



Emergency Alarm Service for patients in hospital

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ABSTRACT: This research paper introduces an innovative solution known as the “Emergency Alarm Service for Patients in Hospital “. This service allows improvement in patient safety and response times in emergency situations with hospitals. The main objective of this service is to provide a rapid and efficient service for patients who needs emergency treatment in most critical areas such as ICUs in the hospitals. This service provides numerous benefits, and it reduces the response time for treating the patients, as a time delay of a min or more can cause serious emergency or also lead to fatal cases. This service provides a prompt response to the patient which will lead to improvise the quality of service in the hospitals and help in betterment of human lives.

KEYWORDS: Raspberry Pi Pico W, OLED, Push buttons, Buzzer, HTTP, ThingsSpeak

I. INTRODUCTION

In medical services and hospitals, ensuring the safety and wellbeing of patients is of utmost importance. To address this critical need the implementation of an emergency alarm service is essential. Our service is designed to provide immediate assistance and support to the patients in the event of emergency situations.

The purpose of this service is to attend the patients as soon as the alert is raised by the patient and improves the overall health care. Also, it reduces the response time of treating the patients who needs emergency service. This service acts as a lifeline in the emergencies of the hospitals. This service is designed to provide immediate assistance and support to patients in the event of emergencies or urgent situations. Implementing an “Emergency Alarm Service for Patients in Hospital “is an essential service that can improve patients’ safety and save lives of people in critical situations. This service is to deliver the important emergency

information, which means it provides the information of the patient which includes the condition or state of the patient. By using this service, we can easily monitor the health condition of the patient. This service provides the alert so that it becomes simpler for us to provide a treatment for the patients those who needs emergency service. It enhances and improves the service to treat the patients. The service also can indicate the emergency or urgent treatment.

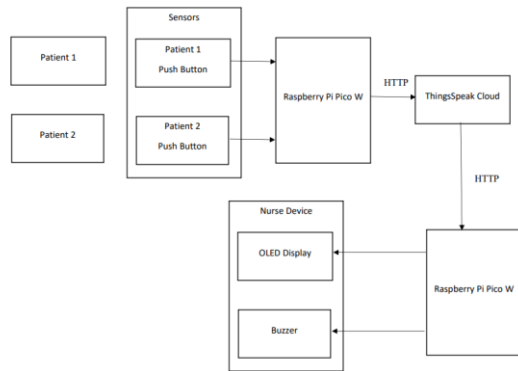
Such a service can provide effective and quick service to the patients. It has reduced the response time for treating the patients in the emergency situations. We have used alarm in this service, so it indicates the condition of the patient so that it becomes easy for us to treat the patients in case of any emergency. With the help of this service the patient can get very quick treatment, so it is very comfortable for getting treated. As it provides all the facilities as well as services to them. By communicating this service can help the health care which is prioritised by the staff which also quickly responds to the urgent cases.

The system detects and responds to medical emergencies or urgent treatments in a timely manner to prevent further harm to patients. And notifies healthcare staff including nurses immediately when an emergency is detected. It optimizes the system to provide effective emergency alarm services while managing costs effectively. By using various techniques, it reduces the cost of the equipment as we have used Raspberry Pi Pico, which reduces the cost and also makes the system compact.



II. METHODOLOGY

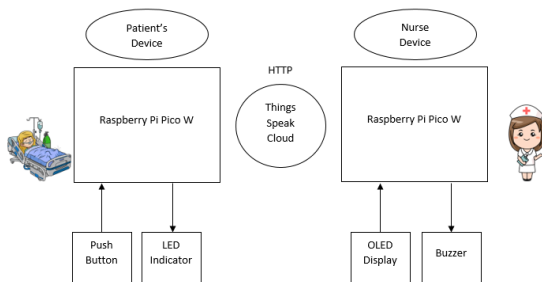
A. Block Diagram



The above block diagram illustrates the emergency alarm system for patients in hospital. The whole system is divided into two parts i.e the device with the push buttons and the device with the nurse. This system uses two Raspberry Pi Pico W's. We have used push buttons for the patients. Whenever they require any kind of emergency

III. DESIGN

The design of the system involves integrating the sensors and devices to the Raspberry Pi and sending the data on the ThingsSpeak cloud.



Raspberry Pi Pico W: Raspberry Pi Pico W acts as the central processing unit. We have used two Raspberry Pi's i.e one for the Patient and other for the Nurse' device. We have used the Picos with inbuilt WiFi module to connect them on the cloud.

Push Button: The push button is connected to the Raspberry Pi Pico Pin 5 and 6. When the push button is pressed by the patient, the signal is sent to the ThingsSpeak Cloud.

OLED Display: The data from the ThingsSpeak cloud is sent to the Raspberry Pi Pico's Pin 8(SDA). The alerts is then displayed on the OLED on the Nurses' device and the buzzer is turned on.

service they can press the push button to call the nurse. The signal is sent to the ThingsSpeak cloud, and the alert is displayed on the OLED and the buzzer is used for alert.

B. Working

The emergency alarm service for patients in hospital is divided into two parts, i.e the patient's sections and nurse section. We have used two Raspberry Pi Pico W's. The first Raspberry Pi Pico W for the patient's device has a push button and LED for indication. The device with the Nurse includes a Raspberry Pi Pico W, OLED, and buzzer. When the push button is pressed by the patient the signal is sent to the cloud on ThingsSpeak. It uses the HTTP protocol to send the data from Raspberry Pi Pico W to cloud. Then the data from the cloud is sent to the Raspberry Pi Pico W. The OLED and buzzer is connected to the Raspberry Pi Pico W. As the signal is received by the Raspberry the buzzer is turned on and alert is displayed on the Display.

