Women's Safety Equipment That Captures Video and Detects Scream

T.P. SUMA and G. REKHA

Department Of Computer Science And Engineering

SPMVV

Tirupati, Andhra Pradesh, India

tpsuma16@gmail.com , rekha.spmvv@gmail.com

Abstract. The proposed system gives priority to self-defense by providing safety and helping women in critical situations. It also tends to implement a device that is triggered without any manual aid, providing safety for women in public transport vehicles such as cabs, taxis, buses, auto rickshaws. The main aim of the project is to implement wearable IoT devices built with the Raspberry Pi, which includes a sound sensor, camera module, GPS, and GSM. When the sound sensor detects screaming, the machine learning SVM (support vector machine) algorithm removes superfluous noise and analyses just the victim's screaming. After analyzing the victim's scream, the device immediately activates the camera module, which records 10 seconds of video. The GPS module will track the geographical locations and, using the GSM module, will send an alert message as well as an emergency call to the nearest police station. In the second scenario, when the victim flips the switch, the camera module is immediately enabled and a 10-second clip is recorded. The GPS will be active, and GSM will transmit a status alert message. The procedure's primary objective is to provide a smart device for a lady that is both comfortable and portable. The smart band's capacity to minimize the size of gadgets is the first and most important distinction between it and other existing safety measures[16].

Keywords: safety, victim screaming, women, (GSM)Global system for mobile communication, (GPS)Global positioning system.

1   Introduction

Women have the right not to be subjected to violence, provocation, or exclusion. Overcoming the challenges of a toxic environment can help women reach their full potential as people and contributors to their workplaces, society, and economies. Given the current situation of the world in terms of women's safety, women are wary of males both inside and outside the home, but this comes at the expense of being subjected to abuse, ruthlessness, and forcefulness in public and even in their own homes. They are unable to leave their houses at any time of day to go to work in peace. Women are subjected to guilt, which kills their emotions of potential and harms their beliefs and goals. Domestic violence is outlawed in at least 155 countries, whereas workplace harassment is criminal in 140. However, obstacles in executing these laws persist, restricting the rights of women and girls to safety and equality. Violence is seldomadequately avoided, and when it occurs, it is frequently unwarranted. Between 2007 and 2016, 83% of assaults on women were registered, with four assaults reported per hour. Child marriage is a common occurrence in India. It is also estimated that 63 million women have gone missing as a result of gender-based abortion, and 21 million girls are married off because their parents despise them. In 2016, 38,947 cases of molestation were recorded in India, with the incidents taking place when women travelled alone in rural areas with no one to aid or rescue them. The advancement of technology has enabled us to communicate, exchange critical data, speak out, and raise awareness of human rights violations [17]. However, it has also resulted in alarming levels of gender-based violence against women and girls, which has mostly gone undetected. Today's globe strives towards a society in which everyone has equal rights, including men, women, and children, and where responsibilities and workloads are assigned evenly. As a result, women's work schedules are shifting, and they are being allocated to shifts during the day or at night. As a result, it is critical to improve the protection of women and children, particularly at night.

Women confront a lot of safety and security challenges across the world. A poll recently found that 35% of women face a range of issues, including abuse and assault. Women's harassment is currently on the rise, with frequent newspaper and television headlines about women being harassed and abducted, despite the fact that several laws and statutes have been established to safeguard women. Despite the laws, polls show that violence against women and girls has grownrather than diminished in recent decades. Since the incident in Manipur in 1978, the incident in Delhi in 2004, and a number of other incidents across India, harassment against women has not decreased but has increased each and every year . Based on the National Crime Record Bureau's (NCRB) 2019 report, the crime rate increased to 7.3% in 2018, with 31% of harassment reported incidents in the previous ten years. The WHO estimates that 40-60% of women in

Somalia, Ethiopia, Bangladesh, Peru, Tanzania, and Thailand are mistreated. There are issues on the streets, in schools, and in institutions that make women feel anxious when they go out. Many victims were harassed as children but did not report itto their parents, guardians, or the police since doing so would have a detrimental impact on them and their family. The safety of women is a societal issue that must be addressed as soon as possible. To address all of these issues, a slew of IoT-powered women's safety devices have been developed and implemented to date. Wearable devices, such as smart bands or wristwatches, are common in modern systems. There have been few implementations produced, with the bulk depending on Sensors that monitor heartbeat, temperature, and other human behaviours in order to activate the gadget based on body temperature or pulse rate. Some use a fingerprint recognition to activate the gadget, while others use a variety of sensors and approaches. The suggested technique will address all of the system's shortcomings[16].

