Pro-tech head protector

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Abstract. Solar-based E-Uniform furnished with better protection to the soldiers who are working in extreme weather. Solar Panels are wont to power up the interior circuitry of the E-uniform. A 12 V DC lead-acid rechargeable battery is employed for storing the energy. We are using a conventional battery charging unit also for giving supply to the circuitry. ATmega16a microcontroller is the heart of the circuit as it controls all the functions. The project is operated in two modes like summer mode and winter mode. By selecting the mode of operation, we are operating the system such that it can drive the body temperature according to heater/cooler. The heater/cooler in turn will help us to provide a cooling or warming effect inside the uniform which helps the soldier to bear any kind of external environment. The metal sensor will detect the metal-like bomb, any other planted weapon in-ground and intimate the soldier with a buzzer indication. The GSM is interfaced with the microcontroller and GPS is additionally interfaced such that the tracking of the whole soldier is observed. And the location is messaged to the particular concerned person /dept. This Uniform will make the soldier work in any kind of environment without any stress or distraction.

1 Introduction

Road accidents are now very usual in the country. The result of road accidents can became to the loss of many lives and can also damage many body organs. This situation becomes more serious if the driver won't wear the helmet which can be by wearing the helmet and can reduce these impacts. When driving the bike, the government made it a mandatory rule to wear the helmet. Using this rule as a base, a smart helmet system is prepared which helps in providing safety to the drivers and prevents accidents. The helmet consists of Arduino Uno as a processor for processing the data, GSM & GPS modules for tracing the location and sending a message alert to authorized numbers, a wiper for wiping the rain water drops on the helmet screen, a vibration sensor for alerting, in case the driver committs an accident and alcohol sensors as breath analyzer for the rider. The system will ensure a safety of their

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driving for riders and gives a helping hand in case of important and emergency. The cost of installing the whole system onto the helmet is reasonably priced.

Fig.1. Block Diagram.

2 Survey of Research

[1]According to the Survey and report released by the Indian Central defence ministry approximately 120 soldiers per year died. India began using GPS technology in its military applications during the 1990s. The Indian military recognized the advantages of GPS for precise navigation, artillery targeting, and logistics.The Kargil War, fought between India and Pakistan in 1999, highlighted the importance of accurate navigation and targeting systems. GPS technology played a crucial role in guiding artillery fire and airstrikes to precise locations in the rugged and mountainous terrain of the Kargil region. Over the years, India has integrated GPS receivers into various military platforms, including aircraft, naval vessels, tanks, and ground vehicles. This integration has enhanced the military's situational awareness and operational effectiveness. The Indian military uses GPS for both strategic and tactical purposes. Strategically, it aids in border surveillance and monitoring. Tactically, it enables precise positioning of troops and equipment during operations.

[2]GSM technology, which is widely known for its use in civilian mobile phone networks, has also found applications in the Indian military. While GSM technology itself has been primarily used for civilian purposes, the Indian military has adopted certain aspects of GSM and related mobile communication technologies for specific applications.SM technology was introduced in India in the early 1990s when the first mobile service providers started offering

cellular services to the public. Initially, these networks were primarily civilian in nature, serving the general population's communication needs. GSM technology was introduced in India in the early 1990s when the first mobile service providers started offering cellular services to the public. Initially, these networks were primarily civilian in nature, serving the general population's communication needs. The Indian military recognized the potential benefits of GSM networks for certain non-critical communication needs. They began using commercial GSM networks for non-sensitive communication purposes, such as troop coordination, logistics, and administrative tasks. This allowed military personnel to use civilian mobile phones on these networks.

[3]The use of temperature and heart rate sensors in Indian military applications has become more prevalent in recent years, reflecting advancements in wearable technology and a growing emphasis on monitoring the health and performance of military personnel throughout much of the 20th century, temperature and heart rate monitoring in the Indian military continued to rely on manual measurements using traditional instruments like thermometers and pulse checks. This approach had limitations in terms of timeliness and accuracy. With advancements in medical technology, the Indian military began to adopt more advanced medical monitoring equipment in its hospitals and medical units. However, these technologies were typically used in clinical settings and not as wearable devices for continuous monitoring in the field: In the 2000s and beyond, there has been a global trend toward the development and adoption of wearable sensors for health monitoring. This includes temperature sensors (thermometers) and heart rate sensors (heart rate monitors) that can be worn by military personnel during training exercises and operations.

[4] The introduction of radar technology in the 1950s and 1960s marked a significant advancement in weapon detection capabilities. Radar systems were deployed to detect and track aircraft, missiles, and other aerial threats. Ground-based radar stations and early warning systems were established to provide early alerts. To defend against aerial threats, the Indian military introduced anti-aircraft systems equipped with radar-guided missiles and anti-aircraft guns. These systems were deployed to protect military installations and cities from enemy aircraft. Over the years, the Indian military invested in advanced radar and surveillance systems to enhance its detection capabilities. These systems featured improved range, accuracy, and the ability to detect smaller and stealthy targets.

