# A Review of IoT with Grid Computing in Industrial Automation

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**Abstract:** Research introduces the use of applications of many appliances that are associated with Internet of things. Paper is studying the influence of Internet of things over the society. Main focus of research is on the advancement of society with the advent of IOT. Paper has described cloud environment to host IOT based software. MATLAB platform based simulation of IOT application has been proposed in this paper. Proposed work considers IOT with integration of digital camera for image capturing. Image would be captured from several dimensions. System need to be deployed with integration of IOT based software with grid environment. Such system would be proposed for financial organization. The paper would provide mechanism to minimize time consumption during graphical content comparison. Research is also going to increase the automation in security. The Grid computing allows the user to share the Processing power and memory with data storage in the users. This type of computing allows the users to influence special kinds of works. The proposed paper is discussing the IOT related application in order to execute them over the grid computing related system.

**Keyword**: IoT, Grid Computing, Industrial Automation

## 1. INTRODUCTION

The well known fact is that the interconnection of worldwide networks is called Internet. In the decades of 80's, the internet has been offered to use. There is very attractive partition of this network is infrastructure. Along with this, the smart devices and smart applications are also considerable. The reason is that these smart devices are applicable to make the task easier. These devices also make the better life of user. The Internet allows the user to connect the computers, mobile phones to each other. The tablets and the smart phone can be connected to each other using internet. The IOT stands for Internet of Things. IOT involves the essential term that is Things. The word is highlighting one fact. The fact is that Internet is applicable to connect any kind of object in any system. The Things of internet and nodes are performed the task without using screen or any user interface at all. These devices are dependent on battery power to do the job. These IOT devices are are usually dedicated to a single task. The IOT application [1] are specially referred as smart objects, edge devices and for example

  a. The home devices that are networked. These devices are managed and controlled by remote.
  b. There are some smart home devices for example the lighting and heating or ventilation units. These devices are with remote management and monitoring access.
  c. These smart devices are also applicable in Wearable and connected clothing and fashion accessories.
  d. The IOT devices are also used in Sensor networks
  e. The Connected industrial and manufacturing equipment Networked
  f. vehicle telemetric sensors
  g. Other embedded devices that are network-connected and computationally capable.

## 2. BASICS OF IOT

There are several characteristic of IOT [2]. The one is that it is applicable to classify each and every appliance separately. There are a specific identifiable address of computers and laptops. These computer and laptop have been applied by the user in their daily life. The specific and unique address has been referred as IP address. Similarly, the devices on the Internet of Things are identified uniquely. One expectation has been made by the user. In present moment several sort of techniques are accessible in marketplace. These techniques are applicable to identify the devices separately. The communication requirement in a particular situation is different [3]. Hence unique element used to identify the IOT devices are also varying according to the condition situation.
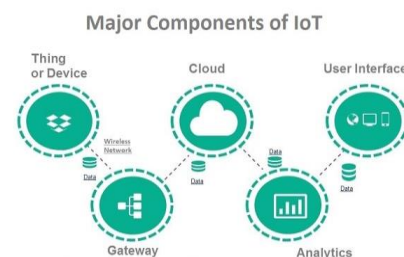


**Fig 1** Major Components of IOT

The unique devices are relying on the transmission needs. Such as for some time it can be assumed that and

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refrigerator try to get a method to connect to Internet with his IP address. The internet connection is not required by the consumable items stored in refrigerator. On the other hand it is feasible that in few condition, the IOT devices are required to have the internet connection kind of internet connectivity on the order of a specialized barcode or RFID tag because they contains information regarding product freshness date.

Despite of the fact that similar kind of technologies and infrastructures are utilized for these purpose still, machine-to-machine technologies (M2M) and the Internet of Things are separated at the consumer level. This is done so that consumer can easily understand the difference between machine-to-machine technologies (M2M) and the Internet of things. In this present situation it is clearly seen that in almost all the industrial and enterprise spaces M2M technologies is utilized. With the help of this technology companies are able to operate their businesses in a best way. It releases the burdens off supply chains. It relay more on informative data in real-time. This M2M technology is adopted by internet of things.

