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Safeguard Corps By Weapon Detection And Health Monitoring Using IoT

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Abstract: The purpose of this project is to protect the soldiers by weapon detection and health monitoring using the Internet of Things. This system helps to protect the soldiers from weapon attacks with help of IOT. Exact location and the health status parameters of the soldier can be sent to the base station in real time. We train the fine-tuned CNN model using our dataset of images. During training, we use techniques such as data augmentation and regularization to prevent over fitting and improve the generalization ability of the model.GPS is interfaced with the Solider Unit which sends the current location of the soldier in the battle field to the server unit via IOT module. In any emergency situation soldier can contact the server by giving a request through keypad interfaced with the unit. Thermoelectric cooling uses the Peltier effect to create a heat flux between the junctions of two different types of materials which is wearied by soldier for worm up. The proposed system involves safeguarding guns using CNN and IOT can enhance safety by detecting and preventing unauthorized use of weapons. CNN can be trained to recognize the specific user's facial features and only allow the gun to be fired by the authorized user. IOT can also provide real-time tracking of the gun. In this way the soldier ensures their security and safety.

Keywords: Convolutional Neural Networks; Weapon detection; Health monitoring; Peltier crystal

I. INTRODUCTION

The safety and well-being of army soldiers are of utmost importance. However, incidents of unauthorized gun usage and lack of monitoring of soldiers' health and wellness status have led to unfortunate outcomes. To address this issue, this project proposes the use of advanced technologies such as Convolutional Neural Networks (CNN), health and wellness observing sensors, and Internet of Things (IoT) to detect and prevent unauthorized gun usage and monitor the soldiers' health and wellness status. The project involves training the CNN algorithm to recognize the facial features of authorized users and only allow them to fire the gun. Health and wellness observing sensors are embedded in the soldier's helmet to collect vital data such as heart rate, body temperature, blood pressure, and other relevant health parameters. The collected data is transmitted to a cloud-based system using IoT technology for real-time monitoring and analysis .The helmet is safeguarded using IoT technology, which can detect any unauthorized access and prevent the helmet from being used by anyone other than the authorized user. The gun can also be connected to the IoT platform for real-time tracking and monitoring.

The collected data can be stored in the cloud and analyzed to provide insights into the soldier's well-being and gun usage patterns. The project has the potential to significantly improve the safety and well-being of army soldiers by detecting and preventing unauthorized gun usage and monitoring their health and wellness status. By using CNN, health and wellness observing sensors, and IoT technology, the project can provide real-time feedback on the soldier's health and enable early detection of any health issues. The use of IoT technology in safeguarding guns and helmets can prevent unauthorized use and ensure that only authorized personnel have access to the weapons and protective gear.

II. RELATED WORK

The concept of gun detection was first introduced by Yunbin Deng, Ryan Campbell, Piyush Kumar et al.[1] a semantic embedding-based method is developed for zero-shot gun and fire detection. Using a pre-trained Contrastive Language-Image Pre-Training (CLIP) model, input images and arbitrary texts can be mapped to semantic vectors and their similarity can be computed. Based on the Jesus Ruiz-Santaquiteria, Alberto Velasco- Mata, Noelia Vallez, Gloria Bueno et al [2] proposed that Closed-circuit television (CCTV) systems are essential nowadays to prevent security threats or dangerous situations, in which early detection is crucial. Results obtained show that the combined model improves the handgun detection state of the art, achieving from 4.23 to 18.9 AP points more than the best previous approach. The authors Muhammad Tahir Bhatti, Muhammad Gufran Khan, Masood Aslam, Muhammad Junaid Fiaz et al [3] focuses on providing a secure place using CCTV footage as a source to

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detect harmful weapons by applying the state of the art open-source deep learning algorithms. The work in this paper is divided in two stages. (1)Weapon detection , (2) Health monitoring. The weapon detection is done by comparing the images with the datasets by CNN algorithm. The health monitor is done by taking input from the sensors of Heart-Beat and Temperature and give remedies to the condition in war field. Finally, if Gun is detected it is intimate the soldier as Vibration.