[5] These are most essential devices to ensure advanced safety and enhanced to the military people. In order to overcome threats at military areas GPS navigation plays a vital role but carrying an external device makes it a burden for them .GSM module is concerned to alert emergency service providers. Health monitoring system is an another most important things while the environment is uncertain. weapons detector provides additional security .These are devices which are essential but burden and consumes more power or external batteries which causes additional weight. Solar based E-uniform is incorporated by multiple features which are very essential for them. The implementation of solar based E-uniform for soldiers provides a comfortable solution to the causes in the easiest manner that is an E-uniform. It is very easy to wear.

3 Proposed system

In this project we are going to charge the battery with the help of solar panel, and the battery gives supply to the controller and other peripherals. Here Heartbeat, oxygen level (present in blood), Temperature of Soldier's bodies were monitored with the help of sensors. Emergency key also designed with other sensors placed in the uniform. To notify the live location of the soldier incase of any emergency or help needed. One more Temperature sensor is used to monitoring the surrounding climatic condition, all the sensor readings are displayed in the LCD and also updated instantly to the IOT cloud and it can be viewed in the mobile

app(Cayenne app). GPS is used to track the location and GSM is used for mobile communication.

4 Working methodology

The 12v solar panel output is connected to the 12v battery which stores the dc power. The 5v dc output from the battery is given as input to the Arduino microcontroller on DVV 5v pin. The positive & negative terminals of LM35 sensor, MAX30100 sensor, emergency switch is connected as input to the microcontroller on A0, A1, A4 and A5 pin. The D13 pin of the microcontroller is connected to the relay driver circuit and peltier plate. The D12 pin of the microcontroller is connected to the GSM and Node Mcu. The D8, D9, D10, D11
pins of the microcontroller is connected to the D4, D5, D6 and D7 pins of the LCD circuit. The R/W and RS pins are connected with D5 and D6 pins of the microcontroller. Finally the Rx pin of the microcontroller is connected to the Tx pin of the GPS.

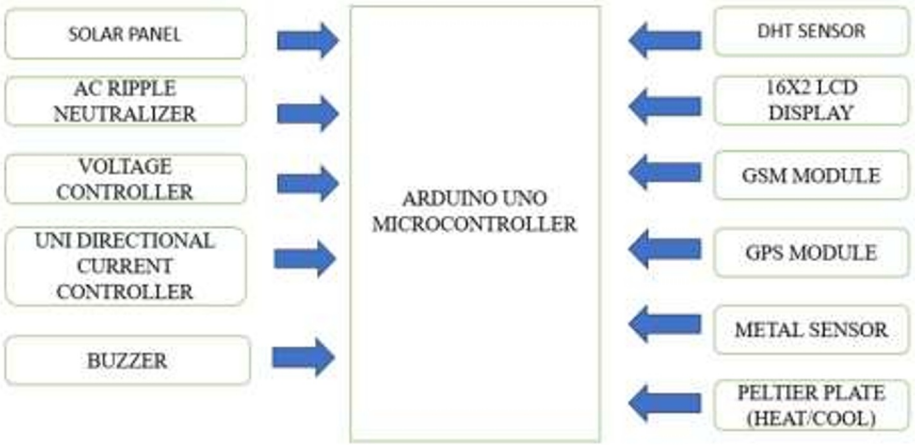

Fig.2. Working Principle.

5 Results

An integrated system employs the MQ-3 alcohol detection module to identify alcohol presence, triggering a message to the bike rider via the GSM Module. Simultaneously, during an accident, emergency services such as 108 and 100 are alerted with details of the incident. This automated alert includes precise location data, transmitted through the GPS module, providing latitude and longitude coordinates to facilitate swift emergency response. This comprehensive system enhances safety by addressing alcohol detection and accident notification, aided by accurate location information.

Fig.3. Circuit Connections.

Fig.4. Received accident Detected text.

6 Conclusion

The proposed system is constructed on the helmet. The two-wheeler driving in any season will become more effective by using the designed system. The system senses the alcohol by breath analyser is kept near the bottom of the helmet. In case of an accident, the location of the driver is sent to the registered mobile number. In the case of rain, the sensor senses and a wiper is turned on to clean the rain drops in front of the helmet. The wiper can also be turned off not automatically it is manual. The proposed system covers most of the benefits that can be given to driver safe by wearing the helmet. The circuit covers more place. In the next version of the prototype of the helmet, the size can be reduced and also planned for the reduction of power consumption. The construction system circuit area can still be reduction process. Artificial Intelligence (AI) can be used for checking the exact place of the helmet on the head. If the bike module won't respond then the bike won't start, in that scenario, a bypass mechanism can be done with the password to open the two wheeler. The accidental message and location can be sent to the nearby trauma or hospital. For the designed system is the area reduction of the circuit. The area of the prototype circuit can be reduced to made it more user friendly. The power of the battery can be still enhanced by installing a higher capacity for a long time.

