M.KUMARASAMY
COLLEGE OF ENGINEERING
NAAC Accredited Autonomous Institution
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Thalavapalayam, Karur – 639 113.

A Minor Project II Report on

PATIENT HEALTH MONITORING SYSTEM USING ESP32 & WEB SERVER

Submitted by

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M.KUMARASAMY COLLEGE Of ENGINEERING

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BONAFIDE CERTIFICATE

Certified that this Report titled "**PATIENT HEALTH MONITORING SYSTEM USING ESP32 & WEBSERVER**" is the Bonafide work of **Nandhakumar R (927622BEE075), Sanchitha KS (927622BEE092), Nandha Kishore S (927622BEE076)** carried out the work during the academic year (2023-2024) under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other project report.

SIGNATURE OF THE SUPERVISOR	**SIGNATURE OF THE HEAD OF THE DEPARTMENT**
Ms.B. Sharmiladevi M.E.,	Dr. J. Uma M.E., Ph.D.,
Assistant Professor	Professor & Head
Department of Electrical andElectronics Engineering	Department of Electrical andElectronics Engineering
M. Kumarasamy College of Engineering, Karur	M. Kumarasamy College of Engineering, Karur

Submitted for Minor Project II (18EEP202L) viva-voce Examination held at M. Kumarasamy College of Engineering, Karur-639113 on ……...

DECLARATION

We affirm that the Minor Project I I report titled "**PATIENT HEALTH MONITORING SYSTEM USING ESP32 & WEB SERVER"** being submitted in partial fulfillment for the award of **Bachelor of Engineering in Electrical and Electronics Engineering** is the original work carried out by us.

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VISION AND MISSION OF THE INSTITUTION

VISION

- ✓ To emerge as a leader among the top institutions in the field of technical education

MISSION

- ✓ Produce smart technocrats with empirical knowledge who can surmount theglobal Challenges.
- ✓ Create a diverse, fully-engaged, learner - centric campus environment to provide Quality education to the students.
- ✓ Maintain mutually beneficial partnerships with our alumni, industry and Professional associations.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION

To produce smart and dynamic professionals with profound theoretical and practical knowledge comparable with the best in the field.

MISSION

- ✓ Produce hi-tech professionals in the field of Electrical and Electronics Engineering by inculcating core knowledge.
- ✓ Produce highly competent professionals with thrust on research.
- ✓ Provide personalized training to the students for enriching their skills.

PROGRAMME EDUCATIONAL OBJECTIVES(PEOs)

- ✓ **PEO1:** Graduates will have flourishing career in the core areas of ElectricalEngineering and also allied disciplines.
- ✓ **PEO2:** Graduates will pursue higher studies and succeed in academic/research careers
- ✓ **PEO3:** Graduates will be a successful entrepreneur in creating jobs related toElectrical and Electronics Engineering /allied disciplines.
- ✓ **PEO4:** Graduates will practice ethics and have habit of continuous learning fortheir success in the chosen career.

PROGRAMME OUTCOMES(POs)

After the successful completion of the B.E. Electrical and Electronics Engineering degree program, the students will be able to:

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of solutions:

Design solutions for Complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental considerations.

PO4: Conduct Investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning in formed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multi-disciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES(PSOs)

The following are the Program Specific Outcomes of Engineering Students:

- **PSO1:** Apply the basic concepts of mathematics and science to analyse and design circuits, controls, Electrical machines and drives to solve complex problems.
- **PSO2:** Apply relevant models, resources and emerging tools and techniques to provide solutions to power and energy related issues & challenges.
- **PSO3:** Design, Develop and implement methods and concepts to facilitate solutions for electrical and electronics engineering related real-world problems.

Abstract (Key Words)	Mapping of POs and PSOs
Arduino uno, Heartbeat sensor, Temperature sensor, WI-FI module, Internet of Things	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8, PO9,PO10,PO11,PO12,PSO1,PSO2,PSO3.

