International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 7, Issue 7, July 2017)

Optimization of Efficacy in Industrial Automation Control and Monitoring System using IIOT

P. Eswari[1], Dr. S. Mary Praveena[2]

[1]*Research Scholar, Department of ECE, Jansons Institute of Technology, Coimbatore, India.*

[2]*Associate Professor, Department of ECE, Sri Ramakrishna Institute of Technology, Coimbatore, India.*

***Abstract*— Infusion of novel ideas and modern technology has made industrial Automation Control and monitoring system efficient. The advent of IOT has opened the doors for evolving even more efficacious industrial Automation Control and monitoring systems with tailor made parameters for industrial requirements that include water quality testing, measuring pH and Temperature level and video surveillance. This literature survey is conducted to find out the application of IOT technology in industrial Automation and Monitoring System to get an overall view of various techniques employed in the field. It also includes an IOT enabled conceptual Intelligence industry environment model.**

***Keywords*— Internet Server, Intelligent Industry, IOT, Protocols, Sensors, Video Surveillance.**

I. INTRODUCTION

Industrial development rate paves way for economic growth and provides employments opportunities for millions all over the world. Though the industrial Automation and monitoring has significantly developed over the years, thanks to technical advancements. The emergence of IOT and its impact on altering and increasing the efficacy of automation and monitoring systems in industries is, so exceptional that it makes the ardour tasks to be completed with precision. IIOT [1] connectivity technology has the power to lay foundation for neat industrial revolution. Despite this, there are barriers to be cleared and issue to be addressed in order to be implemented successfully.

II. LITERATURE SURVEY

This review paper [2] explores the impact of IOT and CPS on automation from an industrial perspective. Present state of work on Ethernet time sensitive networking and the role of fifth generation (5G) telecom networks in automation are inquired. The article [3] shows the dimensions of the development and standardization of connectivity solutions for utilizing industrial internet of things (IIOT). Hindrances in realizing the full potential of the IIOT and managing a widely fragmented eco system of connectivity solutions.

In paper [4] security aspects in IOT capillary net works that includes both unidirectional and bidirectional IP or non IP devices are analyzed. For secure access, they proposed an algorithm for uni and bi directional devices. The security process is based on secure key renewal. Paper [5] lays out the taxonomy of presently available topology control algorithm. In order to achieve scalability and energy efficiency, a system approach to topology construction in IOT is brought forward by them.

In papers [6][7][8] Eclipse programming environment is brought into maximize The scalability and adaptability of the platform practical implications. Several WSN applications in manufacturing environments that includes automated work cells, logistics and simple storage systems can be monitored with the application of their platform.

The paper [9] suggests the use of IPv6 over low power wireless personal area networks. The feasibility of using internet engineering task force in industrial environments by quantifying and recognizing several attributes of 6LoWPAN, RPL based IWSNs in relation to bounded time interval communications are scrutinized. Several probable causes latency in IWSNs is also found out.

In paper [10] the inter connection of field level networks and IP gateways is scrutinized. The common internet communication standards such as SNMP, LDAP, SQL, Native Web technologies, OPC, XML-DA are compared. A key architectural consideration that must be adopted by the manufactures of large devices is reviewed here [11]. It suggests that they should adopt a centralized based approach to deliver next generation IOT solutions.

The papers [12][13][14] provide a bird eye view of the IOT. Technical details which are relevant to IOT enabling technologies platform, protocols and applications are described. The most relevant protocols and applications issues are pointed out. The way in which different protocols fit together to produce the required functionalities without having to go through RFCs and the standard specifications. The relation between the IOT and other upcoming technologies, that includes big data analytics and cloud and fog computing are inquired. It presses for the necessity for better horizontal integration among IOT services.

International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 7, Issue 7, July 2017)

The paper [15] shows a new concept with the Introduction of software defined IIOT for industrial environments to make the network more flexible. Industrial cloud IWNS, physical layer and smart terminals are analyzed and the information interaction among the devices are explained. To provide an interface for information exchange, they come up with the software defined IIOT architecture to manage physical devices.

