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CAMOUFLAGE TECHNIQUE BASED MULTIFUNCTIONAL ARMY ROBOT

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Abstract: **Nowadays, many expenses are made in the field of defense in adopting primitive security measures to protect the border from the trespassers. Some military organizations take the help of robot in border areas of the country where the work done by the army persons are not much effective. These Army robots are confining with the camera, sensors, metal detector and video screen. The main objective of our system is to get camouflaged including some additional parameters like wifi module for real time data processed by the camera at the video screen and PIR sensor to trace the intruders. Thus the proposed system using wifi reduces errors at defense and keeps the nation secure from the foe.**

Keywords: **Camouflage, Surveillance, Raspberry-pi, Sensors, Wireless Robot.**

I. INTRODUCTION

A robot is an automatic mechanical device often resembling a human or animal. Modern robots are usually an guided by a computer program or electronic circuitry. Robots have replaced humans in performing repetitive and dangerous tasks. The use of robots in military combat raises ethical concerns. The possibilities of robot autonomy and potential repercussions have been addressed in the real world environments in the upcoming days. Basically Army Robot is capable of performing tasks such as locomotion, sensing the harmful gas, sensing the humans beneath the surface, metal detection. Army Robot is an autonomous robot comprising of wireless camera which can be used as a spy and Wifi used to control it wireless. This Army robot is more efficient compared to the soldiers. Excellency of this robot is in being operated wireless from remote which offers no risk to the soldier lives. Robots are enhanced to be robust and sturdier giving the guarantee of success in the risk prone environment. The main aim of the paper is to implement a Camouflaged technology based Wireless multifunctional Army Robot which can be controlled through smart phone using Wifi Module having locomotion and navigates around the risk prone areas and tries to identify the intruders. In addition artificial intelligence is being applied to the robot for its safety.

II. LITERATURE SURVEY

[1] Sustainability enabling research methods for development of integrated border security systems.

Cristina Cică ,Lucian Filipoaia

One of the main priorities for an effective and sustainable Security Union refers to the improvement of information exchange, strengthening information systems and enhancing security at the external borders of the European Union (EU). Recent research projects financed at EU level under Security theme calls are approaching the development of modern

technologies and concepts, either for border surveillance and control, or for enhancing IT&C interoperability and common sharing environment enabling for law enforcement agencies. This paper addresses specific new Research Development (R&D) projects type (i.e. pre-operational validation and pre-commercial procurement), aiming to validate them as sustainability enabling research methods for the development of integrated border security systems. In this sense, the paper applies the sustainable development definition elaborated in previous work and provides some specific general Key Performance Indicators (KPIs) / Measures of Effectiveness (MoEs).

[2] Large scale border security systems modeling and simulation with OPNET

Mosad Khatami ,LubnaAlazzawi,Ali Elkateeb

Most aliens who manage to get across borders undetected are known to end up in cities, and comprise some of the greatest security challenges a country can face. Safety in cities requires critical security measures that ensure that no aliens operate from across the border to avoid local enforcement. To control the border effectively, countries must deploy an effective detection system that enables real-time surveillance of border integrity. Events such as border crossings need to be monitored in real time so that any border entries can be noted by border security forces and destinations marked for apprehension. Wireless Sensor Networks (WSNs) are ideal for national and city border security because they enable enforcement teams to monitor events in the physical environment. Using the OPNET to simulate a WSN will make the WSN nodes robust and efficient by optimizing geographical coordination and network design. They developed a open network simulation and modeling there are two general methods of communication network simulation.

[3] Maritime Border Security using Sensors, Processing, and Platforms to Detect Dark Vessels

Ross S. Eaton ,Stan German,Arjuna Balasuriya

Maritime security is critical to national prosperity, but with a large area to be secured and limited resources available, our current maritime situational awareness is not sufficient to secure our borders. This challenge is compounded by the fact that many bad actors intentionally avoid using transponders to obscure their location and actions for nefarious purposes. New solutions are required to detect these “dark” vessels in the expansive maritime domain and thereby enable increased maritime situational awareness and security. In this paper, we present a concept for increased maritime situational awareness, specifically designed to secure our borders against dark vessels using a novel combination of existing technologies. Our concept is Sensors and Platforms for Unmanned Detection of Dark Ships (SPUDDS), which consists of our intelligent ship detection and classification software integrated onboard our autonomous long-duration sensor buoy, which provides long-range passive detection of non-emitting dark vessels for maritime situational awareness.