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We would like to express our deep and sincere gratitude to our Minor Project Guide **Ms**.B.S**harmiladevi** M.E.,**Assistant Professor, Department of Electrical and Electronics Engineering,** for his constant encouragement, kind co-operation, valuable suggestions and support rendered in making our project a success.

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We are glad to thank all the **Faculty Members** of **Department of Electrical and Electronics Engineering** for extending a warm helping hand and valuable suggestions throughout the project.

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ABSTRACT

Internet of Things (IoT) is an online system. IoT devices used in several application areas that makes the lifestyle of the users comfortable. IOT based health monitoring system normal used to collect temperature, pressure level, and etc. The most common symptoms of Covid-19 are increase in body temperature, a high or irregular heartrate and dry cough. Our project detects these symptoms and ensures the monitoring of an individual's basic health. Monitoring an individual's heart rate and body temperature is usually very important as irregularities in either can indicate other underlying illnesses such as cholesterol, high blood pressure, low blood pressure, flu, etc. And in times of pandemic, importance of healthcare monitoring system has elevated even more than ever before Buying individual instruments or continuous visitation to hospitals is also expensive for the regular population. The system we developed will measure a patient's body temperature, heartbeat, and oxygen saturation (SpO2) levels in the blood and send the data to a mobile application using Bluetooth. The main objective is to increase affordability for regular people. Besides sustainability in the context of finance, patients will have easy access to personal healthcare. This paper presents an IoT-based system that will simplify the utilization of an otherwise complicated medical device at a minimum cost while sitting at home. A 95 percent confidence interval with a 5 percent maximum relative error is applied to all measurements related to determining the patient's health parameters. The use of these devices as support tools by the general public in a certain situation could have a big impact on their own lives.

CHAPTER 1

SURVEY FORM ANALYSIS

1.1 NAME AND ADDRESS OF THE COMMUNITY

Mrs. Rukmani.S and Mr. Kanan.S,

Arugampalayam,

vangapalayam,

Karur 639006.

1.2 PROBLEM IDENTIFICATION

We have conducted a surveyed in several villages The report of the survey says that people need to check their health condition frequently In villages there is no proper hospitals and health care centers They said, they need to spend their hole day to go to hospitals which far away from their place and also, they are not having a bad health condition instead they need to check their health condition regularly The most of the peoples are daily wages workers they did not spend their hole day it will reflect on their income Rukmani had sugar problem; she must check her sugar level in regular basis but health care center is to long from her place. She is a daily wages worker, if she went for hospital, she losses her one day salary

1.3 PROPOSED SOLUTION

The proposed solution for this project is to make patient health monitoring system using Arduino, it will be useful for monitoring patient’s health condition by themselves at anywhere and any place, it will be simple in operation so not educated people can use this system.

CHAPTER 2

INTRODUCTION

The patient's physical parameters & movement status is continuously sent to hospital center through wifi module. The monitoring center receives the information from each patient and transmits it through Arduino microcontroller. The data from patient can be displayed as graph or numeric on monitor if it is necessary. The doctor can diagnose the patient according to continuously recorded data, a sensor electronics module permits the acquisition of different physiological parameters and their online transmission to the handheld portable device connected to the processor.

1.1 Patient Monitoring

The sensor electronics module constitutes a wireless personal area network. Thus Arduino has low power consumption, low cost, small size, free frequency etc. so that real time monitoring is possible & patient can be treated on time with the system & is helpful in worst condition .Nowadays, a monitor can move with the patient from the operating room to an intensive care unit, to the hospital room, and even into their home. This is paramount in today's world of health care. The most important features in today's patient monitors are mobility, ease of use, and effortless patient data transfer.

1.2 LITERATURE REVIEW

Paper 1: PLANT HEALTH MONITORING SYSTEM USING IOT

Reference: Paper from R. Shukla, P. Verma, and A. Sahu, "IoT-based Smart Agriculture: A Review," in 2017 International Conference on Inventive Computing and Informatics (ICICI).