The paper [16] shows a model which integrates the capabilities of major IOT devices along with control system gateways using real time challenge responses to provide secure control operations. The solution that they put forward uses both gateway and end point devices which employ a combination of computer cryptography, communication capabilities and signal / image processing for authorization and authentication. The paper [17] contains unified 5-level architecture as a guideline for implementing CPS.

In paper [18], an overview of industrial ecosystem, technical architecture and industrial device management standards are discussed. The correct approach to enable efficient and reliable management of WSN with in such an infrastructure is a cross-layer model of light weight and cloud based RESTful web service. A one M2M standard complaint device software platform for consumer electronics based on the internet of things called cube is brought forward in paper [19].

The increasing adoption of the cube in consumer electronics in lowering will be helpful in lowering the barriers for the manufacturers and developers to innovate creative products. In a paper [20] a flexible structure to confront security threats in a dynamic environment is shown. The reference paper [21] examines the existing protocols and mechanisms to secure communications in IOT. Enabling technologies for efficient WEH is reviewed in paper [22].

A brief description is given about the future trends in designing efficient WEH systems and research challenges. In paper [23] the author address the market changing technology of the internet of things, that relies on machine to machine communications to integrate various sensors, actuators and smart meters across different types of business most prominent existing and novel M2M radio technologies are analyzed. They zoomed in on the cellular M2M sector employing 3GPP LTE technology.

Paper [24] pays attention to the impacts of emerging internet of things (IOT) on ESs in modern manufacturing. The evolution of manufacturing system paradigm is analyzed to identify the requirements of decision support systems in dynamic and distributed environments.

Paper [25] discusses the difficulties in generating assembly plans of complex products. In paper [26] concept of sensing as a service model in technological social and economical perspectives are researched. The major open challenges and issues are identified.

Paper [27] examines the practicability of using internet engineering task force (IETF) in industrial environments by identifying and quantifying various attributes of a 6LOWPAN, RPL and CoAP based IWSNS relating to bounded time interval communication. Several possible causes for latency in deploying internet protocol [IP] based IWSNS requiring IOT connectivity are identified. Paper [28] presents the current state of research on the internet in deploying internet protocol [IP] based IWSNS requiring IOT connectivity are identified.

Paper [28] presents the current state of research on the internet of things by inquiring into the literature, identifying current trends of things by inquiring into the literature, identifying current trends to help researchers. In paper [29], the installation of smart sensor networks to monitor the water quality in industries using IOT environments are described. They find out the system archives good results in practical applications.

III. Proposed Conceptual Model Of Intelligent Industry

A conceptual Intelligent Industry is proposed here with the overall structure of IOT.

There is a four layered structure which has several devices installed for effective execution.

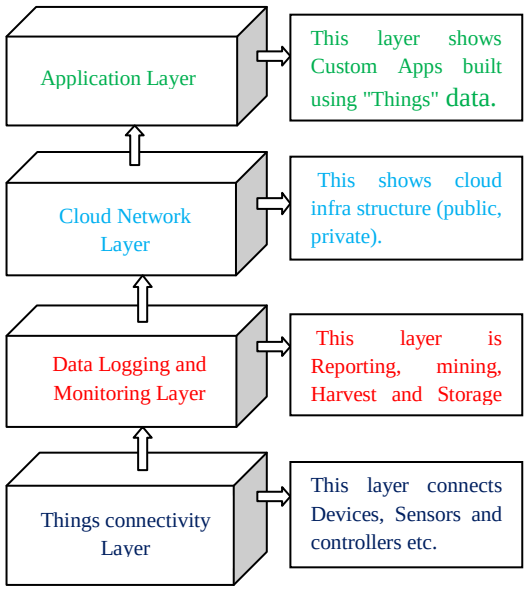

Fig 1 : Four Layer Structure of IIoT

International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 7, Issue 7, July 2017)

The first layer is application layer which has customized apps that built using 'Things" data which can be access by smart phone or computer.

A cloud network layer, the second layer, contains cloud infrastructure which can be accessed via network on the internet.

Received data are logged in the third layer of data logging and monitoring. It receives information from the industrial field through sensors.