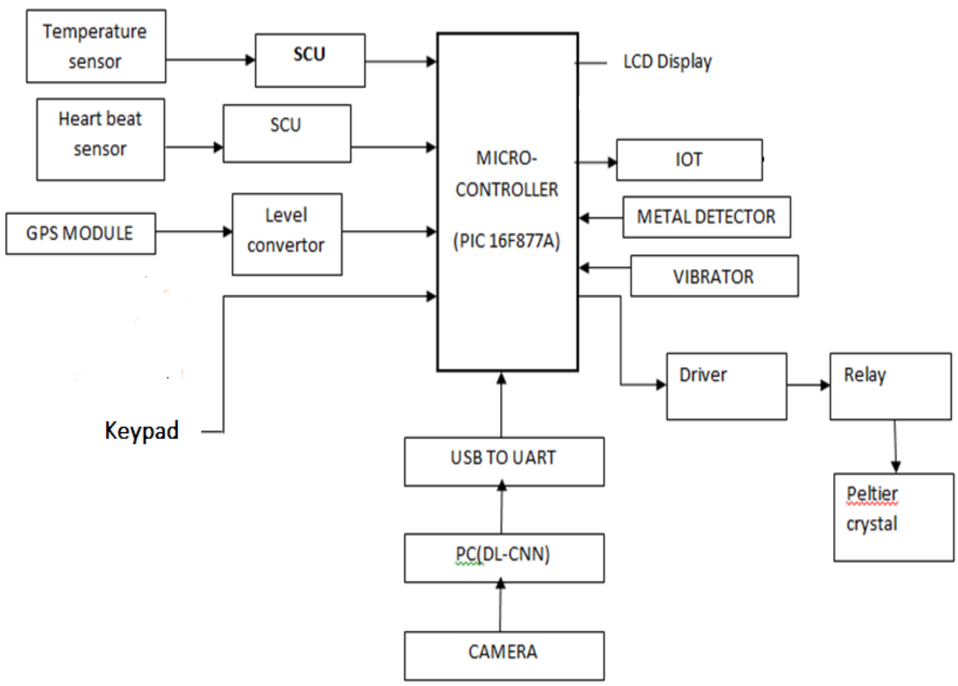
III. METHODOLOGY

Basics of convolutional neural networks The pooling layer, the rectified linear unit (ReLU) layer, the convolutional layer—commonly referred to as CONV2D—and a number of fully connected layers make up a deep convolutional neural network (CNN). To put it another way, a deep CNN is essentially made up of two sub networks: a set of 2D convolutional layers and a traditional but deep neural network, as shown in Fig. 1.

The foundational components of CNN are convolutional-2-dimensional (CONV2D) layers. In order to extract certain features or edges, a set of 2D filtering kernels (of size nn) are applied to an image (NN). The kernels can be design to extract a vertical, horizontal, diagonal edges and any other pattern from the input images. In fact, feature engineering and feature extraction from input images are carried out through the convolutional layers. The size of the input image is (NN3) if it is an RGB image, but the result of this convolution over a volume is 2D rather than a volume once more.

To do this, a volume of size nn3 will be used to replicate each edge detector or kernel. The Rectified Linear Unit (ReLU), which converts all negative values produced by the convolution operation to zeroes, is typically placed below the convolutional layer. Pooling layers is one of the most common variations of this operation is max pooling.

A max pooling layer follows a convolutional layer and performs two tasks: it determines the maximum value in the region and scales down the image. The quantity of downscaling is based on the pool size. Although average pooling is also an option, maximum pooling is more typical. Completely connected layers are comparable to typical neural network hidden layers, for which the number of outputs is the only factor to take into account during the training process. Transfer learning can be applied to these fully connected layers using classical CNN techniques.



Block Diagram

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IV. EXPERIMENTAL WORKS

Figures 1a,1b, 2a, 2b and 2c shows the results of Gun detection from an image by using Convolutional neural networks Algorithm. Figs. 2, 3, 4 (a) shows the original image. (b) is the image obtained by applying first set of criteria.

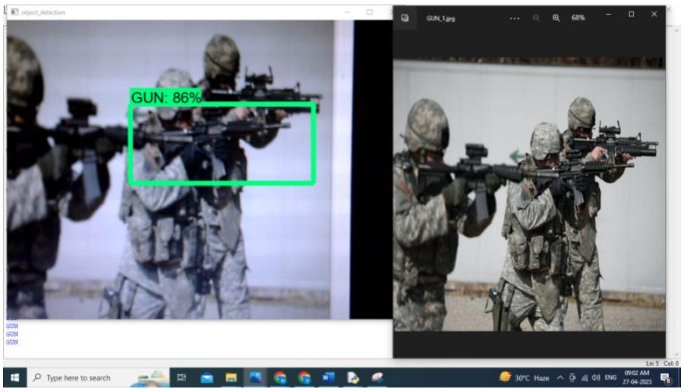
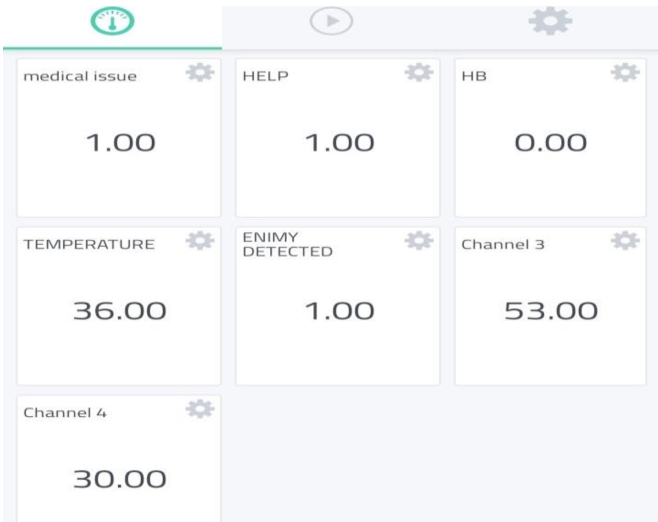


Figure 3 works on second criteria



The image obtained by the health monitoring criteria.

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V. CONCLUSION

In conclusion, the proposed system of army soldiers' gun detection using CNN and health & wellness observing sensors embedded with a safeguard helmet using IoThas shown promising results in improving the safety and well-being of soldiers. The system integrates advanced technologies like CNN and IoT to provide accurate and efficient gun detection and health monitoring capabilities. The system's gun detection module demonstrated high accuracy in recognizing authorized personnel and detecting guns, which is crucial in preventing unauthorized personnel from accessing weapons. The health and wellness monitoring module was also effective in monitoring vital signs and detecting anomalies, enabling prompt interventions in case of any health issues. The proposed system's advantages include improved accuracy and efficiency in gun detection, health monitoring, and prompt interventions in case of any issues. The system's potential applications in military and defense settings are numerous, making it a valuable addition to existing systems. However, the system also has some limitations that need to be addressed in future research, such as scalability in large-scale military operations and working accurately in extreme environments.

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