Problem Statement:
The project's objective is to safeguard women against attacks without the involvement of a second person, to lessen crime rates, and to eliminate female harassment. The present challenging condition for every woman is to establish a safe atmosphere for women in society. The tool helps women overcome their fears and carry out their responsibilities freely and confidently.

Objectives:
The primary goal of the project is to propose a realistic and reasonable philosophy for women's safety. This suggested system operates as a second set of eyes on women while also supporting them in critical situations to assist dependent women in need. Screaming or using the emergency button to protect vulnerable women can save their lives.

2 Literature Survey

Literature survey for existing system

Thamaraiselvi.K,Rinesh.S,Ramaparvathy.L,Karthick.V [1]has implemented an application of a smart band that has been designed and installed with the needed quantities on a smartphone, and the smart band generates a signal that is relayed to the smartphone. A smartphone is linked to a smart band through WIFI. Bluetooth 5.0 and location identification through independent wireless networking are included in this smart system. Bluetooth 5.0 acts as a bridge between the smart band and the smartphone app. The smartphone constantly monitors the body's temperature, movement, and heart rate, in addition to the physiological data sent by the smart band. The position is tracked using longitude and latitude, which is subsequently converted into a link URL by Google Maps and supplied via the mobile application. A smartphone receives an emergency signal will quickly send the message "Help me and save me, I'm in a perilous position" to the nearest police station, along with the location. It will also send the message to any saved main contacts, as well asSMS alerts toanybody who is utilising this application in a risky circumstance. And, before raising an alarm and asking assistance, the smart band will inflict electric shocks of up to 12 volts. A smart band is a wearable monitoring device that incorporates geofencing to assure safety and precise position updates. In the event of an abnormal situation, as well as insufficient balance in the mobile to make a call and send an alert SMS, the installed application (in smartphone) will assist in sending out a toll-free SMS and using geo-fencing features to send out thelocation to the police the patrol/control room stores contacts and the local police station.

Dr.B.Sumathy,P. Deepan Shiva,[2]The ARM processor-based women's safety and security system has been installed. This has two inputs and two switches. By pushing switch 1, the victim's location is identified using GPS, and an SMS is sent via the GSM module to the current mobile phone number. When the user need self-defense, they can engage the mechanism which is panic switch, the panic switch may be used to activate an alarm sound, if the lady feels scared, she can activate the switch, which act as an alerting device. A temperature monitoring system is also included in the security system, which continuously monitors body temperature and sends an SMS warning if it increases over a specific threshold. Another function introduced to the system below the 20-degree Celsius threshold is speech recognition, which ensures that the setting standards module is utilised in critical cases if the specific user is unable to hit the switch on their own. For the preceding feature to function, a speech code is pre-recorded, and when the voice is recognised, an SMS alert is sent to designated mobile phones and the control room.

DhirajSunehra,V. Shashank,B. Uday Kumar Goud [3]The Raspberry Pi 3 is used to create a smart security solution known as a wearable smart device system to increase women's and children's safety and security. When the victim clicks the push button, the device activates, serving as both an alert and a security system. The current user is analysed using the Global Positioning System (GPS), and the user's location is broadcasted through SMS to the emergency contact and police using the Global System for Mobile Communications (GSM) / General Packet Radio Service (GPRS) protocol. When the user presses the panic button on the smart wearable device system, the device also takes an image of the assault and the user's or

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victim's surroundings with a USB web camera linked to the device and sends it as an email alert to the emergency contact. It provides a buzzing alert to those closest to the user.

Imtiaz Hanif, Shakil Ahmed [4]The gadget contains an Arduino Pro-Mini Microcontroller, a GSM module, and a GPS module, and it can send an SMS with the victim's current position. When the victim touches the panic button, the device activates, the SIM800L module contacts law enforcement through the mobile phone tower, an instant call is sent to law enforcement, and the victim's position is updated on the application server. The authorities inform the local police station in order to save the prey. If a law enforcement agency or police department attempts to call the device number, the device will immediately refuse the call and send an SMS containing the victim's current location. The battery life on the gadget is rather lengthy.