Inference:

A Plant Health Monitoring System is a comprehensive framework designed to assess and manage the well-being of plants in various environments. This system typically involves the integration of technology, data analytics, and sensor networks to collect, analyze, and interpret information related to the health and conditions of plants.

Paper 2: FOOD MONITORING SYSTEM USING IOT

Reference: Paper from Bhargavi Vijendra Sangam1Assistant Professor, ECE, KSSEM, Bangalore, Jayashree G R2Assistant Professor, ECE, KSSEM, Bangalore, Dr. Girish V. Attimarad HOD, ECE, KSSEM, Bangalore

Inference:

A Food Monitoring System using the Internet of Things (IoT) involves the integration of IoT devices, sensors, and communication technologies to monitor and manage various aspects of the food supply chain. This approach enhances real-time data collection, analysis, and decision-making, ultimately improving food safety.

Paper 3: AIR AND POLLUTION MONITORING SYSTEM USING IOT

Reference: Paper from Harsh N. Shah, Zishan Khan, Abbas Ali Merchant, Moin Moghal, Diploma in Computer Engineering, BGIT, Mumbai Central, India , 6 Assistant Professor, BGIT, Mumbai Central, India.

Inference:

An Air and Pollution Monitoring System using the Internet of Things (IoT) involves the deployment of sensors and connected devices to measure and monitor air quality parameters in real-time. This system aids in assessing the level of pollutants in the air and provides valuable data for environmental management and public health.

Paper 4: MEDITATION ADHERENCE MONITORING SYSTEM USING Internet of things

Reference: Paper from Muhammad Thesa Ghozali School of Pharmacy, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Indonesia

Inference:

A Meditation Adherence Monitoring System using the Internet of Things (IoT) involves the integration of technology to monitor and track an individual’s meditation practices. The system aims to encourage consistent meditation habits, provide insights into the user’s meditation sessions, and offer feedback for improvement.

Paper 5: A SAFETY MONITORING SYSTEM FOR MANUAL WHEELCHAIRS

Reference: Development of a Safety Monitoring System for Manual Wheelchairs" by Smith, J. et al .

Inference:

A Safety Monitoring System for manual wheelchairs is designed to enhance the safety and well-being of wheelchair users by incorporating technology to monitor various aspects of wheelchair usage. This system utilizes sensors, connectivity, and possibly machine learning algorithms to detect potential risks, provide real-time feedback, and offer assistance when need

CHAPTER 3

PROPOSED METHODOLOGY

3.1 BLOCK DIAGRAM

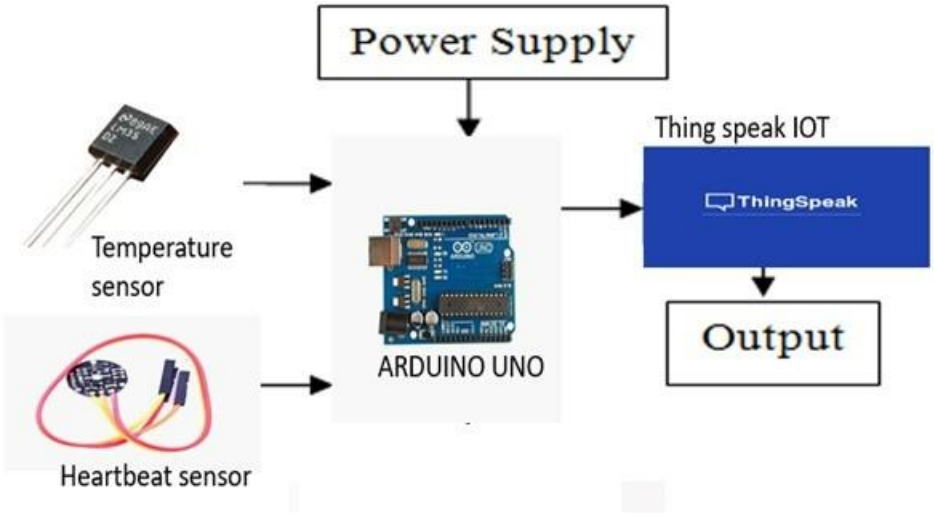

Figure 1-Block diagram

3.1.1 ARDUINO UNO

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Figure 2 -Arduino

3.1.2 HEARTBEAT SENSOR

Heart rate is a very vital health parameter that is directly related to the soundness of the human cardiovascular system. While the heart is beating, it is actually pumping blood throughout the body, and that makes the blood volume inside the finger artery to change too. This fluctuation of blood can be detected through an optical sensing mechanism placed around the fingertip

