iJRASET
International Journal For Research in Applied Science and Engineering Technology

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 8 **Issue:** III **Month of publication:** March 2020

**DOI:**

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429*
*Volume 8 Issue III Mar 2020- Available at www.ijraset.com*

# Smart ICU System using IOT and ML

Prof. Anjali Deore[1], Roshni Patil[2], Kalyani Borse[3], Pooja Vyawahare[4], Saloni Patil[5]
[2, 3, 4, 5]*BE. Student,* [1]*Department of Computer Engineering SITRC Nashik, Savitribai phule Pune University, India*

***Abstract:*** ***Intensive Care Unit or ICU is place where the patients who are critically ill are admitted for treatment. For such critical conditions the Doctors need to have an all-time update patient's health related parameters like their blood pressure, heart pulse and temperature, feet detection, oxygen level. To do manually, this is too tedious task and also for multiple patients it becomes close to impossible. For this type of situations, IOT based system can bring about an automation that can keep the Doctors updated all time over internet. IOT Based ICU Patient Monitoring System is a system which collects patient's information with the help of few sensors. It uses module to communicate this information to the internet. There is admin can add ICU supervisor and doctor. The ICU supervisor can add patient and assign kit and specific doctor for patient and stay update of that patient. The ICU supervisor can only view the current sensor value of patient who admitted in ICU. The Doctor can view Patient with their profile and all medical history. Sensor can sense and get statistics graph according to age group and disease wise which is show by doctor. According to statistic graph the doctor can predict the health of patient based on sensor value and history. Doctor can view the current value of sensor value and doctor can also get auto MSG on patient health seriousness (threshold). Thus, the doctor can get access to these vital parameters pertaining to the patient's health over the IOT based web interface from anywhere over the world. In this way IOT Based ICU Patient Monitoring System is an enhanced system that helps in monitoring the ICU Patients without any manual intervention.***

***Keywords: Smart Health System, Internet Of Things (IoT), Medical Sensors Networks, Patient monitoring in Intensive Care Unit (ICU).***

## I. INTRODUCTION

Information and Communication Technologies solutions for modern healthcare systems continuously grows worldwide. Recent years have seen a rising interest in the wearable sensors and today several devices are commercially available for personal health care and fitness. In addition to current smart medical devices, researchers have also considered applications of such technologies in remote health monitoring systems for long term recording, management and clinical access to patient's physiological information. Based on current technological trends, one can readily imagine a time in the future when your routine physical examination is proceeded by a two–three day period of continuous physiological monitoring using less expensive wearable sensors. The work developed in this paper focuses on the study and the development of an intelligent patient monitoring system in medical environment. Indeed, one of the specialized sections of a hospital that are Intensive Care Units (ICU) are of great importance because of the seriousness of the health status of patients staying and therefore need special attention. Due to the severity of patients treated in the intensive care units, these units are commonly equipped by a variety medical-equipment that is handled a multidisciplinary medical team in order to monitor ICU's patients in real time. In addition, we find, nursing staff, the monitoring and life support devices necessary to provide continuous care to patients that are severely ill and medically unstable. The latter receive special care and are monitored in real time by the medical team through a breathing assistance system and the decision-making support that is, for instance the ECG. To help the patient to stay alive, a partial or total ventilator support is mandatory depending on the severity of the condition in which the patient is located. It appears of course that, the respiratory support justifies a significant monitoring system in ICUs that is very particular and intricate. Faced with these requirements, the limits of the performance of these systems are obvious. They were the subject of a thorough study well supplied in the state of the art. Among many limitations, we have a very alarmist monitoring system with a significant rate of false alarms that hinder the tranquillity of the patient. In order to attempt answer those identified issues, a review will be performed on the importance of smart and connected health care using Internet of Things. This review will be carried out in order to identify the causes of the inefficiency of health care in the ICU to propose appropriate solutions for improving the ability of a better decision making, which should result in a better treatment. We designed an intelligent and ubiquitous system for the patient monitoring in ICUs. This system called ADSA (Automatic Detection of risk Situations and Alert) is based on IOT-architecture including cooperating medical sensors network. The main contribution of this work is the implementation of a new unifying architecture of several wireless technologies. In addition, we have set up a decision support tool to store and interpret the data collected. A physical organization as well as the logical architecture is proposed for the novel patient monitoring system.