## 3. GRID COMPUTING

Grid computing has been determined as computer network. In this, the resources of computer are distributed in every other computer in the system. The Processing power, memory and data storage all community resources are shared in the users. It authorized the users tap into and influences the particular type of tasks.
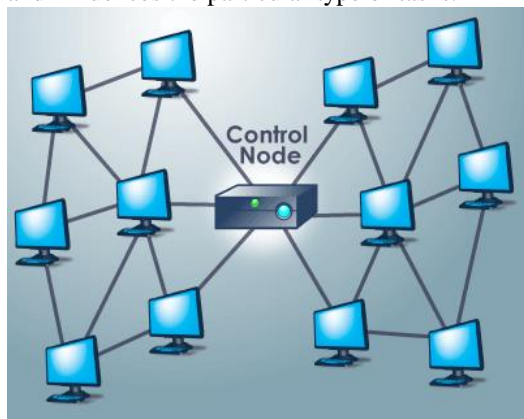


**Fig 2** Grid computing working

## 4. REVIEW OF LITERATURE

There is several researches in the field of IOT. Some of those researches have been discussed in this section.
**In 2009, JayavardhanaGubbi et al. [1] wrote Vision, Architectural Elements, and Future Directions in IOT.**
In the present scenario many areas of daily life are covered by Ubiquitous sensing. Ubiquitous sensing is making possible because of Wireless Sensor Network (WSN) technologies. With the help of this it is possible to figure out, gather and understand environmental

indicators, from delicate ecologies and natural resources to urban environments. The development of these devices in a communicating active system formed the Internet of Things (IOT). In this sensors and actuators are combined seamlessly with the environment around us. After that the information is shared across platforms in order to form a common operating picture (COP). In the present time IOT contains a variety of wireless technologies such as RFID tags. , actuators etc. Therefore it is considered as next revolutionary technology. It would be helpful in transforming the Internet into a fully integrated Future Internet. Due to our progress from www (static pages web) to web2 (social networking web) to web3 (ubiquitous computing web), the requirement for data-on-demand using sophisticated intuitive queries increases significantly.
**In 2016, Muhammad A. Iqbal et al. [2] wrote a review on Internet of Things (Iot). They discussed Security and Privacy Requirements and the solution Approaches.**
The world is undergoing a dramatic rapid transformation from isolated systems to ubiquitous Internet-based-enabled 'things' capable of interacting each other and generating data that can be analyzed to extract valuable information.
**In 2018, Dina Fitria Murad et al. [3] introduced IOT for Development of Smart Public Transportation System. They provided a systematic literature review.**
At present lot of researches are still done in the field of IOT from various researchers. Various models, platforms and applications are proposed and designed in such a way as to benefit society. This paper was developed using the systematic literature review method by conducting surveys on issues oriented towards the utilization of IOT related to the development of intelligent public transport.
**In 2013, TengHaikun and Liu Xinsheng [4] wrote a paper representing application of the IOT Gateway Based on the Real-Time Specification for Java,**
An essential work is done by Internet of Things (IOT) gateway in order to provide a connection between the traditional information network and network awareness. In view of the fact that at present old fashioned development methods are employed by people for the realization of Internet gateway software. Therefore they put forward a method of using real-time Java technology. In this article ARM cortex-A57 architecture of AMD Option 1100 processor is employed for the formation of IOT gateway system hardware platform, through the gateway to realize remote monitoring of underlying device.
**Nikesh Gondchawar and Prof. Dr. R. S. Kawitkar [5] introduced IOT based Smart Agriculture.** A great amount of work has been done by agriculture for the growth of agricultural country. If one can take the example of India, in India farming is the method of earning for almost 70% of overall population. Therefore it

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is assumed that one third of the nation's capital comes from farming. The development of the country slows down by the agriculture concerning issues.

