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WEARABLE PANIC BUTTON: A BLYNK-BASED IOT SOLUTION

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Abstract: **The project, entitled "WEARABLE PANIC BUTTON: A BYLINK-BASED IOT SOLUTION" aims to improve individual security. The device is worn on the wrist and has a physical push button that instantly sends an SOS alert to the user's saved devices. The ESP8266 microcontroller and Wi-Fi connection are its main components. Hardware is basically a basic circuit with a push button. The Arduino IDE is used to create software that enables real-time notifications on the Blynk app. If the user presses the button, these pre-defined individuals can be quickly notified, allowing for a quick response in an emergency. Reliability was ensured by test validation. Multi-device notifications are one of the few enhancements that will be utilized in this project. This highlights the significance of the Internet of Things for personal safety, which makes use of wearable technology to create better equipped and empowered people who can begin requesting assistance when necessary. This makes alerting quick and dependable, and the Emergency SOS Wristband helps make these safety features more common in wearable technology.**

***Keywords*— ESP8266 Microcontroller, Push button, Blynk Iot, Panic alert.**

1. **Introduction:** In the recent past, personal security has become a matter of great concern to people worldwide, and this aspect has been an issue for several years now. This has primarily been due to the surge in such incidences and cases of breach of security across different parts of the world. Amongst one of the most vital and essential components that play a very significant role in providing an individual with the basic and crucial requirement necessary for ensuring safety and security during times of an emergency situation are prompt and swift warning systems [1]. These systems are very important, as well as the ability to effectively find a person during dire circumstances when they are in urgent need of assistance and help. The emergence and widespread adoption of wearable technology have greatly changed the way in which we face and deal with the issues mentioned above. This technology enables individuals to take action as soon as possible during emergency situations, where time is a factor and every minute matters. Amidst the numerous and diversifying innovative advancements in the wearable technology world, this panic button has stood out significantly as one of the most powerful, intendedly designed devices for help at a time when someone would require assistance in especially troubling or dangerous situations. Such an outstanding device performs its functions through alerting and sending notifications to any of the contact numbers preset at the time

of activation-the persons contacted may include close friends, family members, or even emergency services-for immediate rescue assistance when needed the most. We will start by making a deep investigation and research into the design of an elaborate and detailed wearable panic button system. This paper will exploit and make use of the advanced features of the NodeMCU ESP8266 microcontroller, which is very flexible and efficient [2][3]. The system will also be integrated with a friendly push button to facilitate user convenience for the individual in emergency situations [4]. In addition, the system will ensure that it perfectly harmonizes with the Blynk IoT platform to allow it to give real-time timely alerts and notices [5]. The alerts and notices are important to guarantee safety and security during many unexpected emergency cases. This groundbreaking, innovative wearable panic button system employs a not-too-complex yet surprisingly effective integration of hardware and software components working hand in hand seamlessly so that immediate aid is easily accessed for any conceivable scenario that may be considered. The core of this advanced system lies within the NodeMCU ESP8266, widely acknowledged and acclaimed as an economical and relatively low-priced Wi-Fi microcontroller, providing a platform for wireless communication with any kind of online resource or system and even with the massive range of the Internet of Things [6]. The Blynk IoT platform is perfectly integrated in a way that works very well with NodeMCU, which is a very versatile microcontroller with the ability to connect remarkably easily to the Wi-Fi network [7]. This connection allows the platform to send direct and immediate real-time alerts as well as important information straight to the smartphones, tablets, or computers of the users, keeping them abreast of things without delay. The user interface of the Blynk program, which has been designed and thoughtfully crafted in minute detail, works with only one and specific purpose of sending suitable notifications for the time to each one of the registered devices. This happens at the moment when the panic button is pressed, and hence it really makes the critical task much easier and smooth for either the user or his family members to respond to the emergency situation in time and effectively. The system hardware configuration encompasses a NodeMCU ESP8266 microcontroller, it is an advanced part designed with a built-in module with direct access to Wi-Fi. It has thus been used together with a push button specifically wired and connected to one of the digital input pins directly found on the NodeMCU. When the user actively presses the designated button, this action actually serves to switch on the microcontroller, prompting a chain of events that makes it send out an emergency alert into the Blynk app. Such an app, carefully prepared beforehand, contains all important contact details of the user preconfigured so that communication will be efficient and effective at critical moments. In addition to alert messages that have been specially composed to be conveyed to those with a valid interest in them, the system is designed to forward an e-mail message to individuals who have the foresight of registering their contact information ahead of time. This way, such persons