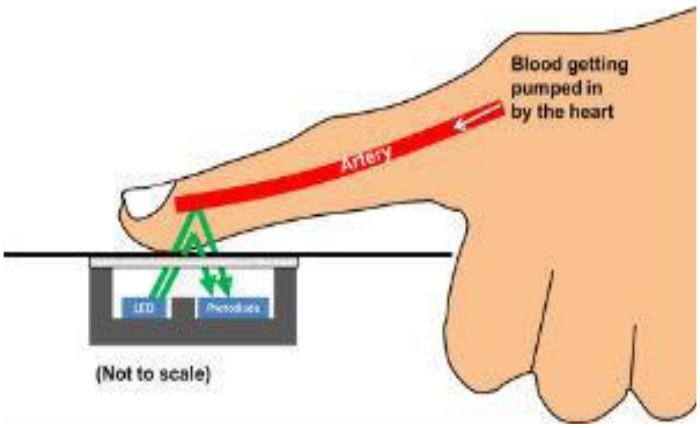

Figure 3 – LM35

3.1.3 TEMPERATURE SENSOR

Temperature sensor is a device which senses variations in temperature across it. LM35 is a basic temperature sensor that can be used for experimental purpose. It give the readings in centigrade(degree Celsius) and Fahrenheit .

3.1.4 WIFI MODULE

The Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. Wi-fi module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi ability as a Wi-Fi Shield offers. The applications of ESP8266 are Smart power plugs, home automation Wi-Fi location-aware devices, Industrial wireless control, and Security ID tags.

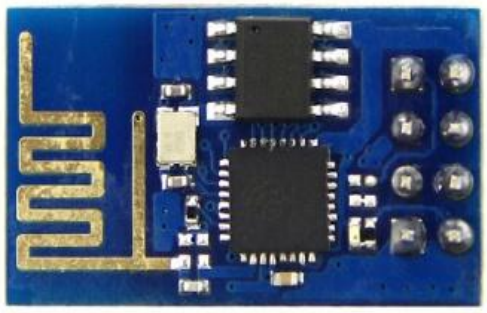

Figure 4 – ESP32

3.2 DESCRIPTION

A patient monitoring system is a set of systems and processes that enable medical professionals to monitor a patient's health. These systems are often used for remote patient monitoring and are also referred to as remote physiologic monitoring. They use digital technologies to capture and monitor health data from patients and transmit it electronically to health care providers to aid in assessing, diagnosing, and ultimately treating health conditions. This technology is revolutionizing the way health care is delivered in the United States by reducing costs and improving outcomes for patients. It is easier to define patient monitoring systems in the context of their applications. One well-known example of a patient monitoring

system is an electrocardiography (ECG) which monitors electrical activity of the heart. Patients who experience hypertension use monitoring systems to measure their blood pressure. Diabetes patients use glucose monitoring devices to measure blood glucose levels etc.