**In 2010, Akanksha Bali et al. [6] study of various applications of internet of things.**

The internet of Things has shown a great performance in this era which is related to networking. It will be very helpful for the inclition of information technology future. With the help of IOT user can use connections from anywhere, anything and at any moment. The concept of IOT is very productive. It has capabilities by which it can transform the real world objects into virtual objects. With the help of IOT it is feasible to manage labeled items like door locks, lights, microwave, led, lcd, coffeemaker, washing machine, window locks etc. In this way it will enlighten the state. The defination of IOT concept represents various technologies. These technologies make the internet available to each real world tangible objects.

**In 2009, Anurag Tiwari et al. [7] reviewed the Challenges and Ongoing Researches for IOT.From the last few years it is seen that** Internet of Thing has become arising technology in Information technology discipline particularly in networking field. For IOT, Internet is the keystone. With the help of IOT technology it is possible to handle the electrical, mechanical objects if they are connected to the internet remotely from anywhere of the world. A number of profitable data and information will be exchanged by millions of devices and facilities. All these facilities and devices will be powered by Internet of Things. The IOT systems are very common and are widespread. Therefore chances of security and privacy problems are common. Due to this all the things which are associated with internet may face safety issues. Due to the issue which is related to security and privacy IOT could not set himself as a reliable technology.

**In 2010, Kwok-Yan LamI and Chi-Hung Chi [8] proposed identity in the Internet-of-Things (IoT): New Challenges and Opportunities,**

As we are moving from the world of digitization to ratification, the role of definers played by Internet-of-Things in the value creation process from big data. It is anticipated that security has consistently become one main concern in the IOT deployment. The characteristics and requirements of IOT are exclusive. The various characteristics and requirement of IOT are limited compute resources, power, bandwidth and massive number of deployed IOT objects, and its loosely coupled networked architecture. In order to give feasible and practical solutions to IOT security latest methods and planning is required. Internet-of-Things (IOT) has generally been agreed to the foundation for digital economy; and cyber security is always a big concern when mission critical applications are built on top of IOT.

**In 2015, M.U. Farooq [9] did reviews on Internet of Things (IoT).**

Internet is a rebellious discovery. It is certain that in future it will be transforming into some new kind of hardware and software. Due to this it becomes unavoidable for anyone. The main objective of this paper is to give a comprehensive overview of the IOT scenario and reviews its enabling technologies and the sensor networks.

**In 2014, Chirag M. Shah, Vamil.Sangoi& Raj M. Visharia [10] introduced smart Security Solutions based on Internet of Things.**

The demand of Internet of Things &its devices are increasing at a rapid rate. In this paper the concept of improving access control systems is described. It is ensure by the methods which are used for boosting of access control system that system is wireless. Prototype described in this paper has provision of accepting inputs from a smart card reader or a biometric sensor. Such inputs are processed inside controller.

In 2014,**Wei Zhou, Yuqing Zhang, and Peng Liu,** *Member* **[11] represented the Effect of IOT New Features on Security and Privacy. They provided New Threats, Existing Solutions, and Challenges.**

The growth of Internet of Things (IOT) in future is totally depending upon us. At present the application of IOT has been commonly employed in many areas of social production and social living for example health care, energy and industrial automation. In addition to the facilities and efficiency which is provided by IOT to us, certain threats are also presented by IOT.

### 5. PROPOSED WORK

a. To study the use of applications of various devices those are related to IOT.
b. To study impact of IOT on the society is also an considerable objective, especially the changes in society due to IOT.
c. To establish grid based environment to host IOT application.
d. To develop IOT Application using MATLAB.
e. To Integrate IOT within Infrared Array sensors in order to implement proposed work.
f. To make Implementation of image capturing module from two different dimensions.
g. To deploy IOT application on grid computing environment.
h. To use system for security of organization.
i. To provide a way of to increase Testing efficiency of system within existing on.