## II. PROBLEM STATEMENT

Tele-ICUs are units where nurses provide 24/7 care, support and advice from a distance to remote ICUs. Various sorts of health information technology (IT) are want to support the sharing of data between the tele-ICU and therefore the ICUs. Technologies allow ICU nurses to monitor patients, to observe patients and medical devices in the patient room though a camera, and to communicate with ICU nurses and providers. Several studies provide a detailed description of the evolution of the ICU, the ICU organization, and ICU nurses activities. Tele-ICUs are a comparatively new phenomenon; but the "oldest" ICU has already been alive for quite 15 years. Nearly 10% of patients in American ICUs are currently monitored by ICUs.

The ICU team can be comprised of multiple clinicians: board-certified, critical care nurses, clerical personnel and, in some instances, a pharmacist. Personnel in the ICU (including residents on duty in the ICU) receive instructions or guidance from the ICU staff and may have the opportunity to learn new skills and knowledge. Tele-monitoring is crucial to the ICU model. Personnel in the ICU receive patient data in real time and, therefore, can detect trends in patient status; they can then alert personnel in the ICU.

Tele-ICU physicians and nurses work on workstations that are commonly composed of multiple monitors, a two-way camera, microphone, and a high-speed dial telephone. Clinical data captured about the ICU patient are directly streamed to the ICU. Tele-ICU clinicians are hooked in to information communicated over the phone or entered into the pc from the bedside to tell them on the present state of the patient. They monitor numerous clinical indicators, such as blood pressure, heart rate, ventilator settings, and oxygen saturation. Other data such as patient care plans, laboratory results, and X-rays are electronically sent or faxed to the ICU. Most ICU software uses MSG to alert the doctor to possible significant changes in patient status.

## III.LITERATURE SURVEY

Most studies on the ICU have focused on clinical and financial outcomes. Several studies have reported that implementation of an ICU telemedicine program can improve clinical care outcomes (e.g., reduced length of stay, reduced mortality, reduced complications) and reduce healthcare costs. However, other studies have did not confirm a number of these positive outcomes. The study by Anders and colleagues focuses on the functions of the ICU. The researchers performed 40 hours of observation of eight ICU nurses and one ICU physician in one ICU. Results showed that the ICU fulfills three functions: (1) anomaly response: ICU nurses processed information related to alerts and alarms and contacted other staff in the ICU or the ICU if they perceived the need for follow-up or action; (2) access to specialized expertise: experienced ICU nurses were observed to mentor junior ICU nurses; ICU nurses had access to expertise and experience of the ICU nurses thereby augmenting their knowledge base; and (3) sense-making: ICU nurses can make sense of what is happening with patients because they have access to many sources of data and have the resources (time, expertise) to synthesize the data. Research on ICUs is limited; in particular nursing issues related to ICU have been overlooked. Few studies have explored how ICU nurses deal with multiple interactions across varied ICUs and hospitals. We need to know more about the work system barriers experienced by ICU nurses, as well as the strategies they use to deal with these barriers and their consequences. The latter receive special care and are monitored in real time by the medical team through a breathing assistance system and the decision-making support that is, for instance the ECG. To help the patient to stay alive, a partial or total ventilator support is mandatory depending on the severity of the condition in which the patient is located. It appears of course that, the respiratory support justifies a significant monitoring system in ICUs that is very particular and intricate. Faced with these requirements, the limits of the performance of these systems are obvious. The shortcomings of the current patients monitoring system in ICU are well established. They were the subject of a thorough study well supplied in the state of the art. Among many limitations, we have a very alarmist monitoring system with a significant rate of false alarms that hinder the tranquillity of the patient. In order to attempt answer those identified issues, a review will be performed on the importance of smart and connected health care using Internet of Things. This review will be carried out in order to identify the causes of the inefficiency of health care in ICU to propose appropriate solutions for improving the ability of a better deciding**,** which should end in a far better overall treatment. We designed an intelligent and ubiquitous system for the patient monitoring in ICUs.