3.3 HARDWARE AND ITS COST

SNO	COMPONENT DESCRIPTION	QUANTITY	COST
1	ARDUINO UNO	**1**	**750**
2	ESP32 WIFI Module	**1**	**100**
3	Pulse sensor	**1**	**200**
4	Jumper wires, Bread board	Few	**300**
5	LM35 Temperature sensor	**1**	**200**

Table 1-Hardware and its components

3.4 CIRCUIT DIAGRAM

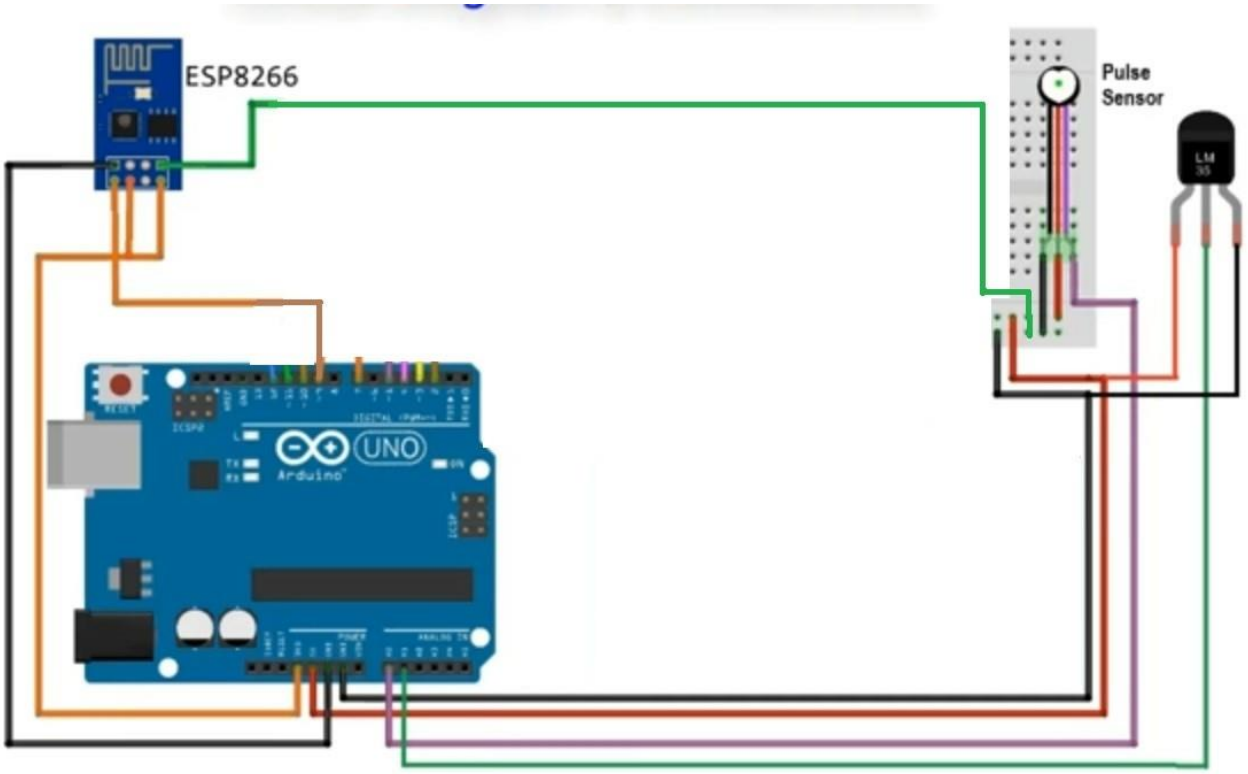

Figure 5- Circuit diagram

3.5 WORKING

This is a simple block diagram that explains the IoT Based Patient Health Monitoring System using ESP8266 & Arduino. Telehealth Expansion- Further expansion of telehealth services, with Patient Health Monitoring Systems playing a crucial role in remote consultations, diagnostics, and treatment adjustments. Pulse Sensor and LM35 Temperature Sensors measure BPM & Environmental Temperature respectively. The Arduino processes the code, ESP8266 Wi-Fi module connects to Wi-Fi and sends the data to IoT device server. The IoT server used here is Thing speak. Finally, the data can be monitored from any part of the world by logging into the Thing speak channel.