N.Penchalaiah, M. Susmitha [5] has implemented an women safety device. If the gadget is triggered by pushing the device's emergency button, women will receive prompt and detailed safety assistance. The gadget tracks the user's location in real time and alerts a local police station and volunteers. The device has pressure, temperature, and pulse rate sensors, as well as GPS, GSM, a buzzer, and an Arduino. When the victim hits the button in a potentially harmful circumstance, an alert message is sent to one of the pre-programmed contact numbers. When pressure and temperature sensors become high, temperature and pulse-rate sensors become high, or pulse-rate and pressure sensors become high, the automatic mechanism is activated. GPS is utilised to track the victim's location and transmit messages, as well as to notify authorities, a nearby police station and the victim's relatives of their whereabouts. When the button is hit, the buzzer emits a loud noise to warn anybody around who can assist them, which is an added feature.

2.1   Gapes Identified in Existing system

Several measures for women's protection have been created in the past, which help in saving victims' lives in vulnerable situations. The proposed gadgets will activate only by scream and work when the user clicks a button, at which point they will send a location and alert message to a previously saved mobile phone. Several technologies were offered to activate the current mechanism, including flex, sound pressure, and cardiovascular sensors. Most of the time, these techniques result in false alarms, resulting in unneeded

3   Proposed System

There is no place or nation in the world where women and girls are safe from violence. Therefore, a safety device for women has been developed using Internet of Things (IoT) wearable devices with a Raspberry Pi, which is integratedwith a camera module, GPS, sound sensor, and GSM. When the sound sensor detects screaming, the Machine Learning Support Vector Machine (SVM) algorithm filters out irrelevant noise and analyses just the victim's screaming. After evaluating the victim's screaming, the device immediately triggers the camera module, which captures ten seconds of video. The GPS module will monitor the location position and, using the GSM module, will send an alert notification and call the local police station. In the second scenario, when the victim presses the button, the camera module is immediately enabled and a 10-second clip is recorded. The GPS will be active, and GSM will transmit a status alert message. The primary purpose of the procedure is to give a woman a smart device that is both comfortable and portable. The smart band's capability to shrink the size of gadgets is the first and most important difference between it and other existing safety measures[16].
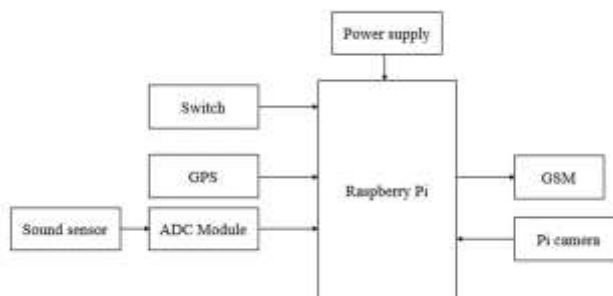

Fig. 1. Block diagram for the women safety

3.1   Components used
Raspberry Pi 4 Model B with 2GB RAM

The Raspberry Pi board features RAM, a processor and graphics chip, an Ethernet connection, GPIO pins, an Xbee socket, a UART, and a power source connector, as well as interfaces for various external

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devices. It also requires large storage, as SD flash card memory is used. Consequently, the Raspberry Pi board will boot from the SD card in the same way as a PC boot from its hard drive. The essential hardware specifications of the Raspberry Pi board primarily consist of an SD card storing a Linux OS a US keyboard, a display, a power supply, and a video connector. A USB mouse, a powered USB hub, a casing, an internet connection, and the Model A or B are all optional hardware specifications. A USB WIFI adapter is used, and an internet connection to Model B is via LAN cable. Fig 2: shows the Raspberry pi4 model.