Thing connectivity layer comprises of devices, sensors and controller to collect data from the industrial facility.

The proposed conceptually designed smart industrial surveillance model is shown in Fig.2. Industrial data acquisition system measures and monitors all the data's from different sensors. And the accumulated data from the industry environment are passed to a cloud through an internet enabled Gateway via LiFi or other communication network.

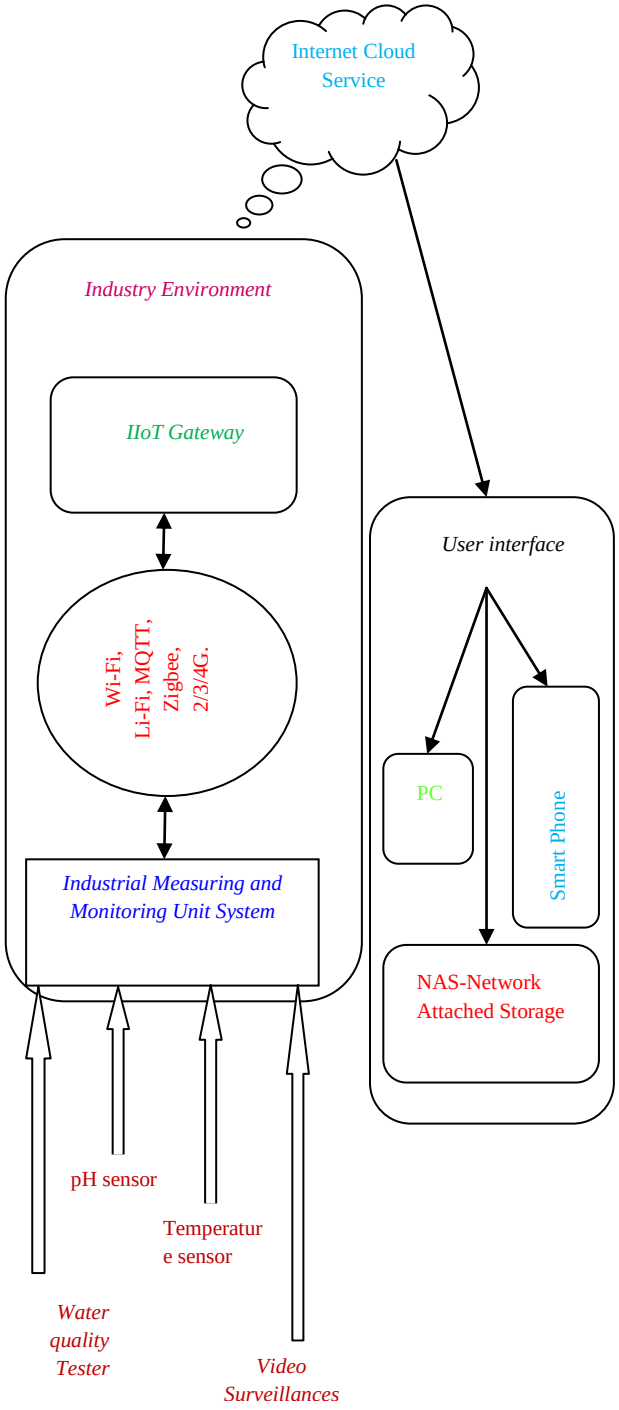

Fig 2 : Conceptual Model of Intelligent industry

International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 7, Issue 7, July 2017)

The data can be accessed by the user with the aid of computer or Smartphone.

IV. Conclusion

IOT enabled industries can function with far more efficacy and get precise information, as IOT technology can be altered and designed accordingly to the needs of the industry which has diverse fields of operation. Flawed and deferred data reception may adversely influence the outcome of industrial production and in due course result in system malfunction.IOT enabled industrial facilities can sort out the shortcomings and furnish accurate data which can be accessed through various domains. Besides these advantages, industrial hazards can be prevented in an IOT enabled industrial facility. It can play a pivotal role in providing a safer and more protecting working environment to the workers by forewarning them with accumulated data.