receive immediate updates and news that are in the course of events of this unfolding emergency situations [8]. Finally, for enhanced effectiveness, an audible alarm on the user's device sounds in order that the user takes immediate notice without any form of delay. It is a design mechanism ensuring that the notice is indeed received with all speed warranted due to the obvious nature it deserves in urgency. This is a highly innovative and thoughtfully designed wearable panic button that is specifically created to be comfortably worn on the wrist of the user, which provides a remarkably convenient and easily accessible method for initiating emergency alerts during critical times of need. This design feature is particularly beneficial as it eliminates the requirement for the user to reach for their smartphone or any other devices that they may have on hand at that moment. The entire system has been thoughtfully mounted on a convenient wristband and compactly, which both enhance its overall portability and ensures that it remains exceptionally user-friendly for every age and background. This design, based around the concept of a wristband, is altogether innovative and effectively ensures that the panic button is always within easy reach of the user at all times. This statement holds and is applicable even during critical situations in which a person may be rendered incapacitated, thereby becoming unable to access or utilize other devices that they might have available to them within their physical body. The system will work using a 5V battery, which is one of the power units that have been designed to offer energy levels that are quite efficient to sustain the working and continuous operation of the system for protracted periods as well as extended periods of time. Because the power consumption characteristics of the NodeMCU and the push button are remarkably low, the battery can be guaranteed to power the wearable panic button for a long enough time before it needs recharging or an entire replacement. This very thoughtful design makes sure that the wearable panic button becomes functional exactly when it is most needed, that is, at times of extended periods of inactivity that do not involve any usage whatsoever. The paper will essentially aim to carefully investigate and determine the overall feasibility of making a panic button system, which would not only be of great simplicity but also low cost while maintaining the high degree of efficiency in its performances. The development will be based on utilizing available hardware components in the markets while exploiting the open source software platforms effectively to support this kind of an initiative. We are going to design a very practical safety device with the help of the node's integration of various functionalities, such as that offered by the NodeMCU ESP8266 microcontroller [9]. Also, it will integrate remarkable versatility and adaptability through the Blynk IoT platform along with a basic push button that is both commonplace and remarkably reliable. This system, through the highly effective integration of state of art wireless communication technologies and the thoughtful implementation of real-time alerts, guarantees that users possess the ability to swiftly and efficiently notify their emergency contacts without any delay [10]. It also allows them to

promptly get help from these contacts when they are in need and significantly heightens their safety and security concerning numerous situations that could have turned potentially hazardous for them. The following sections of the paper are structured as follows with extreme care. We shall clearly provide, in Section 2, an inclusive and thoroughly detailed literature review coupled with the relevant work carried out so far in the specific field of wearable panic buttons [11]. Discussion of this section shall include the various emergency alert systems developed over time. In Section 3, we describe in detail the architecture of the system, which not only involves the myriad hardware components forming the system but also the detailed software setup and how it fits harmoniously and smoothly into the Blynk IoT platform. As we move into Section 4 of our discussion, we will go into details on some of the implementation that is important to understand our work thoroughly. In this regard, this involves particular code that has been used in programming the NodeMCU, as well as a number of steps taken in order to configure the Blynk app for optimal performance. Finally, in Section 5, we are very much delighted to present a comprehensive and in-depth result-related to overall system performance. It primarily includes valuable insights gathered from user feedback, along with a detailed and through discussion concerning the effectiveness of the wearable panic button, particularly in situations that arise during emergency scenarios. Conclusively, as we conclude this extensive document, especially in Section 6, we shall bring all our discussions to a closure with a comprehensive and detailed summary of all the key findings that have been unearthed and developed in the course of our vast research. We shall also provide some insight suggestions on potential future ways that may lead to immense improvements in the overall functionality and efficiency of the system. This section is an account of the critical points presented in this paper. It should be noted that this paper presents a revolutionary wearable panic button system, which adopts workable and practical solutions specifically engineered with the intention of substantially enhancing personal safety for individuals in various situations. That enables these feats as it combines the capabilities which it has of the NodeMCU ESP8266 microcontroller combined with the innovative features of Blynk IoT. The key objective and importance of this device therefore are in providing the functionality for quick and easy delivering emergency alert that allows a simple push button procedure for getting much-needed aid in a timely manner as soon as it is of urgency. Moreover, the highly compact dimensions of the device along with the excellent wear ability of the device allow users to carry it easily from place to place and at any time, which makes the feasibility of their tasks much easier, and it is much more manageable and easier to work on. Such a thoughtful design aspect not only helps to ensure convenience but also gives the user one more layer of comfort: they can easily feel secured knowing that they now have an available tool that they can summon help at any time whenever they might need it.

