Vel Tech
Rangarajan Dr. Sagunthala
R&D Institute of Science and Technology
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SCHOOL OF ELECTRICAL AND COMMUNICATION

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MAJOR PROJECT
EMBEDDED DOMAIN
SECOND REVIEW

REAL TIME STRESS MONITORING SYSTEM USING IOT TECHNOLOGY.

SUPERVISOR
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EMBEDDED DOMAIN

PRESENTED BY

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ABSTRACT

Stress is a prevalent health concern in today's society, and timely detection and management are crucial for overall well-being. The proposed system utilizes a network of IoT-enabled sensors to continuously measure physiological parameters indicative of stress levels, including heart rate, galvanic skin response, and temperature. These sensors transmit data to a centralized IoT platform for real-time processing and analysis. Advanced algorithms are employed to interpret the sensor data, detect patterns, and assess the user's stress levels. The system incorporates various techniques for personalized stress assessment, adapting to individual differences and environmental factors. Users are provided with LCD, to visualize their stress levels, receive feedback, and access resources for stress management. Additionally, the system includes provisions for timely alerts and notifications to users and healthcare professionals in case of elevated stress levels or potential health risks. The proposed real-time stress monitoring system offers a scalable, efficient, and personalized approach to stress management, empowering individuals to proactively monitor and address their stress levels for improved health and well-being.

OBJECTIVE

- This project aims to integrate the assessment of human stress levels through physical activity by employing wearable sensors, and IoT. This study identifies stress levels by monitoring indicators like human body humidity, temperature, and Heart rate
- To help individuals become more aware of their stress levels,identify patterns and triggers and Email notification, and take proactive steps towards managing stress effectively.
- To provide continuous and accurate assessment of an individual’s stress levels through sensor data.
- To develop a cost and power effective system.

SOFTWARE USED

1. ARDUINO IDE
2. UBIDOTS STEM

METHODOLOGY

Creating a real-time stress monitoring system using IoT (Internet of Things) technology involves several steps and methodologies:

•**Define Objectives and Requirements**:Clearly define the objectives of the stress monitoring system. What parameters will it measure? How accurate does it need to be? What are the environmental conditions it will operate in?

•**Select Sensors**: Choose appropriate sensors for measuring stress-related parameters. This could include heart rate monitors, galvanic skin response sensors, temperature sensors.

•**Choose IoT Platform**: Select an IoT platform to collect, store, and process data from the sensors. Platforms like AWS IoT, Azure IoT, or Google Cloud IoT provide services for managing IoT devices and their data

•**Hardware Setup**:Set up the hardware components, including the sensors and the IoT device (e.g., Raspberry Pi, Arduino) that will collect data from the sensors and transmit it to the IoT platform.

- **User Interface**: Develop a user-friendly interface, possibly a LCD, to display stress levels in real-time. Include visualizations and notifications for better user engagement.

- **Alert System**: Integrate an alert system to notify users when stress levels exceed predefined thresholds.

- **Power Efficiency**: Optimize power consumption of IoT devices to ensure prolonged battery life, especially for wearable sensors.

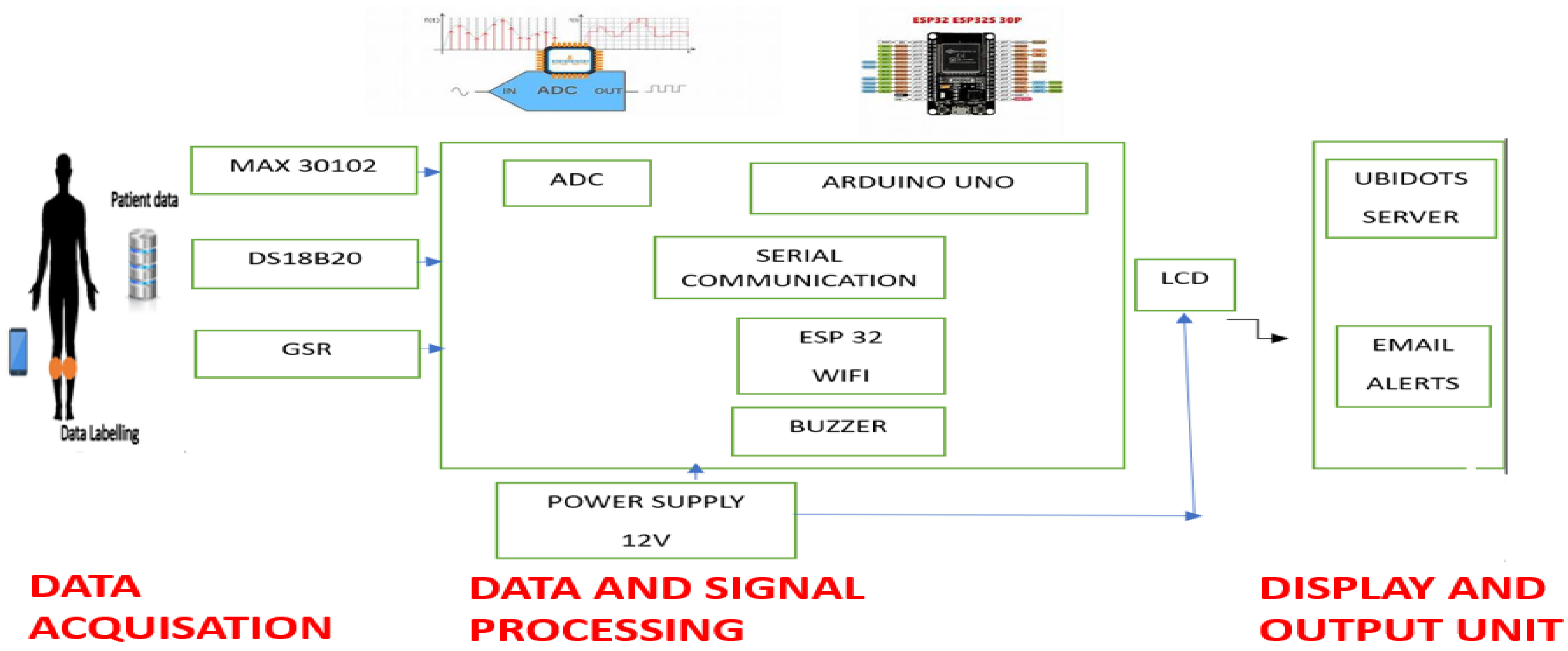
- **Testing and Validation**: Thoroughly test the system to ensure that it accurately measures and responds to stress levels. Validate its performance in different scenarios and conditions.