CHAPTER 4

HARDWARE IMPLEMENTATION

4.1 IMPLEMENTATION PICTURES

Figure 6 – Implementation 1

Figure 7 -Implementation 2

4.2 IMPLEMENTATION VIDEO

https://www.mediafire.com/file/qlq03ucsjmxa7wy/km_20240427_1080p_30f_20240427_095639.mp4/file

4.3 POST IMPLEMENTATION OBSERVATIONS

4.3.1 EXPERIMENTAL SETUP

4.3.2 EXPERIMENTAL OUTPUT

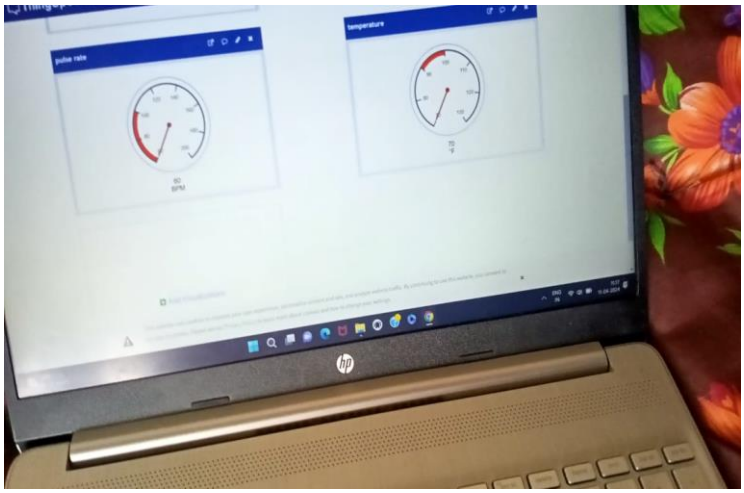

Figure 9 – output

The output data will be accessed any ware from the world by logging in the things speak (IOT)

4.3.3 POST IMPLEMENTATION SURVEY FORM

CHAPTER 5
FUTURE SCOPE & ITS IMPLEMENTATION PLAN

5.1 FUTURE SCOPE

The future scope of Patient Health Monitoring Systems is promising, with ongoing advancements in technology, healthcare, and data analytics. Here are several potential future developments and implementation trends for Patient Health Monitoring Systems

5.2 IMPLEMENTATION PLAN

The number of healthcare monitoring systems in hospitals and other health facilities has increased dramatically, and mobile healthcare monitoring systems with ever-evolving technology have become a serious concern in many countries across the world today. With the usage of IoT technologies, healthcare may be able to go from face to face. Consultation via Telemedicine on a Case-by-Case Basis A sophisticated IoT-based healthcare monitoring system can track a patient's vital signs and the current situation of the room they are in real-time. ThingSpeak is being used as the cloud for an Internet of Things-based health monitoring system. This paper shows a working prototype of a smart healthcare system that uses the Internet of Things to provide high-quality healthcare to everyone in the world. During the design of this system, the ESP8266 and ThingSpeak cloud were used in conjunction with a non-contact temperature sensor. Biometric and trend data from the monitored person is collected using sensor data and Wi-Fi and then communicated to a cloud-based healthcare system via an Internet of Things platform for further analysis. A Wi-Fi connection is used to send sensor data to the network. ThingSpeak is regularly updated and assists in the management of a patient's medical history.

REFERENCES:

1. Paper of An IoT based Health Monitoring System using Arduino Uno Richa, Anwesha Das, Ajeet Kumar Kushwaha, Prof. Mini Sree jeth Department of Electrical Engineering ,Delhi Technology University, New Delhi
2. R.Babu,K.Jayashree, "A survey on the role of IoT and cloud m health care", International Journal of Scientific Engineering and Technology Research, vol. 04, no. 12, pp. 2217-2219, May 2015.
3. V.Ramya, Anuradha Kumari, "Embedded Intensive Health Care Unit", David Bracewell, et al.
4. S.Joephine Selvarani, "Online Health Monitoring System", International Journal on computer science and engineering, Vol.3 no. 4 April 2011
5. Marci Meingast, Tanay Roosta, Shankar Sastry ,"Security & Privacy issues with health care information technology" , IEEE 2006