IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Utility Patent Application (Provisional)

TITLE

[0001] System and method for identifying and neutralizing an active shooter or perpetrator

FIELD OF THE DISCLOSURE

[0002] The present disclosure relates to a system and method for identifying and neutralizing the active shooter. More specifically, a drone is being used for identifying a perpetrator or active shooter by using artificial intelligence.

BACKGROUND

[0003] In the past few years, there had been multiple violent events on school campuses and various other places as well, which involved firearms. These events contributed to a massive loss of life, with dozens of students and civilians got killed and injured. The gun violence as a whole has claimed hundreds of lives in the past years in various places like schools, malls, playgrounds etc. In these events, mostly a single person enters in any public and private area and starts firing at people randomly so to handle or neutralize the one person in most of the cases the operation tolls deaths of dozens of people by the time the perpetrator final gets killed or arrested.

[0004] So, it is the high time to take a step to prevent these gruesome events happening in the USA and around the world. We have now come to an age where almost every task can be performed by machines without much human intervention. To prevent the event like shooting there is a significant risk of life for the person who is there for neutralizing the perpetrator. Here, the technology can perform the major task of neutralizing the perpetrator by using machine learning, artificial intelligence and object detection methods.

[0005] Here are the few prior arts in which the aforementioned problem is tried to be solved but still we need a smarter and technologically advanced device and system that can neutralize the shooter or perpetrator in a more efficient manner.

[0006] In the US Patent Application, No. 2018,021,724,9A1 Leah La Salla discloses an unmanned aerial vehicle includes Wi-Fi sensors, which generate data by reflecting electromagnetic waves off an object within a vicinity of the unmanned aerial vehicle. Wi-Fi data processing circuitry receives the data generated by the Wi-Fi sensors and analyses the data to determine a characteristic of the object.

[0007] In an another US Patent 964,372,2B1 Lucas J. Myslinski et. al discloses an aerial drone device configured for acquiring content and communicating with the security system including receiving trigger location information from the security system, wherein the aerial drone device is configured to acquire an image of an object based on a database of template targets, including scanning an area and comparing the object in the area with the database of template targets to determine whether to acquire the image of the object, wherein the aerial drone device is configured to determine when to patrol an area by analysing social networking information and detecting one or more keywords within the social networking information, wherein the one or more keywords are related to a location of the aerial drone device, wherein the aerial drone device includes one or more lights to indicate different situations based on the content acquired by the aerial drone device, wherein the aerial drone device comprises a nested aerial drone device including a first separable aerial drone device and a second separable aerial drone device, wherein each separable aerial drone device is configured to acquire separate information by traveling in different directions. Further, the aerial drone device includes a storage compartment configured for storing a net, paint, pepper spray or a tracking device and a shielding component configured for protecting the aerial drone device, wherein the shielding component includes one or more extendible wings.

[0008] In yet another US Patent Application No. 2017,018,799,3A1 Henry Gregg Martch et. al discloses various arrangements for using an unmanned aerial vehicle with a home automation system. The home automation host system may determine that a home automation event has occurred. The system may determine to perform unmanned aerial vehicle (UAV) surveillance of the home in response to the home automation event. Deployment of a UAV may be triggered in response to determining to perform the UAV surveillance of the home. The video then captured by the UAV of a portion of the home, possibly corresponding to the location of the home automation event. The video captured

by the UAV of the portion of the home in association with an indication of the home automation event that triggered deployment of the UAV may be recorded.

[0009] Despite having these devices and systems as described above, we still need a device that is smart, robust, technologically advance and capable of preventing an active shooter without much human intervention and in quickest possible time.

SUMMARY OF THE DISCLOSURE

[0010] It should be understood that this disclosure is not limited to the particular systems, and methodologies described herein, as there can be multiple possible aspects of the present disclosure which are not expressly illustrated in the present disclosure. It is also to be understood that the terminology used in the description is for the purpose of describing the particular versions or embodiments only and is not intended to limit the scope of the present disclosure.