- Establish a feedback loop to continuously improve the system based on user feedback and evolving requirements.

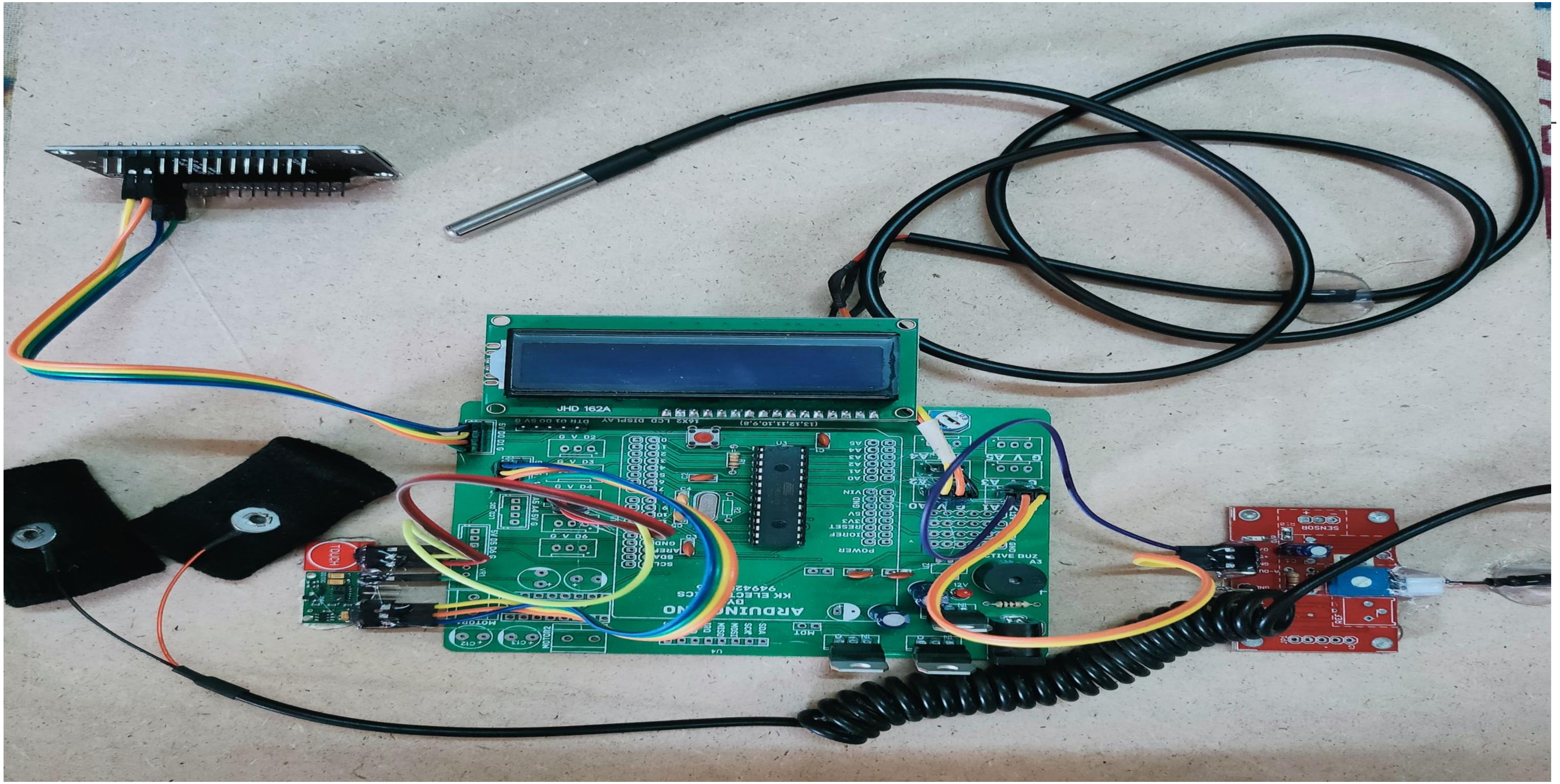
INTRODUCTION

In today's fast-paced world, stress has become an inevitable part of daily life, impacting individuals' mental and physical well-being. Recognizing the critical importance of timely stress management, there is a pressing need for innovative solutions that can provide real-time insights into stress levels. Leveraging the power of Internet of Things (IoT) technology, a paradigm shift is underway towards the development of real-time stress monitoring systems. Stress, often termed the "silent killer," permeates every aspect of modern life, from personal relationships to professional obligations. Its adverse effects on health, productivity, and overall quality of life cannot be overstated. Consequently, there is an urgent need to address stress in a proactive and timely manner. The emergence of IoT technology has revolutionized various industries, including healthcare. By interconnecting devices and leveraging data analytics, IoT offers unprecedented opportunities to monitor health parameters remotely and in real-time. This transformative capability forms the foundation for the development of real-time stress monitoring systems.At the heart of this system lies a network of wearable devices equipped with sensors capable of capturing physiological data indicative of stress levels. These sensors may measure parameters such as heart rate variability (HRV), skin conductance, body temperature, and even behavioral patterns. The data collected by these devices is transmitted wirelessly to a centralized IoT platform for processing and analysis.The IoT platform employs sophisticated algorithms to analyze the incoming data streams in real-time. By correlating physiological markers with established stress indicators, the system can accurately assess an individual's stress level at any given moment. Moreover, contextual factors such as time of day, location, and activity level are taken into account to provide a comprehensive understanding of the stressors. Based on the analyzed data, the system generates personalized interventions tailored to the individual's needs. These interventions may range from simple prompts for relaxation techniques to more proactive measures such as suggesting breaks or engaging in stress-reducing activities. Furthermore, the system can alert designated caregivers or healthcare professionals in case of severe stress episodes, enabling timely intervention and support.