[4]Towards Mobile Contactless 4-Fingerprint Authentication for Border Control

Axel Weissenfeld.AndreasZoufal. Andreas ZoufalBernhard StroblGustavo

In the last years the importance of biometric authentication in border control procedures increased in a way that biometrics have become the core of most border management systems. Current commercial products for mobile border control have not satisfactorily solved both the demand for increasing security checks and the user requirements driven by security personnel such as border guards yet. Due to their flexibility, portable devices are commonly desired during the control process. This paper presents on-going work of an advanced mobile device for border control focusing on usability and integrating new technologies to envision next-generation of mobile devices. The device is based on the MobilePass device but significantly improved. A key technology of the new device is a contactless 4-fingerprint authentication instead of only one in existing solutions. Results based on real data shows the advantages of 4-fingerprint versus 1-fingerprint authentication.

[5] Automatic Gun Targeting System

Ajay S. Mirchapure

The prior concept of Automatic Gun targeting System is to detect and target the living object or any movement in highly secured area such as Border by using automation. The y authors used an automation is sensor base automated gun targeting system target the living object within the range of sensor. The automatic gun targeting is primary base on PIR sensors, microcontroller and RF transmitting and receiving unit with targeting gun. Until then, border is provided with Spike iron wires, and a watch tower from which a person continuously flashing the light over the border area day and

night. Those persons are fully responsible for border security. The sensors will sense any living object within the provide range. The signal of sensor is provide to microcontroller, in response, microcontroller generates the code and it will transmit that code using RF transmitter to the watch tower where the RF receiver receives the code. The microcontroller at receiver side control targeting gun, buzzer and motor drivers circuit as per received code and targeting gun at receiver will target the living object.

[6] Automatic target detection using PIR sensors

Mr.RodabasannavarSharanabasappa,Ms. Shilpa Patil , Ms. PritiChandagad,Ms. AnujaPati

According to our survey the reviewed system contains automatic target system and shooting gun is to detect and target any living object or any movement within range. The automation totally depends on pir sensor, ultrasonic sensor and aurdino controller. Arduino satisfy all necessary requirements of automation the aurdino controls gives command and instruction and gun. pir sensor detects the motion of the objects. ultrasonic sensor calculates the distance between object and gun .whena object tries to cross the border it generates the signal and transmit to the aurdino .Arduino satisfies all necessary requirements of automation. Arduino controls, gives commands and instructions to sensors and gun. PIR sensor detects the motion of the objects. If object tries to cross the boundary, then PIR generates signal and gives to Arduino and it produces alert message. If object continues to go further then Arduino gives command to shoot that object. The main advantage is automatic target detection and shooting gun is wirelessly.

[7] Comparison of Image Matching Techniques

N. Jayanthi, S. Indu

The authors Jayanthi proposed various image recognition and tracking algorithms perform on various datasets. A wide range of datasets have been chosen, ranging from hand gestures to shapes and objects to handwritten manuscript text The algorithms whose performance is being analyzed are namely Blob detection method, Template matching algorithm and S.U.R.F Algorithm., processing speed, flexibility to use for various data sets, invariance to rotation, scale and illumination, every image is identified using its unique set of features. These features are exclusive for each image and hence help in subsequent identification. The discrimination between images. Features can be characterized as the interest focuses or an "interesting" part of a picture, which are utilized as a beginning stage for some computer vision calculations computer vision and image processing the idea of feature identification alludes to techniques that go for figuring deliberations of picture data and settling on nearby choices at each image point whether there is an image feature of a given sort by then or not three image matching techniques for performance comparison.

[8] Camouflage moving object detectio Archana Rajesh Date, Sanjeev ani Kiran Shah

In this review paper, different techniques using various features for camouflaged moving object detection were proposed Moving object detection is an important and basic step in any video surveillance application. Detected object has used an input to higher level tasks such as tracking, event detection, and behavioral analysis. There are several challenges in moving object detection such as illumination changes, occlusion, shadow, bootstrap, dynamic background etc. Detection of moving object having similar color as background structure is called as camouflage, which is another big challenge. The method of detecting camouflage moving object is known as DE camouflaging. In recent years, the researchers are attracted towards the camouflage moving object detection due to its application in the military, the first step of information extraction in any video surveillance application is the detection of a moving object. Moving object detection aims to separate moving foreground objects from background contents. It is an active research area with several challenges such as dynamic background, bootstrap, occlusion, illumination changes, shadows etc. Camouflage is the challenging task as the object and background are difficult to distinguish. It is most important due to its application in the military. Camouflaging is very useful to the soldiers that help them to protect themselves against enemies.