[0011] The present disclosure relates to a system and method for neutralizing or deescalating a perpetrator or active shooter via a drone. The present disclosure discloses a system for detecting an active shooter and identify a weapon. So to accomplish this task, the system is going to use Machine Learning, which is a subfield of Artificial Intelligence, inside Machine Learning it uses subfield called Deep Learning. In Deep Learning there are three fundamental architectures of neural networks that perform well on different types of data i.e. FFNN (Feed-Forward Neural Network), RNN (Recurrent Neural Network) and CNN (Convolution Neural Network). The present system uses R-CNNs (Regional Convolutional Neural Networks) and YOLO algorithm for faster object detection and localization.

[0012] According to an aspect of the present disclosure, the system comprises a camera, a drone, and a master control system. The camera provides a live feed of data to the master control system. Here, the system may use more than one cameras that are installed at various places in a campus, these cameras are via a wired or wireless means connected to the master control system and provide a live feed of the data. When an active shooter enters in the campus holding a gun or firearm the camera facing towards the entry gate display the live data to the master control system. The master control system by using

artificial intelligence particularly deep learning algorithm and object detection module to identify the active shooter and the firearm and generates an alarm or notification. The user or security person monitoring the master control system receives the notification and command the drone to reach the location where the shooter is located. Upon receiving the command from the master control system the drone navigates to the location via the shortest path possible. The drone is also having cameras embedded with a system using object detection and deep learning algorithm to identify the active shooter or perpetrator. The drone first identifies the active shooter and upon receiving the command from the security person neutralize the active shooter by using various methods not limited to spraying pepper, electric shock or by using other weapons.

[0013] According to another aspect of the present disclosure, the system has multiple drones hovering around a predefined campus and each of the drone is feeding live data through their respective cameras to the master control system. Upon detection of the active shooter or perpetrator by the master control system using deep learning and object detection methods, the master control system automatically commands the nearest drone to reach the shooter location. After reaching the shooter's location the drone waits for the user or the person monitoring the master control system to command the drone to deescalate the active shooter.

[0014] The system can be installed at any public or private place e.g. school, shopping centers, hospitals, playground etc.

[0015] The system can use the existing IP cameras but not limited to CCTV (Closed Circuit Television), Infrared cameras, Thermal imaging cameras etc. installed in a building or campus to be secured from any shooters or perpetrator.

[0016] The drone uses 360-degree object detection and collision avoidance sensors while navigating inside any campus.

[0017] The master control system can be installed on a laptop, a computer or a mobile phone. Further, the drone can be controlled through a software application installed on a mobile phone or laptop.

[0018] The foregoing has outlined rather broadly the features and technical advantages of the present invention in order that the detailed description of the invention that follows may be better understood. Additional features and advantages of the invention will be described hereinafter which form the subject of the claims of the invention. It should be appreciated that the conception and specific embodiment disclosed may be readily utilized as a basis for modifying or designing other structures for carrying out the same purposes of the present invention. It should also be realized that such equivalent constructions do not depart from the invention as set forth in the appended claims. The novel features which are believed to be characteristic of the invention, both as to its organization and method of operation, together with further objects and advantages will be better understood from the following description when considered in connection with the accompanying figures. It is to be expressly understood, however, that each of the figures is provided for the purpose of illustration and description only and is not intended as a definition of the limits of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] For a complete understanding of the present invention, reference is now made to the following descriptions taken in conjunction with the accompanying drawing, in which:

[0020] Fig. 1 illustrates a block diagram for a security system according to one embodiment of the present disclosure;

[0021] Fig. 2 is showing a flowchart for the security system according to one embodiment of the present disclosure;

[0022] Fig. 3 shows the demonstration of the security system, according to a first exemplary embodiment of the present invention;

[0023] Fig. 4 shows the demonstration of the security system, according to the second exemplary embodiment of the present invention; and

[0024] Fig. 5 shows the demonstration of the security system, according to any of the exemplary embodiments of the present invention;

[0025] Like numerals refer to like elements throughout the present disclosure.

DETAILED DESCRIPTION OF THE INVENTION

[0026] Embodiments of the present disclosure will be described more fully hereinafter with reference to the accompanying drawings in which like numerals represent like elements throughout the several figures, and in which example embodiments are shown. Embodiments of the claims may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. The examples set forth herein are non-limiting examples and are merely examples of other possible examples.

[0027] As will be appreciated by one skilled in the art, aspects of the present invention may be embodied as a system, method or computer program product. Accordingly, aspects of the present invention may take the form of an entire hardware embodiment, an entire software embodiment (including firmware, resident software, micro-code, etc.), or an embodiment combining software and hardware. Furthermore, aspects of the present invention may take the form of a computer program product embodied in one or more the the computer readable medium(s) having computer readable program code embodied thereon.