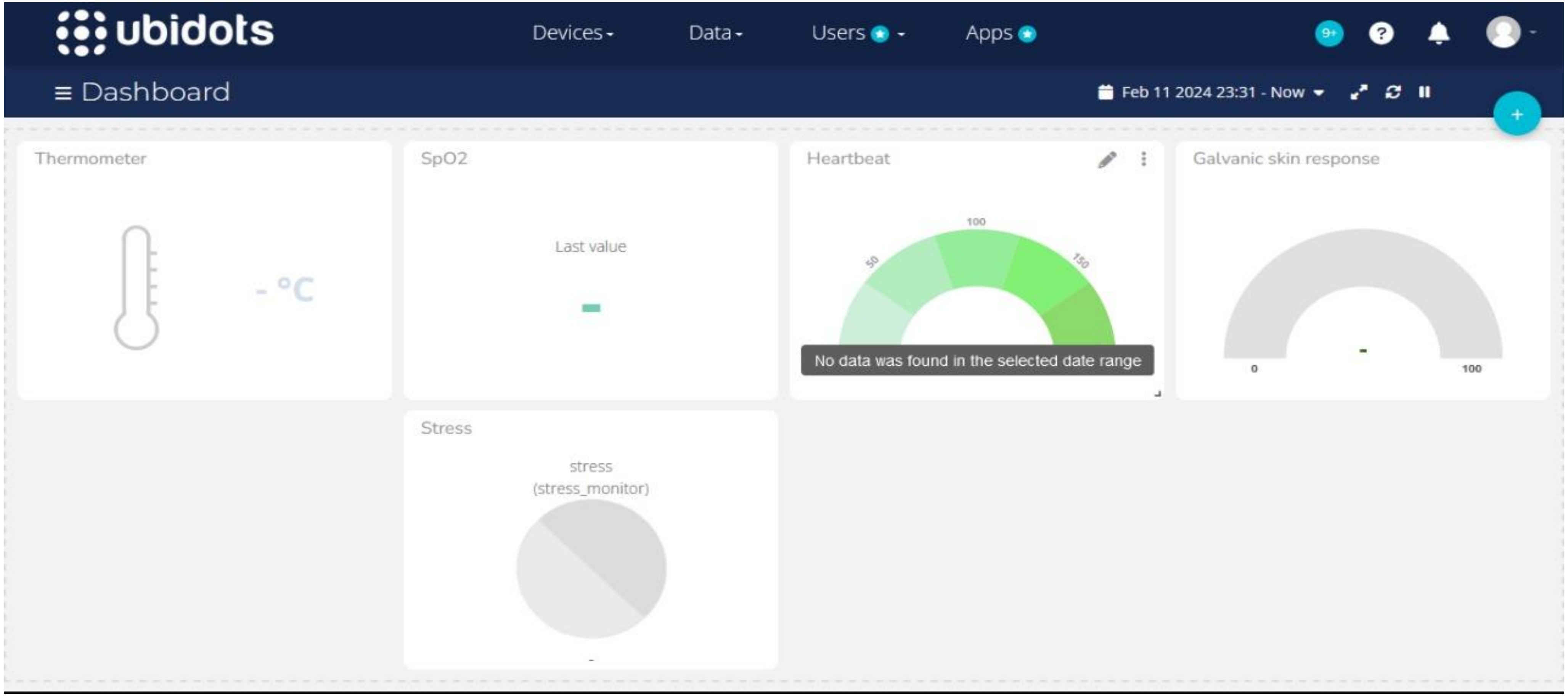
BLOCK DIAGRAM



HARDWARE DESGIN



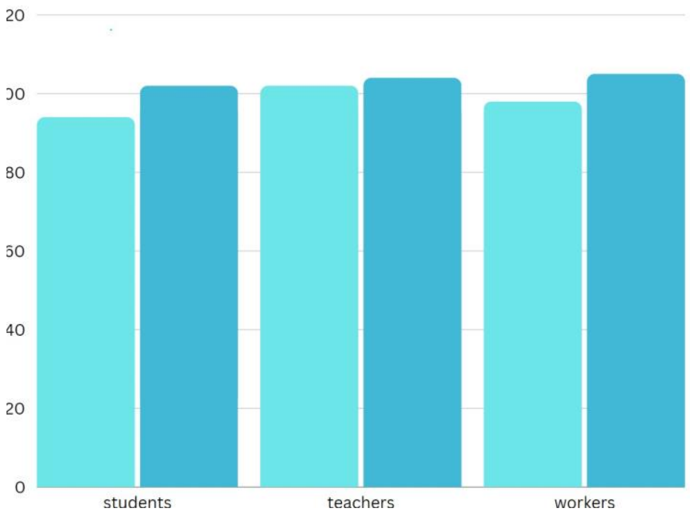
SOFTWARE SETUP



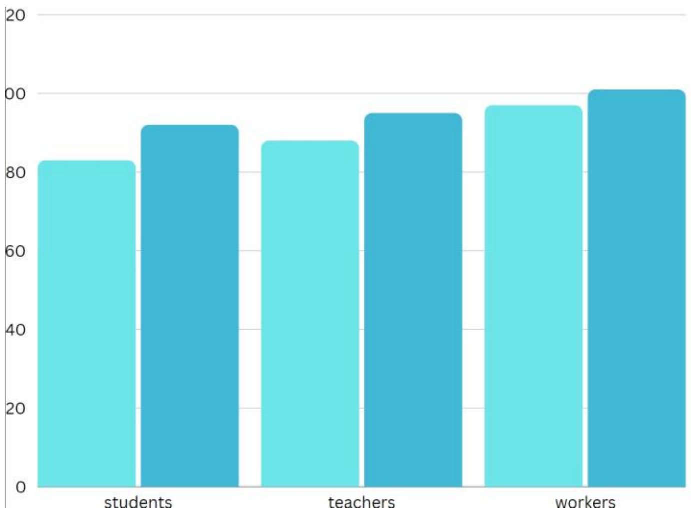
RESULTS

S.NO	PERSON	TEMPERATURE	GSR	SPO2	HR	STRESS/NORMAL
1	STUDENT1	36.7	57	96	83	NORMAL
2	STUDENT2	35	60	102	90	STRESS
3	TEACHER1	38	63	98	84	NORMAL
4	TEACHER2	39	64	103	95	STRESS
5	WORKER1	39	68	96	96	STRESS
6	WORKER2	40	67	103	100	STRESS

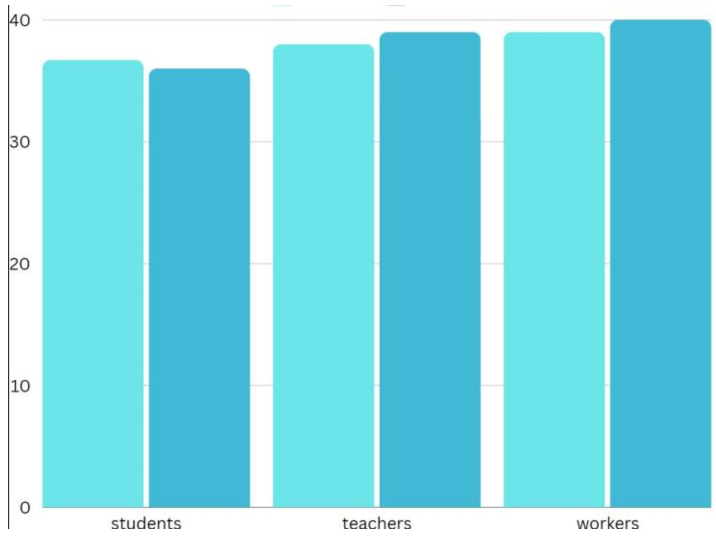
The results section presents the outcomes of the study on the real-time stress monitoring system utilizing IoT technology. In this section, we provide a comprehensive analysis of the data collected, system performance, user feedback, and implications for stress management practices.We begin by presenting the physiological data collected by the monitoring system, including measurements of key parameters such as heart rate variability, skin conductance levels, and activity patterns. Through statistical analysis and visualization techniques, we examine trends, correlations, and variations in stress levels observed in the collected data.