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**Process flow of proposed work**

Start

Establishment of grid environment

Establishment of IOT infrastructure

IOT BASED APPLICATION DEVELOPMENT

Deployment of IOT application over grid environment
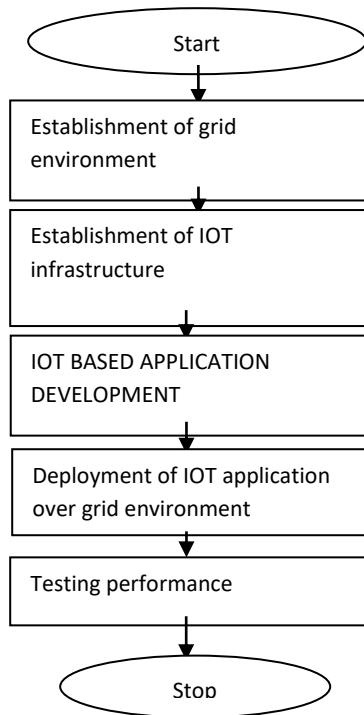
Testing performance

Stop

**Fig 3** Process flow of proposed work

## 6. PROCESS FLOW OF PROPOSED WORK

The process follow of proposed work has been defined in following steps.

1. Capture the image using camera[23]
2. Resize the image size
3. Matlab based module is used to compress the image[19]
4. Again resize the image
5. CANNY BASED EDGE DETECTION MODULE is used[12]
6. Get the edge based image
7. Store the image in image base

**Working of Canny Edge Detector[13]**

1) Smooth image with a Gaussian
   - optimizes trade-off between noise filtering and edge localization
2) Compute Gradient magnitude using approximations of partial derivatives
   - 2x2 filters
3) Thin edges by applying non-maxima suppression to gradient magnitude
4) Detect edges by double thresholding

**Gradient**

- At each point convolve with
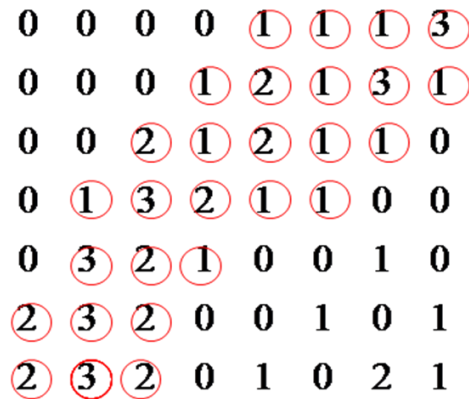- magnitude & orientation of Gradient are computed as

$$G_x = \begin{bmatrix} -1 & 1 \\ -1 & 1 \end{bmatrix} \qquad G_y = \begin{bmatrix} 1 & 1 \\ -1 & -1 \end{bmatrix}$$

$$M[i, j] = \sqrt{P[i, j]^2 + Q[i, j]^2}$$

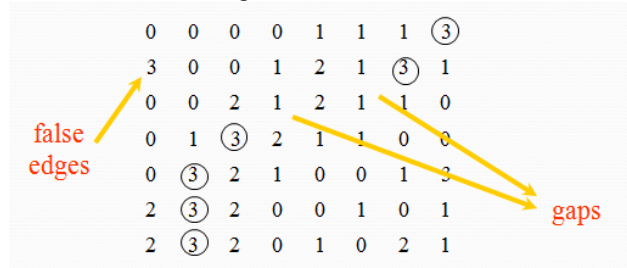- Avoid floating point arithmetic for fast computation

$$\theta[i, j] = \tan^{-1}(Q[i, j], P[i, j])$$

**Non-Maxima Suppression**

- Thin edges by keeping large values of Gradient
  - not always at location of an edge
  - there are many thick edges

```
0  0  0  0  1  1  1  3
0  0  0  1  2  1  3  1
0  0  2  1  2  1  1  0
0  1  3  2  1  1  0  0
0  3  2  1  0  0  1  0
2  3  2  0  0  1  0  1
2  3  2  0  1  0  2  1
```

- Thin broad ridges within M[i,j] into ridges that are only one pixel wide
- Find local maxima within M[i,j] by suppressing all values along line of Gradient that are not peak values of ridge

```
           0  0  0  0  1  1  1  3
           3  0  0  1  2  1  3  1
           0  0  2  1  2  1  1  0
false      0  1  3  2  1  1  0  0
edges      0  3  2  1  0  0  1  3
           2  3  2  0  0  1  0  1    gaps
           2  3  2  0  1  0  2  1
```