[0028] Any combination of one or more computer readable medium(s) referred herein as memory or storage unit may be utilized. The computer readable medium may be a computer readable signal medium or a computer readable storage medium. A computer readable storage medium may be, for example, but not limited to, an electronic, magnetic, optical, electromagnetic, infrared, or semiconductor system, apparatus, or device, or any suitable combination of the foregoing. More specific examples (a non-exhaustive list) of the computer readable storage medium would include the following: an electrical connection having one or more wires, a portable computer diskette, a hard disk, a random access memory (RAM), a read-only memory (ROM), an erasable programmable read-only memory (EPROM or Flash memory), an optical fiber, a portable compact disc read-only memory (CD-ROM), and optical storage device, a magnetic storage device, or any suitable combination of the foregoing. In the context of this document, a computer-readable storage

medium may be any tangible medium that can contain or store a program for use by or in connection with an instruction execution system, apparatus, or device.

[0029] Program code or software embodied on a computer readable medium may be transmitted using any appropriate medium, including but not limited to wireless, wired, optical fiber cable, RF and the like, or any suitable combination of the foregoing.

[0030] The term "module" such artificial intelligence module used herein refers to any known or later developed hardware, software, firmware, artificial intelligence, fuzzy logic, machine learning algorithm, deep learning algorithm or combination of hardware and software that is capable of performing the functionality associated with that element. The module can consist of a software agent, a fuzzy logic algorithm, a predictive algorithm, an intelligence rendering algorithm, an object recognition module and optical character recognition and a self-learning (including relearning) algorithm. It should be noted that the self-learning (including relearning) algorithm can include a self-learning artificial intelligence algorithm and/or a self-learning neural network algorithm and/or a quantum computer enhanced machine learning algorithm.

[0031] The term “master control system” described herein below refers to any processing device, and may include mobile phones, smartphones or PDAs, Tablet, Kiosk, computing devices and the like. In one embodiment, a computing device is a touchscreen device for receiving input from a user via touch, voice, gesture and other computing devices.

[0032] The computer program instructions may also be loaded onto a computer, other programmable data processing apparatus, or other devices to cause a series of operational steps to be performed on the computer, other programmable apparatus or other devices to produce a computer-implemented process such that the instructions which execute on the computer or other programmable apparatus provide processes for implementing the functions/acts specified in the flowchart and/or block diagram block or blocks. As used herein, a “terminal” or node or computing device should be understood to be any one of a general purpose computer, as for example a personal computer or a laptop computer, a client computer configured for interaction with a server, a special purpose computer such as a server, or a smartphone, tablet computer, personal digital assistant or any other

machine adapted for executing programmable instructions in accordance with the description thereof set forth above.

[0033] Some embodiments of this disclosure, illustrating all its features, will now be discussed in detail with respect to Figs. 1 to 5.

[0034] Referring to Fig. 1, a block diagram of the security system 100 is shown according to one embodiment of the present disclosure. The security system 100 comprising a camera 200, a master control system 300 and a drone 400. The master control system 300 is having a master communication unit 310, a master AI module 320 and a GUI (graphical user interface) 330. Further, the drone 400 is having an AI module 420 and a communication unit 410. In this, the camera 200 is connected to the master control system 300 via a wired or wireless communication means and the drone 400 is also connected to the master control system 300 via wireless communication means.

[0035] Referring to Fig.2, a flowchart of the security system 100 is shown according to one embodiment of the present disclosure. At step 111, the master control system 300 gets the live data from the camera 200 and displays the data on the master control system 300 display. The master control system 300 analyses the live data by using the master AI module 320, the master AI module 320 particularly uses deep learning algorithm at step 112.

[0036] Deep learning is a subset of machine learning in Artificial Intelligence (AI) that has networks capable of learning unsupervised data that is unstructured or unlabelled. Also known as Deep Neural Learning or Deep Neural Network. In Deep Learning there are three fundamental architectures of neural networks that perform well on different types of data i.e. FFNN (Feed-Forward Neural Network), RNN (Recurrent Neural Network) and CNN (Convolution Neural Network).