4   Software Tools Used

NOOBS soft ware

[14] NOOBS is an operating system that makes it easier to set up a Raspberry Pi and makes the installation process easier. It also offers several alternative operating systems, which are then downloaded and installed via the internet. It offers the same operating system option menu, allowing users to download and install Raspbian and other images. Users may pick between NOOBS and "NOOBS Lite" on the NOOBS download page. NOOBS offers a full version of Raspbian, so install it without connecting to the internet at all. NOOBS Lite, on the other hand, requires a network connection to install anyof the operating systems offered by NOOBS, including Raspbian. Follow by selecting the appropriate version. After downloading NOOBS extract the.zip file. Then, followed by plugin the SD card into the appropriate slot on the computer. It should be formatted as FAT32. Simply by drag and drop theNOOBS files is extracted into the freshly formatted SD card. If the.zip file was extracted to a folder, open that folder and choose only the contents. NOOBS is simple to use after it is installed on the SD card. Start the Raspberry Pi by inserting the SD card. The instilling an operating system such as Raspbian, Libre ELEC, OSMC, or any of the others that NOOBS provides access to .This is the point at which something occurs. After booting into NOOBS,   a menu where it occurs to choose whatever operating system to install on the Pi. because NOOBS intelligently adapts to generation and model.

FIG .8. Downloading the Noobs

Fig .10. when sound sensor activated, the result shown in VNC viewer

5   Flow Chart and Use Case Diagram

The flowchart of the women's safety device system describes the flow of operations that take place in the system when the system is powered on. The Raspberry Pi, GPS, and GSM modules are initialized. When the user finds herself in trouble, she is prompted to scream. As soon as the sound sensor detects a scream, the device is activated and the SVM machine learning algorithm will classify the woman's scream. The device then checks the threshold value of the woman's scream. When the device senses a threat, the camera module is activated and records 10 seconds of video. The GPS will continually monitor the location, the GSM will send a message with the latitude and longitude values, and the captured video will be sent to the pre stored contact numbers and mail. When the switch mechanism is triggered, the actions procedure described above will proceed.
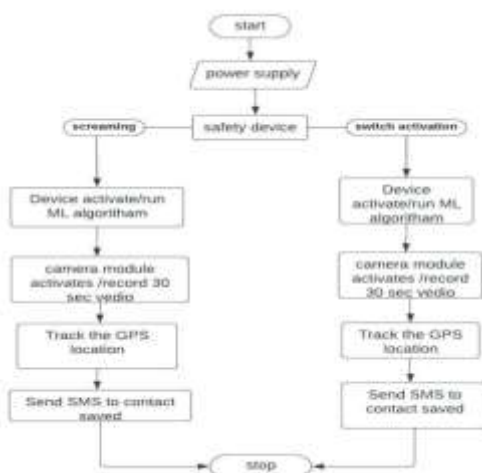
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FIG .11.flow chart for the proposed module

The use case diagram displayed in fig 10 will illustrate the procedure of the safety device and how the device is triggered. When the user detects a threat scenario, she is encouraged to scream, and another method of activating the gadget is by hitting the switch, which is an alternate choice for the user in appropriate conditions. After activation, the camera module will be activated and will record 10 seconds of video. The GPS will constantly monitor the location, the GSM will send a message with the latitude and longitudevalues, and the captured video will be transmitted to the registered contacts.
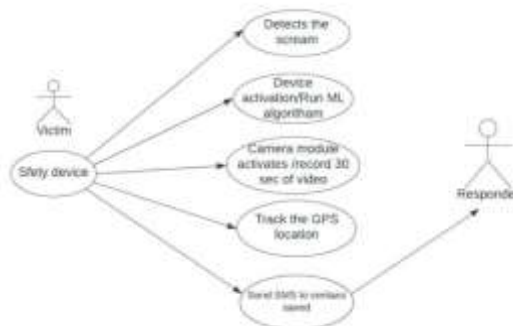

FIG .12.use case diagram for the proposed module

6 Experimental Set-Up

Fig 13,shows that the experimental of the women safety device which is incorporated with raspberry pi, camera module ,GPS,GSM and sound sensor .
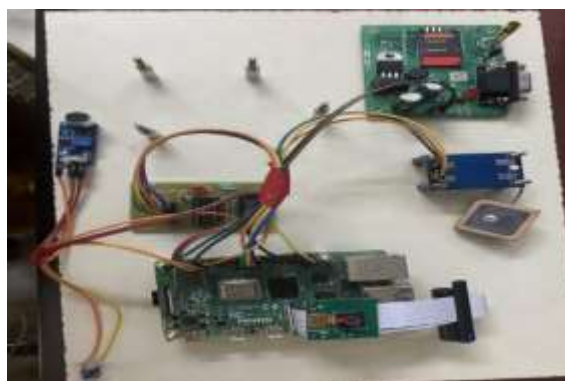