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2. Design and Simulation

This is a very critical device since one can get prompt care within a very short time. Within this wide system, there are various electronic components that interact and work together synergistically. Among these fundamental components include the push button as the control mechanism, a 5V battery for power supply, and NodeMcu microcontrollers fitted with Blynk IoT software for communication purposes. In this case, NodeMcu still keeps scanning and monitoring the status of push button without discontinuation. The moment when that button gets activated and gets turned on, it sends the alert messages without waiting and in that moment. Brings to life connectivity developed and kept on between band and each device registered is facilitated by the Blynk application acting as an all-important and integral platform in the process. More importantly, the most integral part that plays an extremely crucial role in the process of loading the specific instructions that the device is required to follow and implement meticulously is undoubtedly the NodeMcu, which is absolutely vital for its overall operation and functionality.

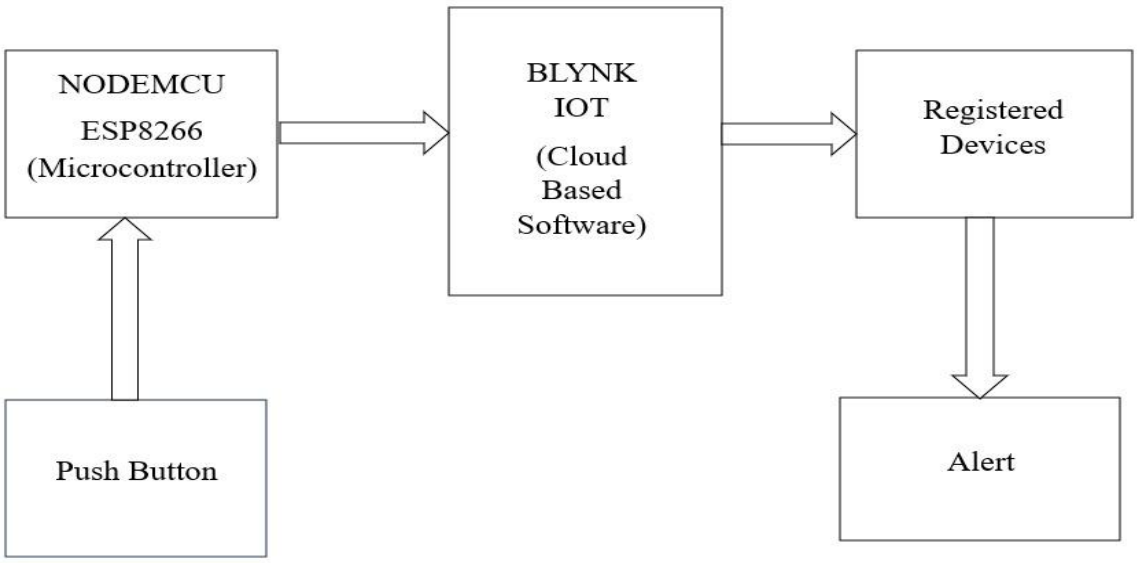
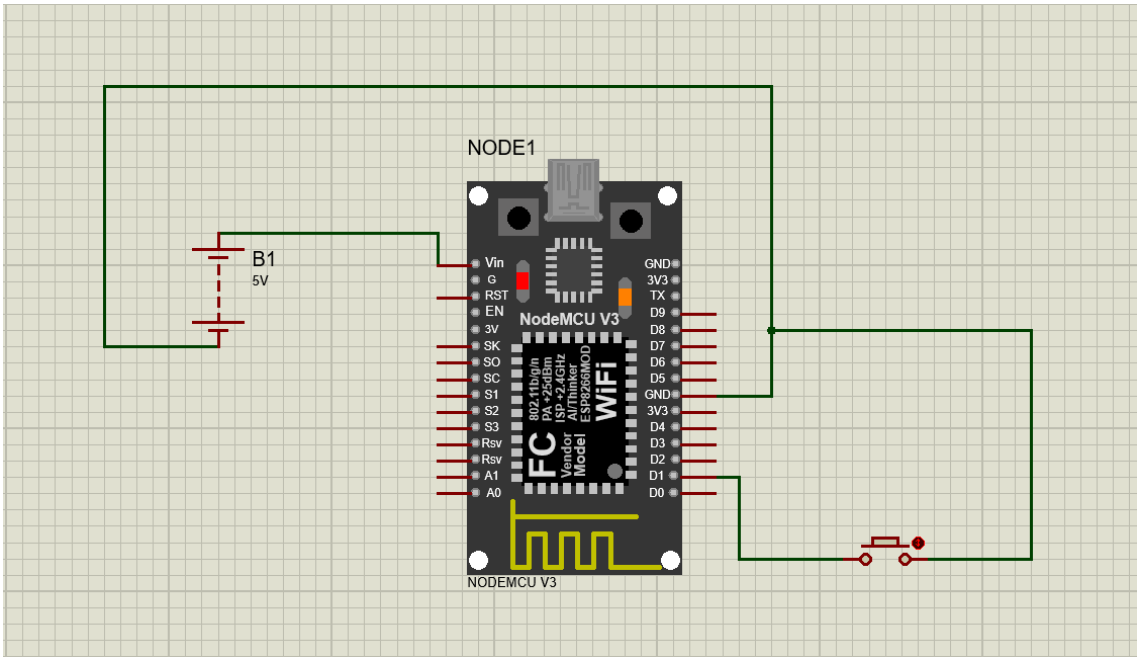