## IV.METHODOLOGY

In this paper connotation of smart ICU system is analysed. And based on the introduction of existing system architectures of IOT, combined with the characteristics of hospital ICU scene, the system architecture composed of sensing, network layer and application layer in smart ICU is also discussed in detail. Then, from the aspects of compilation of information specifications and standards, construction of the unified network platform and embedded mobile electronic ICU patient records application platform, the key technology and content in the construction of smart ICU is sufficiently studied. Application scheme of smart ICU is given, providing meaningful reference for the overall implementation and extension.

In this proposed system;

1) *Admin:* In the proposed system admin can add ICU supervisor and add doctor for patient treatment.
2) *ICU Supervisor:* The supervisor can add the patient in ICU section and assign a kit and specific doctor for him to give proper attention and treatment of ICU patient. Supervisor can do any update of patient record who already added by him in ICU section and get treatment from assigned doctor from supervisor. There are various sensors are built in ICU section, that sensor can change their value according to the ICU section and patient condition. That all record of patient with current records are viewed and monitored by the ICU supervisor.
3) *Doctor:* ICU supervisor can assign doctor for a patient who admitted in ICU section. That doctor can view patient with their profile and all previous medical history. According the patient age group and disease wise statistic graph will be created that is view by doctor. Doctor also can predict the health of patient based on the updated sensor value and current value. This current sensor values also view by both ICU supervisor and patient's assigned doctor. If assigned doctor is not near to patient then also he continuously watch on ICU patient health according to the sensor value. Doctor can get auto MSG if patient health get serious or patient's critical condition.

## V. ARCHITECTURE

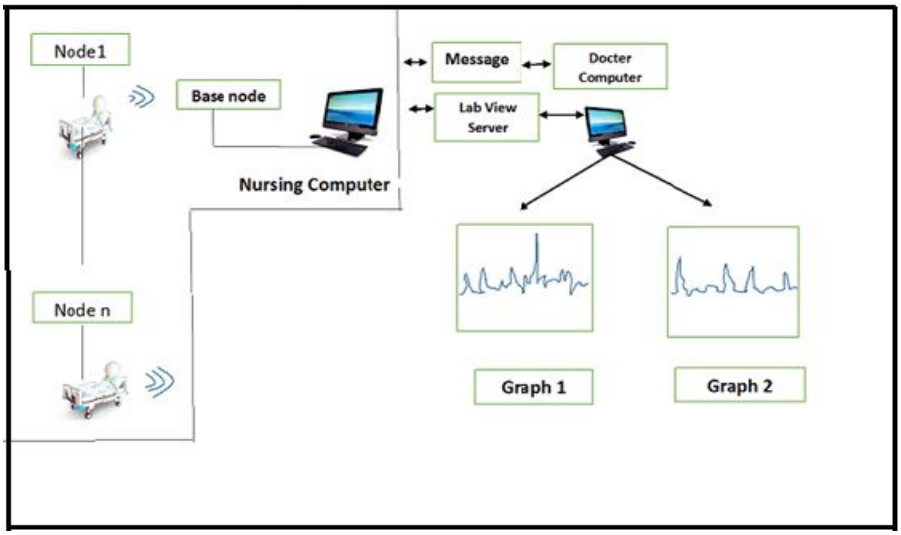



Fig.1. Architecture Diagram

In the above architecture diagram the sensor data of different node i.e. patient data is collected at the base node that is handle by the supervisor. The doctor can view patient with their profile and all previous medical history. According the patient age group and disease wise statistic graph will be created that is view by doctor. Doctor also can predict the health of patient based on the updated sensor value and current value. Doctor can get auto MSG if patient health get serious or patient's critical condition.