[0037] In Feed-forward Neural Networks signals travel in one direction only, from input to output or there are no feedbacks (loops) i.e., the output of any layer does not affect that same layer. Feed-forward NNs tend to be straightforward networks that associate inputs with outputs. They are extensively used in pattern recognition. Further, the Feed-forward neural networks are primarily used for supervised learning in cases where the data to be learned is neither sequential nor time-dependent.

[0038] Further, the RNNs (recurrent neural networks) can have signals traveling in both directions by introducing loops in the network. Feedback networks are powerful and can get extremely complicated. Computations derived from earlier input are fed back into the network, which gives them a kind of memory. Feedback networks are dynamic their 'state' is changing continuously until they reach an equilibrium point. They remain at the equilibrium point until the input changes and a new equilibrium needs to be found. The RNNs allow information to flow back into the previous part of the network that helps the network dependencies on past events. The Recurrent Neural Networks (RNNs) are good with series data (one thing happens after the another) and are used a lot in problems that can be framed as “what will happen next” while CNNs are especially good at problems like image classification. RNNs (recurrent neural networks) are made up of one node. It is fed data then outputs a result back into itself, and continues to do so. Breakthroughs like LSTM (long short term memory) make it smart at remembering things that have happened in the past and finding patterns across time to make its next guesses.

[0039] Further, LSTMs have an edge over conventional feed-forward neural networks and RNNs in many ways, this is because of their property of selectively remembering patterns for long durations of time. Long Short-Term Memory (LSTM) networks are an extension for recurrent neural networks, which basically extends their memory. The units of an LSTM are used as building units for the layers of an RNN, which is then often called an LSTM network. LSTM’s enable RNN’s to remember their inputs over a long period of time. This is because LSTM’s contain their information in a memory, that is much like the memory of a computer because the LSTM can read, write and delete information from its memory.

[0040] The Convolutional Neural Networks (CNNs) are designed for data that comes in the form of multidimensional arrays. The CNNs are used but are not limited to image recognition, video understanding, speech recognition, and natural language understanding. The CNNs are good with hierarchical structure, strong local correlations and features can occur anywhere and are invariant to rotations/translations.

[0041] To accomplish better and faster results the R-CNN networks are introduced where the R stands for the region, to bypass the problem of selecting a huge number of regions, the proposed method (R-CNN) is used where a selective search to extract just 2000 regions

from the image and called them region proposals. Therefore, now, instead of trying to classify a huge number of regions, you can just work with 2000 regions. These 2000 region proposals are warped into a square and fed into a convolutional neural network that produces a 4096-dimensional feature vector as output. The CNN acts as a feature extractor and the output dense layer consists of the features extracted from the image and the extracted features are fed into an SVM to classify the presence of the object within that candidate region proposal. In addition to predicting the presence of an object within the region proposals, the algorithm also predicts four values which are offset values to increase the precision of the bounding box. For example, given a region proposal, the algorithm would have predicted the presence of a person but the face of that person within that region proposal could've been cut in half. Therefore, the offset values help in adjusting the bounding box of the region proposal. Problems with R-CNN (a) It still takes a huge amount of time to train the network as you would have to classify 2000 region proposals per image; (b) It cannot be implemented real time as it takes around 47 seconds for each test image; and (c) The selective search algorithm is a fixed algorithm. Therefore, no learning is happening at that stage. This could lead to the generation of bad candidate region proposals.

[0042] The drawbacks of R-CNN are solved to build a faster object detection algorithm and it is called Fast R-CNN. The approach is similar to the R-CNN algorithm. But, instead of feeding the region proposals to the CNN, in this user feeds the input image to the CNN to generate a convolutional feature map. From the convolutional feature map, the user identifies the region of proposals and warp them into squares and by using an ROI (Region of interest) pooling layer and reshape them into a fixed size so that it can be fed into a fully connected layer. From the ROI feature vector, the user uses a softmax layer to predict the class of the proposed region and also the offset values for the bounding box. Thus, the reason Fast R-CNN is faster than R-CNN is that you don't have to feed 2000 region proposals to the convolutional neural network every time. Instead, the convolution operation is done only once per image and a feature map is generated from it.