References

1. Keesari Shravya, Yamini Mandapati, Donuru Keerthi, Kothapu Harika, Ranjan Senapati. Smart Helmet For Safe
2. Shikha Gupta, Kashish Sharma, Nihar Salvekar, Akshay Gajra, Implementation Of Alcohol And Collision
3. Vinod, G.V., Mr, & Krishna, K.S. (n.d.). Smart Helmet. International Journal of Engineering Sciences &
4. Chandran, Sreenithy & Chandrasekar, Sneha & Elizabeth, N.. (2016). Konnect: An Internet Of Things(Iot)
5. S. Gupta, K. Sharma, N. Salvekar, and A. Gajra, "Implementation of Alcohol and Collision Sensors in a Smart Helmet," 2019 Int. Conf. Nascent Technol. Eng. ICNTE 2019 - Proc., no. Icnte, pp. 1–5, 2019, doi: 10.1109/ICNTE44896.2019.8945979.M. Ben Rabha, M.F. Boujmil, M. Saadoun, B. Bessaïs, Eur. Phys. J. Appl. Phys. (to be published)
6. Title: "Smart Helmet for Accident Detection using GPS and Fall Detection using Accelerometer" Authors: Jagruti Bhosale, Aparna A. Pol, and Rohan Naik Published in: 2017 IEEE 3rd International Conference on Electro-Technology for National (NIGERCON)DOI: 10.1109/NIGERCON.2017.828181L. T. De Luca, Propulsion physics (EDP Sciences, Les Ulis, 2009)
7. Automatic accident notification system using gsm and gps modems with 3g technology for video video monitoring" International Journal of Emerging Trends in Electrical and Electronics (IJETEE) Vol. 1, Is-sue. 2,March-2013.
8. "Vehicle accident alert and locator" International Journal of Electrical & Computer Sciences IJECS-IJENS Vol: 11
9. "Wireless accident information using gps and gsm" September 15, 2012, Research Journal of Applied Sciences, Engineering and Tech-nology, © Maxwell Scientific Organization, 2012. "Wireless accident information using gps and gsm" September 15, 2012, Research Journal of Applied Sciences, Engineering and Tech-nology, © Maxwell Scientific Organization, 2012.
10. Sudharsana ,Vijayan, Vineed T Govind, Merin Mathews, Simna Surendran, Muhammed Sabah ,"Smart Helmet System Using Alcohol Detection For Vehicle protection",International Journal of Emerging Technology inComputer Science & Electronics (IJETCSE), Volume 8 Issue 1 APRIL 2014.
11. Nitin Agarwal, Anshul Kumar Singh, Pushpendra Pratap Singh," Intelligent Helmet: Application of RF"
12. International Research Journal of Engineering and Technology (IRJET), Volume: 02 Issue, 02 May-2015
13. Amitava Das, Priti Das, Soumitra Goswami ,"Brainwave and Alcohol Sensitising Helmet for Riders Safety"Proceedings of Eleventh IRF International Conference, 17th August 2014
14. Amitava Das, Priti Das, Soumitra Goswami , "Smart helmet for Indian bike riders"Proceedings of Eleventh IRF International Conference, 17th August 2014.
15. Abhinav Anand, Kumar Harsh, Kushal Kumar, Sourav Gouthi, "Safety measures for "Two wheelers by Smart Helmet and Four wheelers by VehicularCommunication" International Journal of Research in Engineering andTechnology, Volume: 04 Issue, 05 May-2015

16. K. Sudarsan, P. Kumaraguru Diderot ,“ Intelligent Helmet“ international Journal of Science and research(IJOFR) Volume 3 Issue 3, March 2014
17. Anshu Singh Gautam, Gulshan Kumar Dubey, MayankMishra, Mohita Prabhat-“Smart Helmet System”-Journalof emerging technologies and innovative research (JETIR),April 2015, Volume 2, Issue 4,pp.1165-1168
18. Mohd Khairul Afiq Mohd Rasli, Nina Korlina Madzhi,Juliana Johari- “Smart Helmet with Sensors for Accident Prevention”, International Conference Electronics and System Engineering, 2013, pp.21-26.
19. Nitin Agarwal, Anshul Kumar Singh, Pushpendra Pratap Singh, Rajesh Sahani “Smart Helmet”, International Research Journal of Engineering and Technology (IRJET) Volume: 02 Issue: 02, May- 2015, p-ISSN: 2395-0072.