## VI. CONCLUSION

In this paper, we highlight the opportunities and the challenges for IOT in realizing this vision of the future of health care. Indeed, the intensive care unit is a great example whose need for smart system becoming unavoidable. In this paper, we succinctly reviewed the current state and projected future directions for integration of intelligent remote health monitoring in patient admitted in ICU technologies into the clinical practice of medicine. In this sense, we proposed a smart and pervasive ICU using an architecture based on wireless sensors Based-IOT for Improving Intensive medical care. This hybrid architecture of wireless technology has the advantage of uniting in a platform for converged data transmission services for the efficient transport of medical data. Noted that there are several benefits of Smart Process Applications can have for patient monitoring in ICU like:

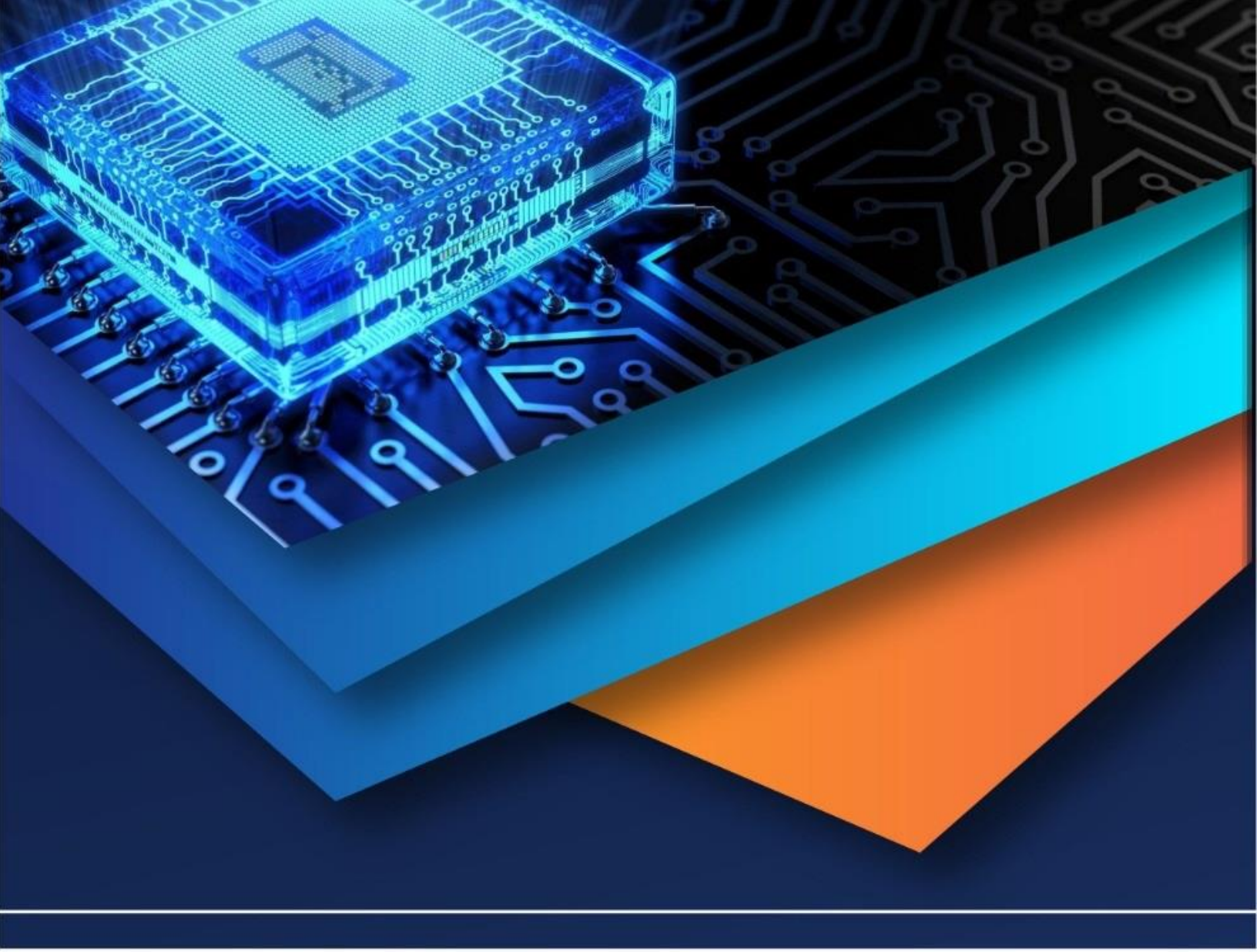
1) Smart functions provide accurate, transparent data processes
2) Smart functions, collect, process and consolidate information and analyses, simplifying records and reporting processes and integrating all decision-making processes
3) Smart functions help optimizing patient monitoring system in ICU, thereby increasing medical care quality and reducing costs.