[0043] Both of the above algorithms (R-CNN & Fast R-CNN) uses selective search to find out the region proposals. Selective search is a slow and time-consuming process affecting the performance of the network. Therefore, an object detection algorithm that eliminates the selective search algorithm and lets the network learn the region proposals is proposed.

Similar to Fast R-CNN, the image is provided as an input to a convolutional network which provides a convolutional feature map. Instead of using a selective search algorithm on the feature map to identify the region proposals, a separate network is used to predict the region proposals. The predicted region proposals are then reshaped using an ROI pooling layer which is then used to classify the image within the proposed region and predict the offset values for the bounding boxes. This network configuration is called Faster R-CNN and it can even be used for real-time object detection.

[0044] All of the previous object detection algorithms use regions to localize the object within the image. The network does not look at the complete image. Instead, parts of the image which have high probabilities of containing the object. YOLO or You Only Look Once is an object detection algorithm much different from the region based algorithms seen above. In YOLO a single convolutional network predicts the bounding boxes and the class probabilities for these boxes. In YOLO configuration the user takes an image and split it into an SxS grid, within each of the grid taken by the user in m bounding boxes. For each of the bounding box, the network outputs a class probability and offset values for the bounding box. The bounding boxes having the class probability above a threshold value is selected and used to locate the object within the image.

[0045] The master control system 300 may use any of the above method or combination thereof for object detection and identifies the active shooter at step 113. Upon detection of the active shooter the master control system 300 generates an alarm or notification at step 114. The alarm can be an audio message, different types of light signals or any other type of alert signal to make the person monitoring the master control system 300 realize about the situation.

[0046] Further at step 116, according to one approach, the drone 400 upon receiving the notification from the master control system 300 itself reaches to the shooting location and identifies the shooter by using the AI module 420 same way as the above described deep learning algorithm used to identify the shooter first.

[0047] Further at step 115, according to the second approach the user or the person supervising or monitoring the master control system 300, commands the drone 400 to reach at the shooting location by using the shortest past. For this purpose, the drone's AI module 420 is already trained about the navigational route of the campus in which it is

installed. So that it takes minimum time to find the route when instructed to reach any specific location.

[0048] Furthermore, at step 116 the user command the drone to neutralize the active shooter or the perpetrator. By using the methods not limited to using a net for trapping the shooter, using chili powder spray, using electric shock or other weapons.

[0049] Referring to Fig. 3, a demonstration of a security system 100 according to one exemplary embodiment of the present disclosure. Here an active shooter/perpetrator 500 with a firearm 510 enters in a campus 600, the security cameras 200 are installed to feed data to the master control system 300. When the perpetrator 500 enters in the campus 600 the video cameras 200 live feed the data to the master control system 300 i.e. a computer system, and the master control system 300 is continuously monitored by a security person 700. Upon receiving the threat signal from the master control system 300 the security person 700 instructs the drone 400 to reach to the perpetrator 500.

[0050] Referring to Fig. 4, a demonstration of a security system 100 according to the second exemplary embodiment of the present disclosure. Here an active shooter/perpetrator 500 with a firearm 510 enters in a campus 600, the security cameras 200 are installed to feed data to the master control system 300. When the perpetrator 500 enters in the campus 600 the video cameras 200 live feed the data to the master control system 300 i.e. a mobile device held by the security person 700, and the master control system 300 is continuously monitored by a security person 700 through the mobile application installed in the mobile device. Upon receiving the threat signal from the master control system 300 the security person 700 instructs the drone 400 to reach to the perpetrator 500.

[0051] Referring to Fig. 5, a demonstration of a security system 100 according to various embodiment of the present disclosure. Here the drone 400 upon receiving the command from the master control system 300 reaches to the shooter's location and when the user or the security person 700 commands the drone 400 to neutralize the perpetrator 500 the drone as shown in the Fig. 5 by spraying the pepper on the perpetrator.

[0052] According to various embodiment of the present disclosure, the drone 400 is having a compartment to hold items for neutralizing the perpetrator like pepper spray holder, net

holder, electric shock element, or any other weapon holding compartment. Further, the drone 400 also have a releasing mechanism for the above items. Like the drone has the mechanism to press the pepper spray, a release mechanism for the net to release on the perpetrator etc.

[0053] According to various embodiment of the present disclosure, the drone is having a plurality of rotatable wings to provide the drone desired lift.