Fig .13. Women Safety Device

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7   Result and Discussions

Fig 14 depicts a snapshot of the SMS alert with location through latitudes and longitudes received in the emergency contact's mobile phone. By following the coordinates, authorities may determine the exact location of the victim and either go there or notify the local police station to safeguard the victim.
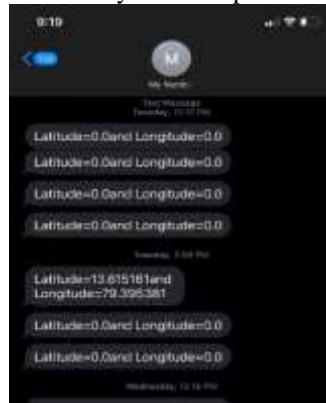

Fig.14.SMS alert with latitudes, longitudes of user location

The bellow Figure 15shows the snapshot of the email alert sent to the emergency contact along with the recorded video the surrounding area where the user (victim) is located.

Fig .15. Email alert with user location and captured video

The bellow mentioned Figure 17 16 shows the captured image by camera module, of the surrounding area where the user (victim) is located.

Fig .16.snapshots of the video captured by the camera module were recorded.

The bellow Figure 15shows the snapshot of the email alert sent to the emergency contact along with the recorded video the surrounding area where the user (victim) is located.

Fig .15.Email alert with user location and captured video

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The bellow mentioned Figure 17 16 shows the captured image by camera module, of the surrounding area where the user (victim) is located.

Fig .16. snapshots of the video captured by the camera module were recorded.

Fig .17. snapshots of the video captured by the camera module were recorded.

CONCLUSTION

The suggested approach for women's safety includes video recording and yelling detection, both of which are improved versions of existing technology. It will be compact and functional. Make sure that the person is saved as soon as possible. The proposed methodology uses the SVM algorithm to categorise the screams of the women, preventing false alarms by doing so. Additionally, it has a camera module that can record a 10-second video clip and upload it to a pre-registered Gmail account for further use. By sending SMS via a GSM module and providing location through a GPS module, this technology is intended to assist women in need and alert authorities as well as family members. It was conceptualized to improve the security system's portability and comfort.

References

1. K.Thamaraiselvi, S.Rinesh, L.Ramaparvathy & V.Karthick, 2019. Internet of Things (IoT) based smart band to ensure the security for women. *International Conferance on Smart Systems and Inventive Technolgy (ICSSIT),* November .pp. 1093-1096.
2. Dr.B.Sumathy, et al., 2019. Virtual Friendly Device for Women Security. International Conference on Physics and Photonics Processes in Nano sciences, June.
3. V.Sai Sreshta, V.Sashank and B.Uday Kumar Goud. "Raspberry Pi Based Smart Wearable Device for Women Safety using GPS and GSM Technology." IEEE International ConferenceforInnovationinTechnology(INOCON)(2020). <https://ieeexplore.ieee.org/document/9298449>.
4. Md.Imtiaz Hanif, et al. "Anti-Molestation: An IoT based Device for Women's Self-Security to Avoid Unlawful Activities ." International Journal of Advanced Computer Science and Applications (IJACSA) 11 (2020):722-727.
5. Ganesan, U., Paul, N.E.E., Krishnan, G.H., Aarthi, S., Swamy, I. K., "Detecting Diabetes Mellitus from Tongue Image Hybrid Features and Neural Network Classifier", Proceedings of 4th International Conference on Cybernetics, Cognition and Machine Learning Applications, ICCCMLA2022, 2022, pp.425-427.
6. Umashankar, G., Vimala, J.A., Hari, K.G., "Elbow Joints for Upper-Limb Prosthesis: Analysis of Biomedical EEG Signals using Discrete Wavelet Transform", International Journal of Engineering Trends and Technology , 2022, 70(7), pp. 190–197.
7. Sudhakar, T., H Krishnan, G., Prem Kumar, J., ...Devanesan, P.S., Shalini, S., "Inducement of Artificial Sleep using Low Strength Magnetic Waves", Journal of Physics: Conference Series , 2022, 2318(1), 012028.
8. N.Penchalaiah, et al. "An IoT Based Wearable Device for Women Safety." *International ResearchJournalonAdvancedScienceHub*03.05S(2001).
   https://rspsciencehub.com/article_12150_0a485479f68bb04efcde0cab36fcd09d.pdf
9. Dr.CK Gomathy and Ms.S.Geetha. "Women Safety Device Using IoT." *International Jpurnal of Scientific Research in Engineering and Management(IJSREM)*05.10(2021). <https://www.researchgate.net/publication/357748826_WOMEN_SAFETY_DEVICE_USING_IOT>.
10. HDNalina, et al. "Smart Women Safety Device using IoT." *International Journal of Engineering Research & Technology (IJERT)* 09.12(2021).<https://www.ijert.org/smart-women-safety-device-using-iot>.
11. A.Kodieswari, D.Deepa, C.Poongodi, & P.Thangavel. (2021). Design of Women Smart Safety and Health Reporting Device Using IoT and Mobile Mesh Networking technologies. *International Journal of Aquatic Science*