## VII. ACKNOWLEDGMENT

I would like to thank Prof Anjali deore for helping me in doing my review paper which is based on Smart ICU sytem using IOT and ML.

## REFERENCES

[1] Real time wireless health monitoring application using mobile devices, International Journal of Computer Networks Communications (IJCNC) Vol.7, No.3, May 2015, Amna Abdullah, Asma Ismael, Aisha Rashid, Ali Abou-ElNour, and Mohammed Tarique
[2] Smart Healthcare Monitoring System Based on Iot, International Journal on Recent and Innovation Trends in Computing and Communication Volume: 3 Issue: 7, Bhoomika.B.K, Dr. K N Muralidhara./
[3] Secured Smart Healthcare Monitoring System Based on Iot, International Journal on Recent and Innovation Trends in Computing and Communication Volume: 3 Issue: 7, Bhoomika.B.K, Dr. K N Muralidhara./
[4] Goutam Motika, Abinash Prusty, Wireless FetalHeartbeat Monitoring System Using ZigBee IEEE 802.15.4 Standard, 2011 Second International Conference on Emerging Applications of Information Technology, 978-0- 7695-4329-1/11, 2011 IEEE DOI 10.1109/EAIT.2011.89./
[5] S. M. Mahalle, P. V. Ingole, Design and Implementation of Wireless Body Area Sensor Network Based Health Monitoring System, International Journal of Engineering Research Technology, Vol. 2 Issue 6, pp. 105-113, June 2013./
[6] Healthcare Monitoring System Using Wireless Sensor Network, D. Mahesh Kumar, Department of Electronics, PSG College of Arts and Science, Coimbatore - 641 014.Volume 04, Issue 01 Pages:1497-1500 (2012),ISSN:0975-0290./
[7] G. Konvalina and H. Haick, ”Sensors for Breath Testing: From Nanomaterials to Comprehensive Disease Detection,” Accounts of Chemical Research, vol. 47,pp.66-76,Jan212014.
[8] J. Cancela, M. Pastorino, M. T. Arredondo, K. S. Nikita, F. Villagra, and M. A. Pastor, ”Feasibility study of a wearable system based on a wireless body area network for gait assessment in Parkinson’s disease patients,” Sensors (Switzerland), vol. 14, pp. 4618-4633, 2014 SITRC, Department of Computer Engineering 2019-20 57
[9] S. Xu, Y. Zhang, L. Jia, K. E. Mathewson, K. I. Jang, J. Kim, H. Fu, X. Huang, P. Chava, R. Wang, S. Bhole, L. Wang, Y. J. Na, Y. Guan, M. Flavin, Z. Han, Y. Huang, and J. A. Rogers, ”Soft microfluidic assemblies of sensors, circuits, and radios for the skin,” Science, vol. 344, pp. 70-4, Apr 4 2014.
[10] C. Y. Yan, W. B. Kang, J. X. Wang, M. Q. Cui, X. Wang, C. Y. Foo, K. J. Chee, and P. S. Lee, ”Stretchable and Wearable Electrochromic Devices,” Acs Nano,vol. 8, pp. 316-322, Jan 2014.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY