light remains "ON" all the time. The photo reception receives these flickers and amplitudes them. [5]

7. Li-Fi and the internet of things

Imagine that all things in our life goods, objects, vehicles... and so on can sense, communicate and share information. All interconnected over internet protocol IP networks. That what we call the internet of things IOT.

IOT expected to have billions of nodes and each one to be wireless. So LI-FI find it place in view of it can maintain connectivity in the internet of things .LI-FI can provide hundreds of times greater wireless capacity while in the same time we save the energy which we already spend on lighting. [6]

8. Conclusion

The internet of things is the future and I reckon that it is one of the places where there will be a lot of money as soon as possible. The IOT depend on meeting its requirements thus this paper present an idea that li-fi can be useful for the high bandwidth requirement of IOT.

References

- [1] B .R .Vatsala, Dr.Vidya Raj C "Internet of Things: Usage of Li-Fi and Need for Flow Control Protocol"
- [2] http://www.ted.com/conversations/17189/the_debate_about_rupert_sheldr.html?c=629643/
- [3] Ashton was working on RFID (radio-frequency identification) devices, and the close association of RFID and other sensor networks with the development of the IoT concept is reflected in the name of the RFID device company that Ashton joined later in his career: "Thing Magic."
- [4] Dr.Ing.Alexandru radovici "introduction to the internet of things" available at: <https://www.youtube.com/watch?v=G4-CtKkrOmc>
- [5] Ravi Prakash, Prachi Agarwal " The New Era of Transmission and Communication Technology : Li-Fi (Light Fidelity) LED & TED Based Approach", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 3, Issue 2, February 2014]
- [6] <http://purelifi.com/li-fi-and-the-internet-of-things>
- [7] Dave Evans " The Internet of Things How the Next Evolution of the Internet Is Changing Everything "April 2011.
- [8] ZHIBO PANG "Technologies and Architectures of the Internet-of-Things (IOT) for Health and Well-being"
- [9] <http://images.huffingtonpost.com/2016-07-12-1468314021-5633148-internetofthings.jpg>