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Eur. Chem. Bull. 2023, 12(Special Issue 4), 2161-2168

(IJAS), *12*(03), 1141-1149. Retrieved from http://www.journal-aquaticscience.com/article_135449_845d952edddb91a5e0899515bbfd6ee4.pdf

12. Md Faizan Zargar, Sakshi D Barshi, & Dr.T.K.Sivakumar. (2021, March). Hybrid Beacon and Gps Based Women Safety Device for Alerting During Emergency. *International Journal of Computer Science Trends and Technology (IJCST), 09*(02), 53-58. Retrieved from http://www.ijcstjournal.org/volume-9/issue-2/IJCST-V9I2P9.pdf

13. Ronak M, A. Srinivasulu, C. Ravariu, A Bhargav, "Liveness Detection with Convolutional Neural Network Algorithm", *in proc. of*Intelligent Computing Techniques for Smart Energy Systems, Lecture Notes in Electrical Engineering, vol.862, pp.407-418, doi:10.1007/978-981-19-0252-9_37

14. Sumanth Pagadala, Lakshmi Prasanna, & Anusha Reddy. (2021, June). A Novel ML -Supported IoT Device for Women Security. *International Research Journal of Engineering and technology (IRJET), 08*(06). doi:2395-007

15. MA.D.Ashalatha, Ms.Kavya G, Ms.V N Pratiksha, & Mr.Raghav S. (2022, June). IoT Based Women Safety Device. *International Journal of Advanced Research in Scene ,Communication and Technology (IJARSCT), 02*(09), 85-89. doi:10.48175/IJARSCT-5301

16. Siddhi Mahajan, Prof.Shobhika P Gopnarayan, & Hrucha Wankhade. (2022, August). Women Safety Device with GPS Tracking and Alert. *International Journal for Research in Applied Science & Engineering Technology (IJRASET), 10*(VIII), 1177-1183. Retrieved from https://www.ijraset.com/research-paper/womens-safety-device-with-gps-tracking-and-aler

17. R. Mundra, A. Srinivasulu, C. Ravariu, A. Bhargav, M.Sarada, "Real Time Driver Alertness System Based on Eye Aspect Ratio and Head Pose Estimation", in proc. of the International Conference on Smart Technologies in Urban Engineering, 29 Nov.2022,vol. 536, pp. 707-716. doi:10.1007/978-3-031-20141-7_63

18. S.Gokula Priya, K.Arun, R.Raghul, & M.Mathankumar. (2022, June). Automated Women Safety Device. *International Research Journal of Engineering and Technology (IJERT), 09*(06), 312-314. Retrieved from https://www.irjet.net/archives/V9/i6/IRJET-V9I653.pdf

19. T.P. Suma,G. Rekha,International Journal of Engineering Applied Sciences and Technology Vol. 6, Issue 7, ISSN No. 2455-2143, Pages 257-262 ,Published Online November 2021 in IJEAST.

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Eur. Chem. Bull. 2023, 12(Special Issue 4), 2161-2168