

Smart Helmet with Inter-Communication System, Smart reminder System and Panic Button for Emergencies

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Abstract—The project aims at designing a helmet with the first priority as safety and involving Information and Communication Technology (ICT), increasing the safety measures. This involves a panic button, to be able to alert the people around, in a feasible range, who can approach the person in trouble and handle the emergency situation. Besides, it also contains an inter-helmet communication, using a technology similar to 'walkie-talkies', involving communication via radio frequencies and similar ranges and methods of communication. Another novel addition to of Reminder System to every helmet is made, so that the noise pollution caused by the hooters and beepers at regular periods is reduced.

Therefore, each helmet includes a microcontroller, handling the panic button, along with the intercom system for general conversation and efficient coordination among the workers at all levels.

Keywords— IoT, Smart Helmet, RF Communication, Panic Button, reminder System, Arduino, ATmega, Microcontroller, Inter-Communication System.

I. INTRODUCTION

Each industry and construction site involves a variety of workers, from officers to laborers, but one thing they deserve in common is 'safety' at the workplace. And the best way to ensure safety in a technology surrounded place, is by technology.

The device ensures that there always is a communication between the co-workers, ensuring team work, and reducing the chances of errors and emergencies. Even if an emergency occurs, a simple press to the accessible 'panic' button notifies people present in a defined range, who can be approached in a matter of time.

A centralized reminder and alarm system is put in the helmets, so that the noise pollution caused by the hooters in the industries don't affect the surrounding areas and an automated reminder reminds about them staff and workers about durations such as the working hours, lunch time, etc.

1.1 Literary Review

A commonly used equipment at a work site is a Safety Helmet. It is an essential headwear that protects the user from head injuries as they can be fatal. There are many incidents which have claimed the lives of workers who did not take proper precautions. A Safety Helmet therefore has been made mandatory at such sites.

The only problem now is that a simple helmet is not of much advantage to the worker. Therefore, researchers came forward to make it more useful and gain more importance. One of the ways they thought of was to make a Smart Helmet. There has been a lot of research and there have been many prototypes but only a handful of them have reached the product stage and even fewer made it to the market. In reference [2], the use of many different sensors have allowed the workers to be more efficient but more importantly stay safe. It also incorporated many other features such as easy communication, easy navigation of the site, etc. This Smart Helmet shows that the idea has a lot of scope. Discusses how a team of three from the University of Akron has developed an even smarter Helmet and they are all geared up for starting production [5]. Highlights a major innovation in the field. The Proactive Smart Helmet is inspired from a Baseball Helmet and it incorporates a flexible inner layer which can harden and absorb the shock upon impact, thereby protecting the worker [1]. In a similar approach to, some aim to incorporate an emergency notification system (called *SHENS*) which can directly inform the nearest medical institute about an accident [6]. Integrating web and cloud services into the helmet to make it even smarter [3]. Finally, suggestions on adding a small display and a set of microphone and speakers are made [4]. Although this product reached the patent stage but there is no news of it hitting the production line. Overall, there have been a lot of prototypes and the failures of those prototypes has led to an even better and innovative solution.

1.2 Proposed Method And Novelty

The proposed method includes a built-in inter-communication system, similar to a walkie-talkie externally implemented into a helmet.

The inclusion of panic button to warn the people around in a particular range is usually a separate entity, while the system of reminders via beepers is a completely novel idea in this industrial application, as no such efforts to such a basic implementation have been made to reduce noise pollution.

II. METHODOLOGY

The 'Smart helmet' collaborates three separate systems,

- i) Inter-communication system
- ii) Panic Button
- iii) Reminder system

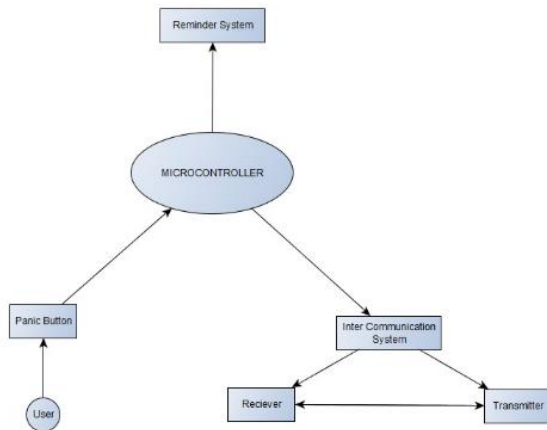


Figure 1 System processing

- i) **Inter-Communication System:**
The Inter-Communication system uses simple radio frequency modules of 433 MHz to send a basic audio signal in the prototype so that the system can be tested at lower levels of baud rate.
- ii) **Panic Button:**
The panic button is a simple push button in the external part of the helmet, accessible both internally and externally, which sends an emergency alert to the people in the range of RF module, so that the most approachable people can be reached for help.
- iii) **Reminder Buzzer:**
The prototype uses same RF modules working at frequency of 433 MHz used for communication to send alerts and reminders regarding the various activities of the day, judged by number of beeps from the buzzer. For example, an elongated 3 second beep refers to a lunch break, while a triple buzz means the end of working hours for the day.

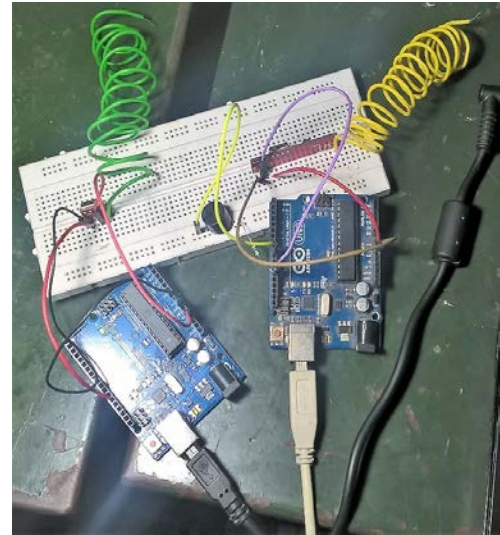


Figure 2 Circuit for RF Communication, including the reminder buzzer

A centralized microcontroller, here, ATmega 328p, manages the timings of the reminders to be sent to the staff and workers, which are set via a simple app.

III. CONCLUSION

The prototype Smart Helmet is ready and is in working condition. All modules are functioning properly and provide accurate readings. The intercom system needs a bit more work as the results after testing were lacking quality. The rest of the system including the Reminders and Panic Alert worked perfectly. We will overcome the shortcomings of this prototype and they will be discussed in another paper. Although we could not make the project reach the product stage but the prototype is more than proof that it has immense potential

IV. FUTURE ASPECTS

The future aspects of the project may include the already-designed materials used in ProActive helmet, which get hard only when under sudden impact, otherwise being soft and comfortable to the head of the wearer. The further inclusion of sensor technology such as ECG for mood detection of the worker, CO2 sensors for working environment and GSM module for alerting the ambulance and police in emergencies, is sure to be helpful. Further image processing inclusion can also be helpful to tackle minor technical problems and self-troubleshooting for time efficiency.

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