**Gradient Orientation**

- Reduce angle of Gradient θ[i,j] to one of 4 sectors
- Check 3x3 region of each M[i,j]
- If value at center is not greater than 2 values along gradient, then M[i,j] is set to 0

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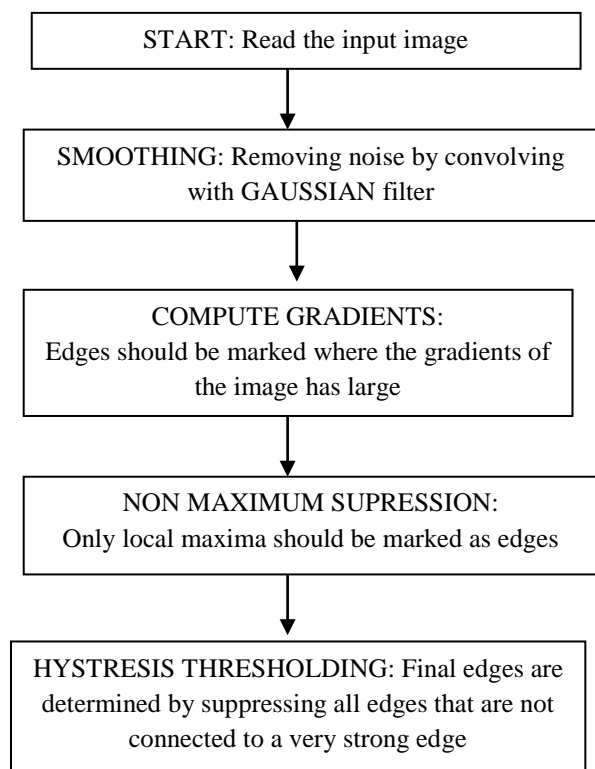**Flowchart of Canny edge detection algorithm**



Fig. 4  Flow chart of Canny Algorithm

**LOSSLESS COMPRESSION OF DATA TO BE SENT& DECOMPRESSION OF DATA AFTER RECEIVING**

Images are stored in form of matrix in & these images are compressed using lossless picture compressing method s used in MATLAB. Here captured picture is resized so that size of picture gets reduced as a result dimension of matrix also gets reduced. Due to reduced size picture comparison time get reduced in order to find motion.
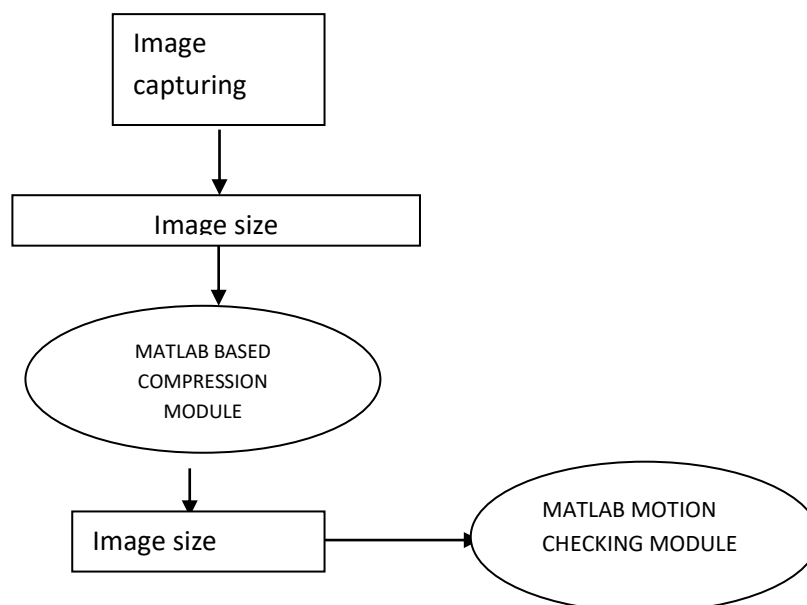