Figure 1: Block diagram of wearable panic button

The panic button is an important interface that connects the user directly to the device. It has been innovatively designed to focus on simple, intuitive, and easy handling, which is crucial in times of great stress when urgency is strictly required. Traditionally, it is a button that fits into an available wristband, pendant, or clip-on accessory as a wearable form factor so that it is always within a user's hand at a moment's notice and always accessible. Once activated, the user will press a button, which will send a signal to the microcontroller known as NodeMCU ESP8266 that is supposed to activate the process in an effort to ring the alarm. The push button needs to be made so that both strong and durable, of a size that is large enough to be easy to press in a frantic state or high-stress situation. Besides that, any



design related to the button has to include some kind of feeling or sensation as when a user would want to avoid activation, that feeling is used so the user presses it intentionally and purposely.

Figure 2: circuit diagram of wearable panic button

At the heart of this innovative wearable panic button system is the NodeMCU ESP8266 microcontroller. These microcontrollers are so small, high in performance, and of the best order to perform well on a number of IoT applications owing to their Wi-Fi built-in features. They enable a smooth internet connection and communication of this device in real-time with no hitch. The NodeMCU is an intermediary between the physical push button and the Blynk IoT software platform. These intermediary handles communication in every form as it processes the state of the button. The NodeMCU has very careful loop running around, checking it every time given in order to monitor and track the status about the push button. Within the instant that this happens, on the instance of depression, at once detects the input created on this process, and at once triggers the alarm turn-on confirmation about whether not the button is pressed. This system can be run using a 5V battery with the capability to supply the exact amount of power needed for it to enable the NodeMCU to operate and function proficiently without any glitches or interruptions. The microcontroller should also contain GPIO pins to read the status of the button and activate other actions, for example, sending notifications to emergency contacts or activating other alarms. The wearable panic button system is designed to be portable and to be worn constantly. This can be done through the use of a 5V rechargeable battery, for example, a lithium-ion or a lithium-polymer, Li-Po battery. The used battery needs to be as small as possible but with sufficient power to drive the NodeMCU appropriately. Also, the battery should have a power reserve so that the system continues functioning for a longer period without the need for frequent recharging. It is a core for the enabling process of communication between the panic button system and all the devices registered under an individual. Blynk can be considered a solid, cloud-based platform through which an individual can develop innovative IoT applications by establishing hardware connections such as that of the NodeMCU with the help of personal smartphones or tablets. In short, within seconds, through the internet, after depressing the panic button, a NodeMCU sends its signals to the Blynk cloud for proper communication or alerting in good and timely manner. Now through the Blynk App installed on his user mobile or any other mobile handset he may be having gives him real-time alert update by which he gets quick access to updates. This