[0054] According to an advantageous embodiment, the drone 400 is made of waterproof and weather resistant material so to withstand in any weather condition.

[0055] According to another advantageous embodiment of the present disclosure, the drone 400 can be controlled through a remote master control system installed in a mobile device like a software application from any remote area. Further, the master control system and the drone itself can be activated or controlled by voice commands.

[0056] According to another advantageous embodiment, the drone 400 uses 360-degree object detection and collision avoidance sensors while navigating inside any campus.

[0057] According to another advantageous embodiment, the master control system can use the loudspeaker installed in the campus to announce the possible threat and can also make false gunshot sounds to distract the perpetrator.

[0058] Certain embodiments of this invention are described herein, including the best mode known to the inventors for carrying out the invention. Of course, variations on these described embodiments will become apparent to those of ordinary skill in the art upon reading the foregoing description. The inventor expects skilled artisans to employ such variations as appropriate, and the inventors intend for the invention to be practiced otherwise than specifically described herein. Accordingly, this invention includes all modifications and equivalents of the subject matter recited in the claims appended hereto as permitted by applicable law. Moreover, any combination of the above-described elements in all possible variations thereof is encompassed by the invention unless otherwise indicated herein or otherwise clearly contradicted by context.

[0059] Although specific embodiments and certain structural arrangements have been illustrated and described herein, it will be clear to those skilled in the art that various other modifications and embodiments may be made incorporating the spirit and scope of the underlying inventive concepts and that the same is not limited to the particular methods and structure herein shown and described except insofar as determined by the scope of the appended claims.

What is claimed is:

1. A security system comprising:
   at least one drone having an artificial intelligence system and a communication unit;
   a master control system having an object detection module and a user interface;
   at least one camera feeding live data to the master control system; and
   wherein the master control system is configured to communicate and control the at least one cameras and the at least one drone, further the master control system commands the at least one drone to neutralize an active shooter upon the detection of a firearm.
2. The security system according to claim 1, wherein the system can be installed at various public and/or private places like school, hospital, playground, home, and office etc.
3. The security system according to claim 1, wherein at least one drone is having a plurality of rotatable wings to provide a lift to the drone.
4. The security system according to claim 1, wherein the at least one camera and the master control system are connected to each other via a wired or wireless connection.
5. The security system according to claim 1, wherein the master control system and at least one drone are connected to each other via a wireless connection.
6. The security system according to claim 1, wherein the master control system may use existing cameras installed in various campuses for input.
7. The security system according to claim 1, wherein the at least one camera is installed on at least one drone that is continuously roaming around a predefined area.
8. The security system according to claim 1, wherein the master control system is a remote control device including but not limited to a mobile, laptop and desktop.
9. The security system according to claim 1, wherein a user is monitoring the master control system and upon the detection of the active shooter the user triggers a panic button or take a desired action with help of the at least one drone.
10. The security system according to claim 1, wherein at least one drone and the master control system uses deep learning and object detection algorithms to identify the active shooter.
11. The security system according to claim 1, wherein the at least one drone is having a compartment and mechanism to neutralize the active shooter by using but not limited to a net, pepper spray, electric shock weapon, alarms.
12. The security system according to claim 1, wherein the system may have more than one drones that are located at different places in a building and when the active shooter is

identified the master control system will command a drone which is nearest to the location of the active shooter.

13. A method for neutralizing an active shooter using at least one drone, the method comprising:

scanning a predefined area by at least one camera;

providing a live feed of data from at least one camera to a master control system;

identifying the active shooter by using deep learning algorithms;

commanding by the master control system to at least one drone to reach a location near to the active shooter;

identifying the active shooter by the at least one drone using object detection method; and

neutralizing the active shooter by ways not limited to pepper spray, electric shock and alarm signals.

14. The method as claimed in claim 13, wherein the master control system has pre-stored navigation data of a predefined area for swiftly commanding and sending the at least one drone.

ABSTRACT

The present invention relates to a system and a method for neutralizing or deescalating a perpetrator by using a drone. The system comprises a camera that is monitoring a predefined area or the area to which the user wants to secure. The camera is feeding the live data to a master control system that is using artificial intelligence particularly deep learning algorithm to identify the shooter and stop him/her from shooting any further. The security system can be installed at various place like schools where these kinds of incidents happen frequently and can save many lives.