SOURCE CODE FOR THE RASPBERRY PI PICO W W:

```
import machine, time
from machine import Pin, I2C
import network
import urequests
import random
from ssd1306 import SSD1306_I2C
```

```
WIDTH = 128 # oled
display width
HEIGHT = 32 # oled
display height
```

```
i2c = I2C(0, scl=Pin(9), sda=Pin(8), freq=200000)
# Init I2C using pins GP8 & GP9 (default I2C0 pins)
print("I2C Address : "+hex(i2c.scan()[0]).upper()) # Display device address
print("I2C Configuration: "+str(i2c)) # Display I2C config
oled = SSD1306_I2C(WIDTH, HEIGHT, i2c)
# Init oled display
buzer = Pin(27, Pin.OUT)
# Fill in your network name (ssid) and password here:
ssid = 'Redmi 9 Prime'
password = '123456789'
```



```
def ConnectWiFi():
    wlan = network.WLAN(network.STA_IF)
    wlan.active(True)
    wlan.connect(ssid, password)
    while wlan.isconnected() == False:
        print('Waiting for connection...')
        time.sleep(1)
    print(wlan.ifconfig())

ConnectWiFi()
#ThingSpeak Initialization
server = "http://api.thingspeak.com/"
apikey = "270XWYWZTTCLCGVW"

while True:
    url =
'https://api.thingspeak.com/channels/2506564/feeds.
json?api_key=270XWYWZTTCLCGVW&results=
1'
    request = urequests.get(url)
    data=request.json()

    print("pt1",pt1)
    print("pt2",pt2)
    #print(data)
    oled.fill(0) # Add some text
    if (pt1)==1:
        #oled.fill(0) # Add some text
        oled.text("Pt No:1 calling",5,8)
        buzzer.high()
    else :
        #oled.fill(0) # Add some text
        oled.text(" ",5,8)
        buzzer.low()

    if (pt2)==1:
```

V. CONCLUSION

The emergency alarm service utilizing Raspberry Pi Pico proves to be an efficient means of communication between patients and nurses in a hospital. The system exhibited reliability in transmitting alerts. The of the push button interface near the patient's bed ensures ease of use, allowing patients to quickly aid when needed. Implementing the system with Raspberry Pi Pico allows to be cost-effective compared to traditional emergency alert systems, making it a better option for healthcare facilities with budget constraints. Overall, the emergency alarm service utilizing Raspberry Pi Pico provides effectiveness, reliability, and affordability, providing a valuable tool for improving patient care and safety in hospitals.

```
#oled.fill(0) # Add some text
oled.text("Pt No:2 calling",5,18)
buzzer.high()
else :
    #oled.fill(0) # Add some text
    oled.text(" ",5,18)
    buzzer.low()
# Finally update the oled display so the image &
text is displayed
oled.show()
```

IV. RESULTS

The hardware setup consists of Raspberry Pi Pico boards installed with push buttons near each patient's bed and an alarm device equipped with an OLED display and a buzzer for the nurse. When a patient requires emergency assistance, they press the push button near their bed, and a triggering signal is generated. The signal from the push button was transmitted wirelessly to the nurse's alarm device through the ThingsSpeak cloud. Upon receiving the signal, the nurse's alarm device activated both the OLED display and the buzzer to alert the nurse of the emergency. The system demonstrates rapid response times, ensuring that nurses were promptly alerted to attend to the patient's needs.



REFERENCES

- [1]. IoT-Based Healthcare-Monitoring System towards Improving Quality of Life: A Review, Suliman Abdulmalek,^{1,2} Abdul Nasir,^{1,*} Waheb A. Jabbar,³ Mukarram A. M. Almuahaya,¹ Anupam Kumar Bairagi,^{4,*} Md. Al-Masur Khan,⁵ Seong-Hoon Kee⁵; Healthcare (Basel). 2022 Oct; 10(10): 1993. Published online 2022 Oct 11. doi: 10.3390/healthcare10101993 PMID: PMC9601552 PMID: 36292441
- [2]. Patient Medical Emergency Alert System Benjamin Kommey Kwame Nkrumah University of Science and Technology Knust - Kumasi Ghana Seth Djanie Kotey Kwame Nkrumah University of Science and



- Technology Knust - Kumasi Ghana Daniel Opoku Kwame Nkrumah University of Science and Technology Knust - Kumasi Ghana, IJAS – ISSN : 2249 - 0868
- [3]. Emergency Alarm System: Prototype and Experience, Meng-Che Teng Ju-Peng Chen Tsung-Han Lin Polly Huang, July 2005 DOI:10.1109/HEALTH.2005.1500396 Conference: Enterprise networking and Computing in Healthcare Industry, 2005. HEALTHCOM 2005.
- [4]. Application of an Emergency Alarm System for Physiological Sensors Utilizing Smart Devices by James Kang and Henry Larkin, Technologies 2017, 5(2),26; <https://doi.org/10.3390/technologies5020026>
- [5]. Impact of clinical alarms on patient safety from nurses' perspective Author links open overlay panel Sarah Alsuyayfi^{ab}, Abdullah Alanazi^{abc}, <https://doi.org/10.1016/j.imu.2022.101047>
- [6]. The Personal Emergency Response System as a Technology Innovation in Primary Health Care Services: An Integrative Review Monitoring Editor: Gunther Eysenbach Reviewed by Marie Sjölander and Hege Andreassen Randi Stokke, RN, Med corresponding author¹², J Med Internet Res. 2016 Jul; 18(7): e187. Published online 2016 Jul 14. doi: 10.2196/jmir.5727 PMID: PMC4965612 PMID: 27417422