TABLE I
Various Parameters Measured In Different Papers

MEASURED INDUSTRIAL PARAMETERS	[2]	[3]	[4]	[22]	[25]	[29]
VIDEO SURVEILLANCE (SECURITY)	YES	YES	YES	NO	YES	YES
TEMPERATURE	YES	YES	YES	YES	YES	YES
WATER QUALITY	YES	YES	NO	YES	YES	NO
PH VALUE	NO	NO	NO	NO	YES	YES
EFFICIENCY	NO	YES	NO	NO	NO	NO
WIRELESS ENERGY HARVESTING	YES	NO	NO	YES	NO	NO
TIME MANAGEMENT	YES	NO	YES	NO	NO	NO

REFERENCES

[1] Shahid Mumtaz , Ahmed Alsohaily, Zhibo Pang-Massive Internet of Things for Industrial Applications: Addressing Wireless IIoT Connectivity Challenges and Ecosystem Fragmentation,Volume: 11, Issue: 1, March 2017.

[2] Martin Wollschlaeger, Thilo Sauter,-"The Future of Industrial Communication: Automation Networks in the Era of the Internet of Things and Industry 4.0" IEEE Industrial Electronics Magazine , Volume: 11, Issue: 1, March 2017.

[3] Romeo Giuliano, Franco Mazzenga, Alessandro Neri -"Security Access Protocols in IoT Capillary Networks,IEEE Internet of Things Journal , Volume: 4, Issue: 3, June 2017.

[4] R. Giuliano, F. Mazzenga, A. Neri, and A. M. Vegni, "Security access protocols in IoT networks with heterogenous non-IP terminals," in Proc. IEEE Int. Conf. Distrib. Comput. Sensor Syst. (DCOSS), May 2014, pp. 257–262.

[5] Jun Huang, Qiang Duan, Cong-Cong Xing -"Topology Control for Building a Large-Scale and Energy-Efficient Internet of Things" IEEE Wireless Communications, Volume: 24, Issue: 1, February 2017

[6] Bi, Z. M., G. Wang, and L. Xu. 2016. "A Visualization Platform for Internet of Things in Manufacturing Applications."M. E. Khanouche et al., "Energy-Centered and QoS-Aware Services Selection for Internet of Things", IEEE Trans. Automation Science Eng., vol. 13, no. 3, pp. 1256-69, July 2016.

[7] D. Georgakopoulos, P. P. Jayaraman, M. Fazia, M. Villari, R. Ranjan, "Internet of Things and edge cloud computing roadmap for manufacturing", IEEE Cloud Comput., vol. 3, no. 4, pp. 66-73, July–Aug. 2016.J. Weinman, "The economics and strategy of manufacturing and the cloud", IEEE Cloud Comput., vol. 3, no. 4, pp. 6-11, July–Aug. 2016.

[8] J. Weinman, "The economics and strategy of manufacturing and the cloud", IEEE Cloud Comput., vol. 3, no. 4, pp. 6-11, July–Aug. 2016.L. Da Xu, W. He, S. Li, "Internet of Things in industries: A survey", IEEE Trans. Ind. Informat., vol. 10, no. 4, pp. 2233-2243, Nov. 2014.

[9] C. P. Kruger, G. P. Hancke, "Implementing the internet of things vision in industrial wireless sensor networks", Proc. 12th IEEE Int. Conf. Ind. Informat., pp. 627-632, 2014.

[10] T. Sauter, M. Lobashov, "How to access factory floor information using Internet technologies and gateways", IEEE Trans. Ind. Informal, vol. 7, no. 4, pp. 699-712, Nov. 2011.

[11] R. Venkatesan, M. V. Raghavan, K. S. Sai Prakash, "Architectural considerations for a centralized global IoT platform", Proc. IEEE Region 10 Symp., pp. 5-8, May 2015.

[12] A. AI-Fuqaha et al., "Internet of Things: A Survey on Enabling Technologies Protocols and Applications", IEEE Commun. Surveys & Tutorials, vol. 17, no. 4, pp. 2347-76, Nov. 2015.