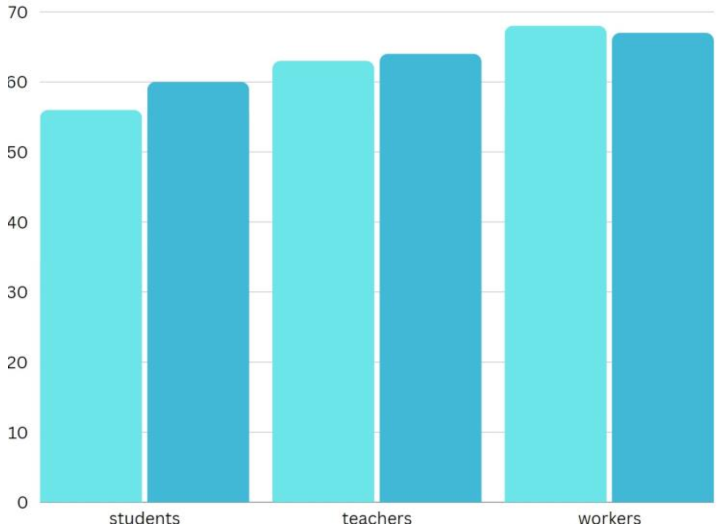
SPO2 Graph



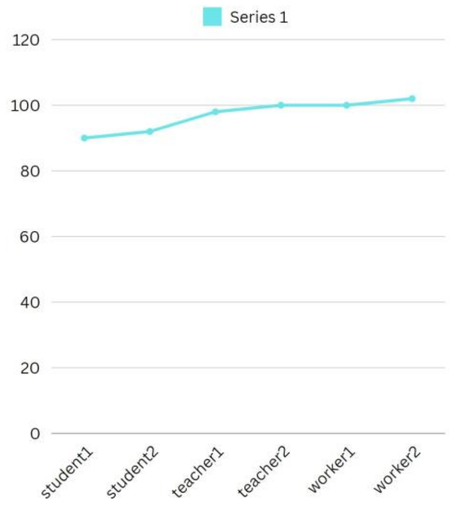
Heartrate Graph



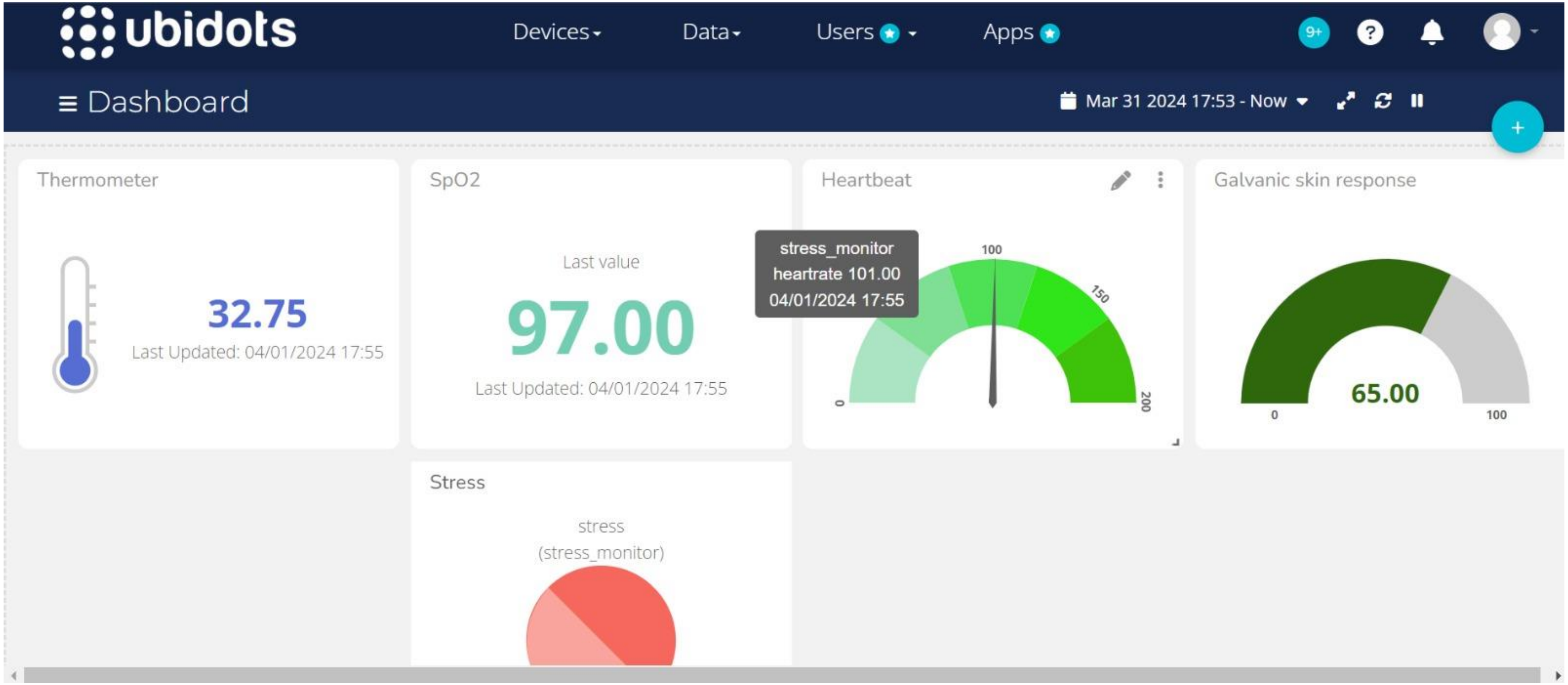
Temperature Graph



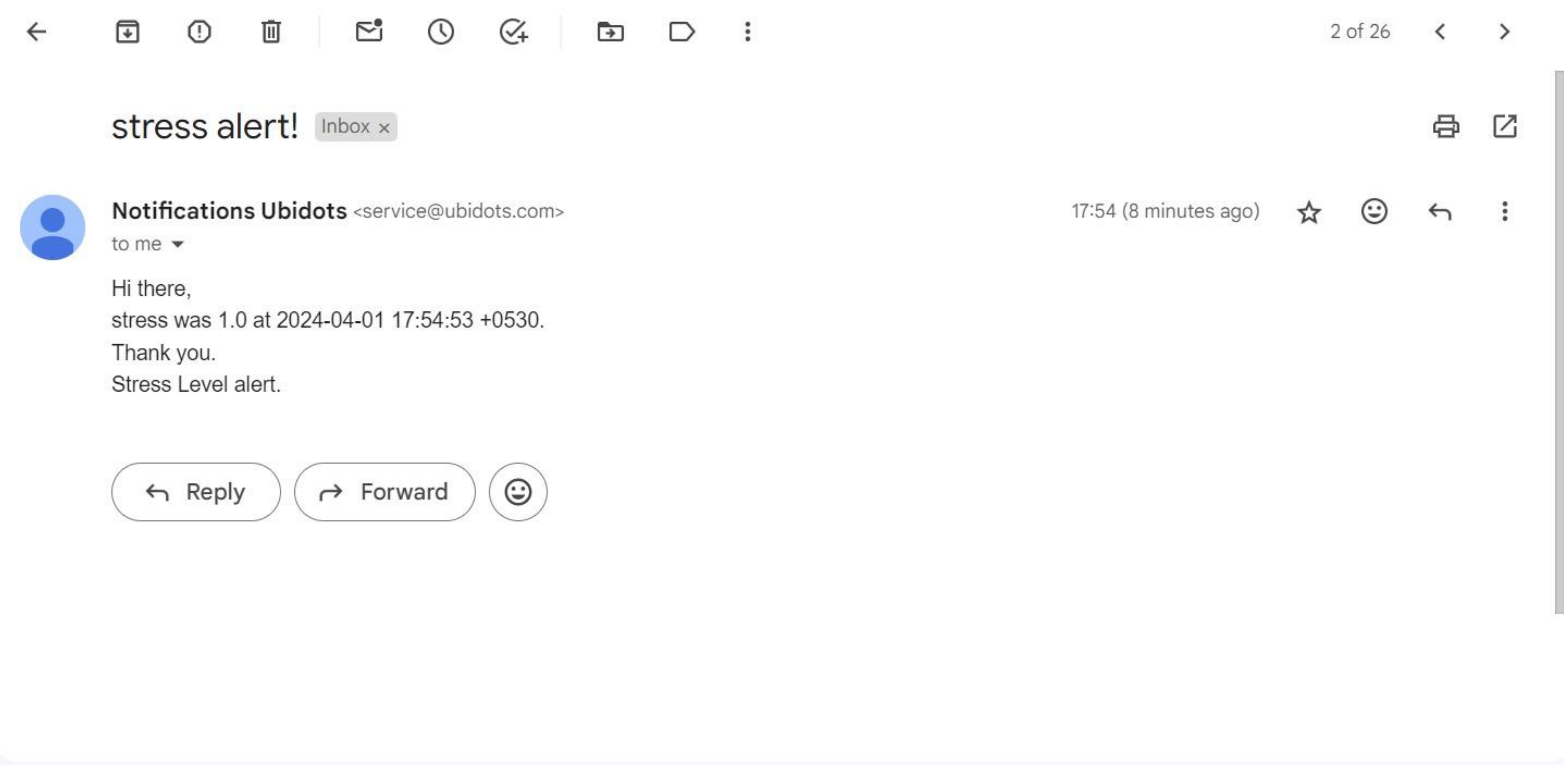
GSR Graph



Stress level Graph


ubidots
Devices
Data
Users
Apps
9+
Dashboard
Mar 31 2024 17:53 - Now
Thermometer
32.75
Last Updated: 04/01/2024 17:55
SpO2
Last value
97.00
Last Updated: 04/01/2024 17:55
Heartbeat
stress_monitor
heartrate 101.00
04/01/2024 17:55
0
100
150
200
Galvanic skin response
65.00
0
100
Stress
stress
(stress_monitor)