Bayes classification and Gaussian mixture model were used by HongxingGuo et al. to separate foreground and background in visual surveillance field. Naive Bayes conditional probability model is given as in background subtraction method, due to camouflage, threshold determination is very difficult while separating mostly, when considering visual surveillance applications, when the color properties of foreground object are identical to background image frame. As a result of this, a method is proposed to reduce variances in background image frame by averaging all the video frames serially

[9] Foreground Segmentation Using Motion Vector for Camouflaged Surveillance Scenario

K. IyshwaryaRatthi, V. Nithya, Yogameena, K. Menaka

The work extracts motion information using optical flow algorithm to detect the moving object and Motion Assisted Matrix Restoration (MAMR) for foreground segmentation in fully camouflaged surveillance method involves detection of moving objects and removal of camouflage in the surveillance videos. The video is first converted into required number of frames that has the target. The motion vector is found for each target frame by optical flow method using Lucas kanade algorithm. The motion information extracted from optical flow method is given as input to the background subtraction method carried out by MAMR algorithm. The first frame is taken as the initial anchor frame. Followed by, mapping of motion information into a weighing matrix recognizing each pixel neither as background nor foreground. Thus, the problem of background and foreground occlusion/merging due to similar color will be rectified which is nothing but the camouflage the proposed system is detection of motion vector. Motion estimation is the process of determining motion vectors that describes the transformation from one 2-D image to another. Estimation is the process of determining the velocity of image structures from one frame to another in a particular time period. The motion estimation is classified into two categories namely motion segmentation and motion parameter estimation. Motion parameter estimation is the process of identifying moving object's boundary. The parameters respectively are rotation, rigid bodies, illumination, translation movement etc. The 2 dimensional projections are the optical flow. Generally, there are three types of motion namely, forward, horizontal and rotation. Motion vector always relates an image or its parts of portions such as pixels and blocks. The Lucas kanade optical flow algorithm is a simple technique that provides an estimation of the movement of an interesting features in frames of an image scene.

[10] Comparative Analysis of Convolutional Neural Networks and Support Vector Machines for Automatic Target Recognition

Ievgen M. Gorovyi and Dmytro S. Sharapov

Automatic target recognition in synthetic aperture radar images is described. It is demonstrated, that two different machine learning instruments can provide very high classification accuracy. In particular, support vector machines with proper optimization and developed local feature set gives competitive results. Secondly, a novel architecture of convolutional neural network is proposed various intelligence systems are very popular nowadays. A key of automatic decision making is related with application of proper artificial intelligence (AI) algorithms. Computer vision and machine learning are two most used groups of applied techniques. Linear discriminant classifier (LDC), quadratic discriminant classifier (QDC), k-nearest neighbors (k-NN) and support vector machines (SVM). Comparative analysis was performed Bayesian compressive sensing (BCS) technique was applied with scattering centers features. High-resolution range profiles were used detector is applied for extraction of target candidates after that discriminator is applied. This is considered as a low-level binary classification. As a result, false

positives such as buildings, trees and clutter are rejected. Finally, high-level classification is performed. As a result, target types are automatically determined the classification step is investigated SVM is widely used technique for such tasks as pedestrian detection, handwritten text recognition face recognition Interesting peculiarity of CNN is automatic feature extraction Thus, a key question is a construction of a proper network architecture. Several building blocks (layers)are typically utilized. A convolutional layer (Fig. 3) contains a set of 2-D kernels of a particular sizes (typically the same). Parameter stride (distance between blue squares controls the decimation of the outputs. we used the moving and stationary target acquisition and recognition (MSTAR) database This is a public dataset of SAR images of 0.3m by 0.3m resolution. The images were taken over 360 degrees covering various target orientations. Dataset was obtained in two acquisitions with 3671 and 3203 samples respectively

[11]A Novel Human-Robot Interaction System Based on 3D Mapping and Virtual Reality.

Pan Wang, Junhao Xiao, Huimin Lu, Hui Zhang, Ruoyi Yan, Shao

The Author proposed a virtual reality (VR) is in the background of rescue robots. In the HRI system, the rescue robot constructs a 3D map in the complex post-disaster environment based on a multi-line LiDAR and an inertial measurement unit (IMU) in real time. The map is represented using 3D-NDT, which is incrementally transmitted to the VR system. In the VR side, the human operator uses interactive devices to generate commands to control the robot's movement remotely, in order to perform the rescue task. Using the proposed HRI system, the operator can obtain a strong sense of

immersion, thus can better understand the robot's working environment. In addition, as a new way of human-robot interaction, the HRI system provides new ideas to improve the natural level of the interaction between the robot and the human operator. They are equipped with various sensors and actuators which enable them to replace the human exploring disaster areas in advance, establishing the environmental maps, searching for victims, determining the victims' life status and locations, and then marking them on the maps. This information can be used to assist rescue workers saving more victims in the prime time. Furthermore, rescue robots can substitute humans to participate the rescue campaign, which can avoid the threatten caused by the precarious post-disaster environment, such as collapsed building. For example, the United States sent four robots to the Fukushima earthquake environment in Japan, which can detect the temperature, gamma radiation, et al. and then send all the data back in real time. In these levels, the remote-control operation of the task-level is the most efficient and the least depending on the communication. However, it requires the highest autonomous ability. The action-level's remote control requires the robots to have the lowest autonomy, but the operators undertake the greatest load, and they are easily getting fatigue. Different from the above technologies, this paper proposes a HRI method based on the 3D mapping and VR technology. Our method has been evaluated by exploring the rescue environment using the NuBot rescue robot. The results indicate that the system can provide a first perspective for the operator.