feature will ensure that the user's emergency contact or recipient is informed of the situation at hand immediately and effectively. The notification itself may include many components, from text alerts to push notifications and even crucial location data, in case the system has included a GPS module that greatly helps in locating the user fast and efficiently by the responders. The Blynk app is very customizable. Users can create and design a personal interface that perfectly suits their specific needs for their panic button system. This is made possible by the addition of an array of components, such as buttons, sliders, and other various widgets, all used to control and monitor different aspects and functionalities of the device effectively. In this specific implementation, the virtual pin feature provided on the Blynk app has enabled instant activation of the alarm when the panic button is pressed with the assurance of instant action and security. The application has its architecture designed to be so unique that apart from all the different features it has been featured with, it can always be configured to alert lots of contacts at the same time. With this feature, help arrives on time, and fast action is possible at the hour of need.

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3. Result Analysis

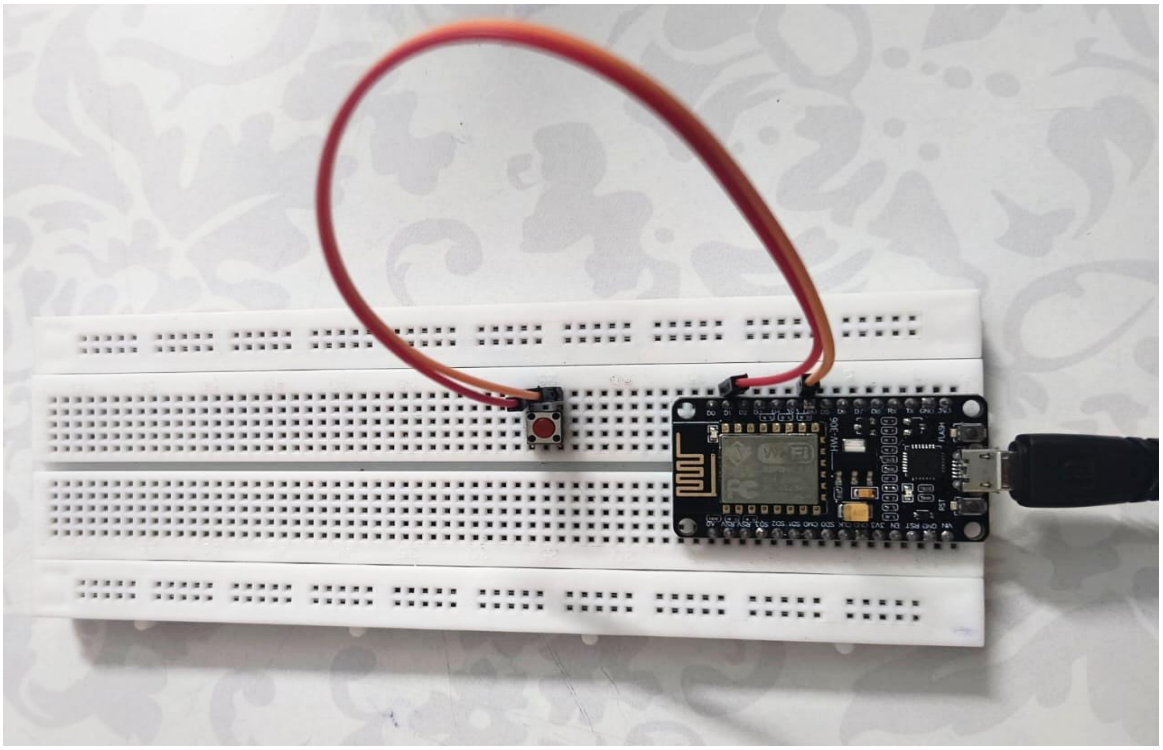

Figure 3: Prototype of Panic Button

This is when the interaction starts as the user is asked to press the panic button. It will automatically send a signal to NodeMCU that reads the input and sets up a Wi-Fi connection to the Blynk platform. The message will then be transmitted as an application notification through the cloud to all registered emergency contacts regarding the distress of the user. Then it will alert those individuals selected for a real-time