[13] J. Weinman, "The economics and strategy of manufacturing and the cloud", IEEE Cloud Comput., vol. 3, no. 4, pp. 6-11, July–Aug. 2016.

[14] D. Georgakopoulos, P. P. Jayaraman, M. Fazia, M. Villari, R. Ranjan, "Internet of Things and edge cloud computing roadmap for manufacturing", IEEE Cloud Comput., vol. 3, no. 4, pp. 66-73, July–Aug. 2016.

[15] J. Wan, S. Tang, Z. Shu, D. Li, S. Wang, M. Imran, A. V. Vasilakos, "Software-defined industrial Internet of Things in the context of industry 4.0", IEEE Sensors J., vol. 16, no. 20, pp. 7373-7380, Oct. 2016.

[16] M. W. Condry, C. B. Nelson, "Using smart edge IoT devices for safer rapid response with industry IoT control operations", Proc. IEEE, vol. 104, no. 5, pp. 938-946, May 2016.

[17] J. Lee, B. Bagheri, H.-A. Kao, "A cyber-physical systems architecture for Industry 4.0-based manufacturing systems", Manuf. Lett., vol. 3, pp. 18-23, 2015.

[18] Z. Sheng, C. Mahapatra, C. Zhu, V. C. M. Leung, "Recent advances in industrial wireless sensor networks toward efficient management in IoT", IEEE Access, vol. 3, pp. 622-637, 2015.

[19] J. Yun, I.-Y. Ahn, N.-M. Sung, and J. Kim, "A device software platform for consumer electronics based on the Internet of Things," IEEE Trans. Consum. Electron., vol. 61, no. 4, pp. 564–571, Nov. 2015.

[20] S. Sicari, A. Rizzardi, L. A. Grieco, and A. Coen-Porisini, "Security, privacy and trust in Internet of Things: The road ahead," Comput. Netw., vol. 76, pp. 146–164, Jan. 2015.

[21] J. Granjal, E. Monteiro, and J. Sá Silva, "Security for the Internet of Things: A survey of existing protocols and open research issues," IEEE Commun. Surveys Tuts., vol. 17, no. 3, pp. 1294–1312, 3rd Quart., 2015.

[22] P. Kamalinejad et al., "Wireless Energy Harvesting for the Internet of Things", IEEE Commun. Mag., vol. 53, no. 6, pp. 102-08, June 2015.

[23] Andreev S, Galinina O, Pyattaev A, Gerasimenko M, Tirronen T, Torsner J, Sachs J, Dohler M, Koucheryavy Y (2015) Understanding the IoT connectivity landscape: a contemporary M2M radio technology roadmap. IEEE Commun Mag 53(9):32–40.

[24] Bi, Z., Xu, L. D., & Wang, C. (2014). Internet of things for enterprise systems of modern manufacturing. Industrial Informatics, IEEE Transactions on, 10(2), 1537–1546. doi: 10.1109/TII.2014.2300338

[25] Wang, C., Bi, Z., & Xu, L. Da. (2014). IoT and cloud computing in automation of assembly modeling systems. Industrial Informatics, IEEE Transactions on, 10(2), 1426–1434.

[26] C. Perera, A. Zaslavsky, P. Christen, D. Georgakopoulos, "Sensing as a service model for smart cities supported by internet of things", Eur. Trans. Emerging Telecommun. Technol., vol. 25, no. 1, pp. 81-93, 2014.

[27] C. P. Kruger, G. P. Hancke, "Implementing the internet of things vision in industrial wireless sensor networks", Proc. 12th IEEE Int. Conf. Ind. Informat., pp. 627-632, 2014.

[28] A. Whitmore, A. Agarwal, L. Xu, "The internet of things—A survey of topics and trends", Inf. Syst. Frontiers, vol. 17, no. 2, pp. 261-274, 2014.

[29] A.Jothimani , A. Shirly Edward , K. Manoj Gowthem , R. Karthikeyan –"Implementation of Smart Sensor Interface Network for Water Quality Monitoring in Industry using IoT", Indian Journal of Science and Technology, Vol 10(6), February 2017.