Email Alert


2 of 26
stress alert!
Inbox ×
Notifications Ubidots <service@ubidots.com>
to me
17:54 (8 minutes ago)
Hi there,
stress was 1.0 at 2024-04-01 17:54:53 +0530.
Thank you.
Stress Level alert.
Reply
Forward

- As we have taken the results from various people in the certain various aged people.The normal body temperature of the human beings is around 36.7 degree centigrade . At the time of stress it seen difference of slightly increasing of the temperature ,the differnce is based on ages and stress levels.
- As we exaplained above we have taken the information of different age group people for the case study.So,for GSR sensor the normal value of the conductance is 50-55 .When the person is in optimum stress levels the value varies accordingly it increses upto a certain level based upon the stress levels.
- Similarly, for the heart rate the normal value ranges from 80-100 in the adults.So at the time of stress the value make the difference it crosses the value 100 its based upon the person stress levesl.
- At last spo2 which is calculated using the MAX30102 sensor this value normally varies from 95-100 .But,at the time of stress itr varies to above 100 which is depends upon the person stress value
- The stress levels graph presents the variations in stress levels observed over a designated monitoring period. Stress levels were measured using a combination of physiological parameters, including heart rate variability (HRV), skin conductance levels (SCL), and activity patterns.The graph illustrates fluctuations in stress levels recorded throughout the monitoring period. Each data point on the graph represents a specific time interval, with stress levels plotted on the y-axis .Overall, the stress levels graph provides valuable insights into the dynamics of stress experienced by individuals over time. By visualizing stress data in this manner, patterns, trends, and stress events can be identified, enabling targeted interventions and personalized stress management strategies.
- In our real-time stress monitoring system, we have implemented email alerts to provide timely notifications to users and caregivers about significant changes in stress levels detected by the system. The email alert functionality is designed to enhance user awareness and facilitate prompt intervention in response to stress-related events

CONCLUSION

In conclusion, the implementation of IoT technology in stress monitoring systems offers a promising avenue for proactive stress management. By providing real-time data insights and personalized interventions, these systems empower individuals to better understand and manage their stress levels. As technology continues to evolve, the potential for IoT-enabled stress monitoring to enhance well-being and promote healthier lifestyles remains significant. Continued research and development in this field will undoubtedly lead to further advancements in stress management practices, ultimately improving the quality of life for individuals worldwide.

LITERATURE SURVEY

S. No	TITLE	AUTHORS	PUBLICATION YEAR	ABSTRACT
1.	Real-time stress detection and monitoring system using IoT-based physiological signals .	1. Atika Hendryani 2. Dadang Gunawan 3. Mia Rizkinia	2023	This research explains that stress detection can be done by analyzing psychological signals and the importance of monitoring stress levels. The authors develop research on stress detection based on psychological signals. The system then processes the recorded data; the android application displays the calculation results. The database can also be accessed as spreadsheet via a web application. The design of real-time stress detection and monitoring using internet of things (IoT) can work well. **Sensorsused:pulsesensor(MAX30100);Temperature sensor(DS18B20 sensor)** **Technology used: ESP32 (wife and Bluetooth)**
2.	Wearable Stress Monitoring System Based on IoT Multi-Sensor Platform for Living Sheep Transportation	1. Yan Cui 2. Mengjie Zhang 3. Jun Li	2019	This paper proposes a non-invasive Wearable Stress Monitoring System (WSMS) with PhotoPlethysmoGram (PPG), Infrared Temperature Measurement (ITM), and Inertial Measurement Units (IMU) that aimed to remotely and continuously monitor the stress signs.The purpose of this study was implemented by following the multi-dimensional sensing platform to identify more pressure information. The

S. No	TITLE	AUTHORS	PUBLICATION YEAR	ABSTRACT
3.	IOT Based Stress Detection and Health Monitoring System	1.Anusha 2.Padmaja 3.Manaswi	2020	The Wireless networks based on IOT (Internet of Things) provides wide range of opportunities to monitor stress levels regularly and transmit the information to the concerned for immediate action. A model is designed and developed to detect the stress levels using various sensors such as heartbeat rate, blood pressure (BP), body temperature and concentration of CO_2 gas. Further based on the values of these sensors, the levels of stress is calculated and the information is transmitted using IOT. **Sensors used: Blood pressure sensor;Heart beat sensor;GSR sensor;DHT11 sensor** **Technology: ESP8266(Wifi)**
4.	Stress monitoring using wearable sensors: IoT techniques in medical field	1. Fatma M. Talaat 2. Rana Mohamed El-Balka	2023	The main contributions in this paper are as follows: (1) importing signals from wearable devices, extracting signals from non-signals, performing peak enhancement; (2) processing and analyzing the incoming signals; (3) proposing a new stress monitoring algorithm (SMA) using wearable sensors; (4) comparing between various ML algorithms; (5) the proposed stress monitoring algorithm (SMA) is composed of four main phases: (a) data acquisition phase, (b) data and signal processing phase, (c) prediction phase, and (d) model performance evaluation phase; and (6) grid search is used to find the optimal values for hyperparameters of SVM (C and gamma). From the

SNO	TITLE	AUTHORS	PUBLICATION YEAR	ABSTRACT
5	IoT-based Healthcare System for Real-time Maternal Stress Monitoring	1. Olugbenga Oti 2. Iman Azimi 3. Arman Anzanpour	2021	In this paper, we propose a stress-level estimation algorithm based on heart rate and heart rate variations during pregnancy. The algorithm is distributed in an edge-enabled IoT system. We test the performance of our algorithm using supervised and unsupervised learning via an unlabelled set of data from a 7-month monitoring. The monitoring was fulfilled for 20 pregnant women using wearable smart wristbands.