update as far as possible from where the user is; additionally, where available status of an emergency. Blynk can provide effective communication to take place when there are also the provisions to send information to various contacts. This ensures almost instantaneous receipt of the emergency signal from the user, with appropriate help being dispatched without any further delay. There is also customization of the Blynk app to make further improvement in the functionality of the system, so settings and notifications can be configured as preferred by users.

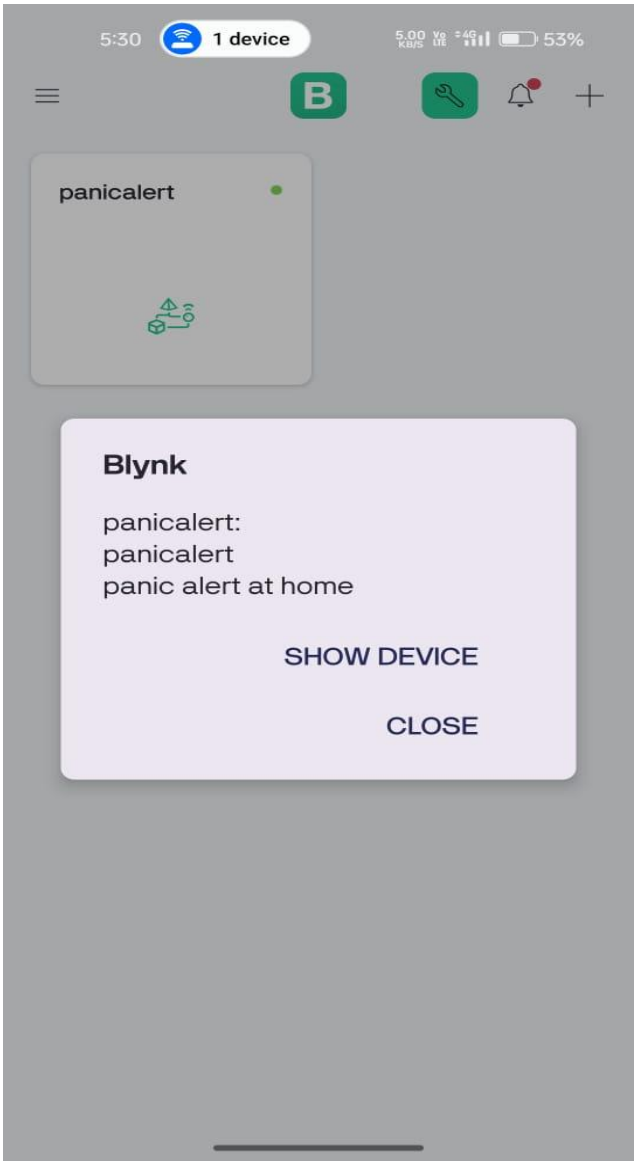

Figure 4: Alert message on the registered device

4. Conclusion

Wearable panic button stands as exemplary innovation of a safety device geared in the direction to reduce probable dangers individuals can face on coming and also quickly help somebody exposed to frightening situation. Its use is associated with advance technologies and significantly works about detecting and tracing critical situations of health issues when

experienced or initiated. This helps a significant number of geriatric care recipients who have less confidences regarding communicating with care providers at instances of feeling frightened, especially along isolated track roads, so also youth who have much insecurity issues getting along such track roads isolated places, besides other classes whose only goal is saving one's life among potential users of such a piece. It is a truly significant step forward in the world of personal safety and security. This innovative device enables people to maintain their independence, allowing them to go about their daily lives with confidence but also to create peace of mind not just for themselves but also for those who care about their well-being.

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