III. METHODOLOGY

An Army Robot is designed on the camouflage techniques. The main goal of the project is to design the robot and to control its operations using a Smart phone, used as remote control device can reproduce the color accordingly with the ground surface where it will be moving on, hence being camouflaged to the outside world. On the one hand, in order to achieve these goals, we used a LED matrix (RGB) which can diffuse uniform colors, coupled to sensors that can precisely identify ground colors. This robot is designed in such a way that it can reproduce the color independently at various areas each area being able to reproduce color with specific spots of the ground surface. Which allow the robot to mock up as a checkerboard of multiple colors – the various colors it drives over. On the other hand, we also created a system which can receive and decipher information received from the Smart phone using Wifi to further pilot motors which in turn drive the robot in any required direction. Furthermore, Camera is attached to show the real time data, toxic gas detection using gas sensor, Metal detection using proximity metal sensor, passive PIR sensor to detect the obstacles and human intruders, LCD display to display the detected parameter. The algorithms used are Haar classifier for image processing and color detection algorithm for detecting the surrounding's colors.

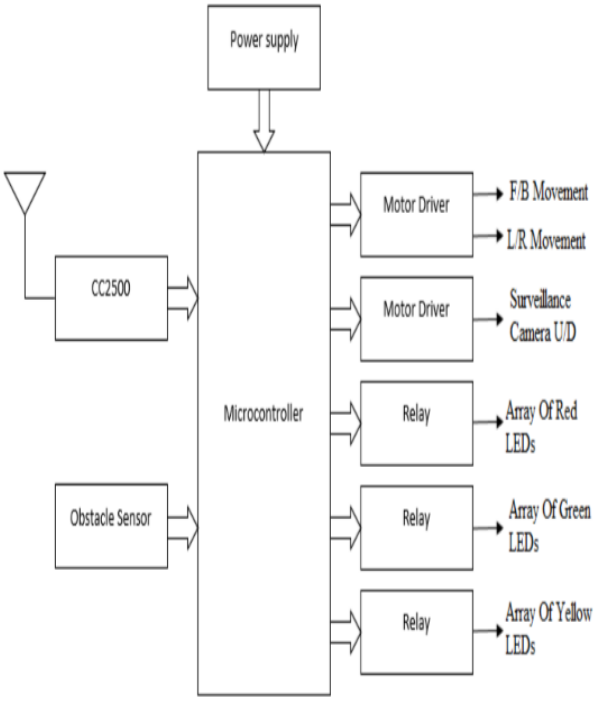

Figure 1: Block diagram of multifunctional army robot

Haar Algorithm

It is a machine learning mechanism where a cascade function is trained from a huge of positive and negative images.

The algorithm has four stages:

1. Haar features selection.
2. Creating integral images.
3. Adaboost training.
4. Cascading classifiers.

Haar features will be collected in the first step of the algorithm.A haar feature considers adjacent rectangular regions at a specific location in a detection window, sums up the pixel intensities in each region and calculates the differences between theses sums.

Integral images are used to make the haar features to work superfast.

Adaboost training will train the best features which also selects both best features and train the classifier. This algorithm constructs a strong classifier as a linear combination of weighted simple weak classifiers.

A huge number of haar features are necessary to describe an object with sufficient accuracy and are therefore organized into cascade classifiers to form a strong classifier.

By performing all the above steps the image will be classified and identified.

IV. PROPOSED SYSTEM

Nowadays, with the growth of technology, several robots with very special integrated systems are particularly employed for such risky jobs to do the work diligently and precisely. This is intended to give related information about such military robots and their working abilities and efficiencies. The main goal is to design the robot which has better range and camouflaging feature. Provide better stability and higher processing speed and it help to acquire color of surrounding. To make system automated. Replace the manual efforts with machine mechanism. The aim of redesigning the model is to make the machine multitasking so that not only it can check for several parameters for monitoring but also carry out other significant tasks on its own. Reduction in wastage of time and human efforts

V. CONCLUSION

The proposed system is a substitution to human life. It enacts and plays an important role to pay a continuous attention on the war field areas and protect the surroundings. As it is based on the Chameleons color changing effect, the robot changes its color according to the surrounding environment and is hidden from the enemy's insight. The robot also captures live footage of the surrounding area so that we can monitor and analyze the war field areas. When the robot encounters with an obstacle it will stop moving and changes its direction. The robot can also be used in very risky areas where human cannot survive.

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