TIME LINE

S.NO	PROJECT ACTIVITY	DESCRIPTION	DATE OF COMPLETION
1	Literature survey	The literature survey on the project title will be done from referred journals	17-01-2024
2	Review with supervisor	Discussion on objectives and formulation of objectives	19-01-2024
3	Formulation of Block diagram	Concept of the project will be finalised as a schematic diagram. The list of components will be finalised	21-01-2024
4	Review with supervisor	Concept discussion	24-01-2024
5	Training	Model training based on keyword detection	29-01-2024
6	Review with supervisor	Discussion on the results and review comments	8-02-2024
7	Analysis and testing	Overall result analysis and performance valuation	15-02-2024
8	Documentation	Report preparation , Correction and Updation	10-03-2024
9	Review of work by supervisor	Verifying the incorporation of all suggestions given by review panel	

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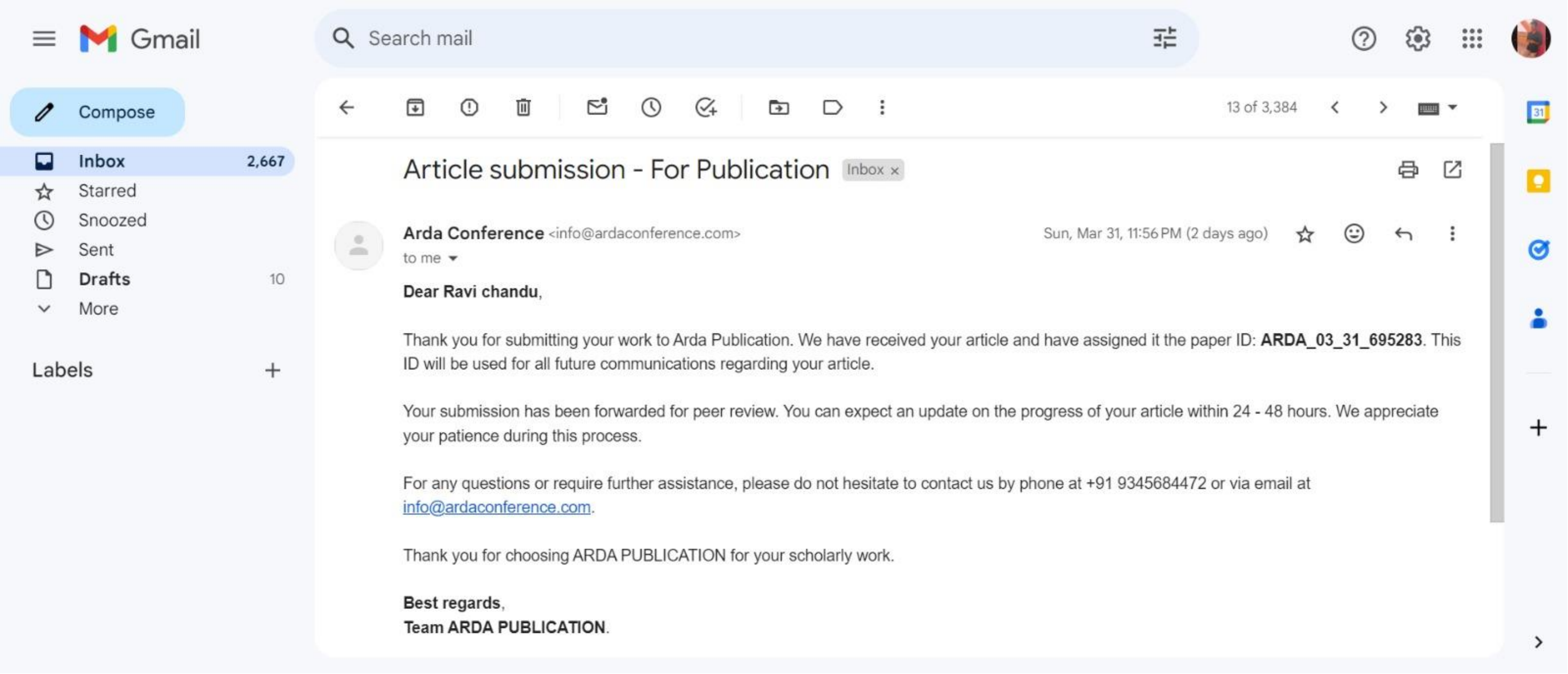

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