**Fig 5** Lossless Compression of Data to Be Sent

Images are stored in form of matrix in & these images are compressed using lossless picture compressing methods used in MATLAB. Here captured picture is resized so that size of picture gets reduced as a result dimension of matrix also gets reduced. Due to reduced size picture comparison time get reduced in order to find motion.
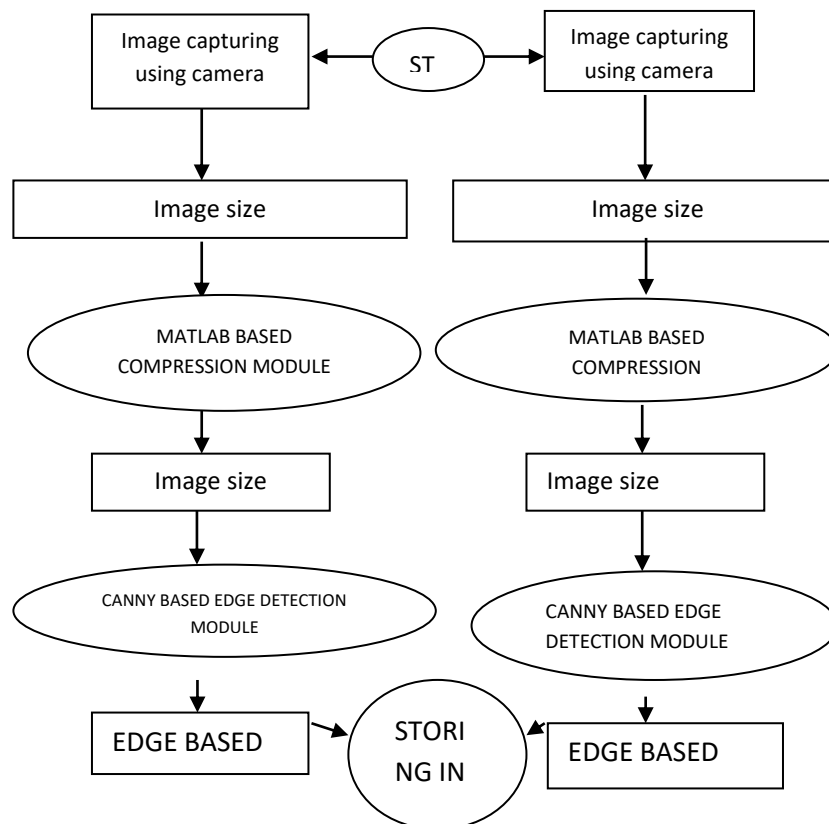
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**Fig 6** DFD Mechanism Storing Captured picture Matrix

### 7. CONCLUSION

The use of applications of many appliances which are connected to Internet of things has been discussed. Research has made study of impact of Internet of things over the society.

Research has focused the advancement of society due to IOT. Here the cloud environment to host IOT based software is discussed. In this paper IOT Application with the support of MATLAB platform has been developed. IOT with integration of digital camera has been used in order to implement proposed work. Research has implemented image capturing mechanism. Image is captured from multiple dimensions. System has been deployed with integration of IOT based software with grid environment. This system has been found useful for financial organization. The paper is providing mechanism to reduce the time consumption while graphical content comparison and increase the automation in security.

### 8. SCOPE OF RESEARCH

Proposed work is offering a review of using the applications that are related to the related to IOT. The paper also provides the review of the usefulness of IOT in the society. The paper has also considered the development of society due to IOT. In future the paper would assist to setup the cloud system in order to host

the IOT application. The research work would be helpful to develop the IOT Application with MATLAB programming platform. Proposed work would to make connection of the IOT within Infrared Array sensors. It would be done to make implementation of research work. In the future time, the research work would be proved helpful for those who are exciting to have the knowledge of implementation of graphic detecting module from two separate dimensions. The proposed would be assisting to deploy the IOT application on cloud system. The work has been offer an environment system to secure the company. The paper would also propose a technique to enlarge the Testing performance of system.

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