

# A Review Paper on Utilization of Robot in Defence Applications

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## Abstract

During a decade ago apply autonomy businesses has acquired different transformation of our encompassing. There is different sort of research are rushing to create a smart(intelligent) robot that adheres to the laws of the robot just as a robot which can have the capacity of pursuing movement as being living. Bionic robot and delicate robot just as few quadrupole robots are there which have the abilities like mini cheetah by MIT jellyfish by Festo which been utilized for understanding the movement of this species despite the fact that there are the same number of examines are continuing for utilization of this sort robot in different fields, for example, restorative business mechanical and protection ventures. In this review paper, various existing technology used in robot and applications of robotics is discussed.

Keywords:- Defence Robot, Intelligence, Surveillance, Reconnaissance

## 1. Introduction

Robotics is one of the most growing fields as well as one of most used as an application base field for precision work around the world. The robot is the one which is replacing human from the various zone. Presently there are many industries which have opt robot to perform certain kind of critical task such as robot-like DaVinci for operation in medical situations. The robotic arm is in manufacturing industries for different kinds of precise operations such as pick and place, packaging, welding, etc. Also, in many hotels for surviving food or cooking food. The few countries which are using a smart robotic system for surveillance like Israel. Robotics has made a very deep impact in the developing world where the smart robotic system is used for reducing the harm.

There have been a few significant talks in the improvement of military mechanical technology because of innovative progressions in mechanization and artificial intelligence. Currently, the robots are equipped with cutting edge innovations like mechanized weapons frameworks which can counter each and every assault. These types of military robots are requiring few coding and commands which require intense calculation works.

Organizations continuously arranging and examining propelled robots, which can explore a vehicle around a progression of arches, navigate various landscapes, ascend stepping stools, expel flotsam or jetsam, and work in a debacle circumstance.

Little robots remain progressively actuality utilized in defence applications, from ISR to submerged mine freedom and review. The Bluefin Robot as shown in fig.1, an auxiliary of General Dynamics Corporation (US), has built up a smaller than normal AUV named Sand Shark which has a width of 5 inches and length running from 23 creeps to 60 inches relying upon the payload. The organization has conveyed 10 Sand Sharks to Defense Advanced Research Projects Agency (DARPA) under the Adaptive Sensor System program. DARPA, alongside certain foundations, will utilize Sand Sharks for test purposes.



Fig. no.1 Bluefine

## 2. Literature Review

Sapaty et al describes the latest trend in the present scenario and various kinds of robots present in military industries. Also, talk about a certain point that helps us to make military robot smart and intelligent and a method program robot using spatial grasps language which is helpful for teaching machines about the task to develop understanding between the physical and virtual world. Author also describes about various military robot which helpful to understand different actuating system [1].

Tulue et al describes the hardware architecture of the system and also briefly talk about the actuator and design about ASLP legged structure (advanced spring-loaded pantograph) as well as it also provides a comparison and similarity between various design of legged of animal base robots. Author also talks about the forward and inverse kinematics of legged design and dynamic of body. This also discuss about the other actuator that can be used in different actuator such as hydraulic based or stepper-based actuator [2].

Wang et al describes the design principle of highly efficient legged for quadruple robot-like Mit Cheetah also the factor affecting motion angle and constraint of link as well as the mechanism of locomotion for Mit Cheetah robot. Also the about actuator control motion of the robot algorithm and trajectories of the leg. Author also discusses the special design stepper motor for operating the robot [3].

Porto et al describes the method and process to detect the pedestrian through the camera using raspberry pi and the algorithm for detecting the presence of human around camera also the basic element behind detection such as frame differencing, mean filtration, haar like features, background subtraction technique for detection of the object. Additionally, also about the logic for detection [4].

Mane et al describes the process of detection and recognition of face using raspberry pi and the logic behind it. This also talks a bit about concept machine learning and OpenCV library and programming using python language and image acquisition. It was about the detection of the face during the real-time process [5].

### 3. Existing Applications of Robots in the Defence base work

ISR are some of the significant applications where defence satellites are utilized. UAVs, UGVs, USVs, ROVs, AUVs, and others are widely utilized currently for ISR operations. Little UAVs being utilized in the defence part predominantly to give front line insight. At present, the military worldwide never again depend upon human detective and rather utilize little robots, those are practically undetectable to the foe. These robots aid screen adversary powers or explicit zones or even communicate recordings and pictures to the head station by the help of GPS. UAVs are utilized for ISR activities to report promising objective data which is hard to distinguish.

For instance, WASPAE as shown in fig.2, is a low weight, hearty, short height remote-controlled Unmanned Aerial System (UAS), planned or made mutually by AeroVironment (US) and the Defense Advanced Research Projects Agency (DARPA), is utilized by the US for observation and surveillance.

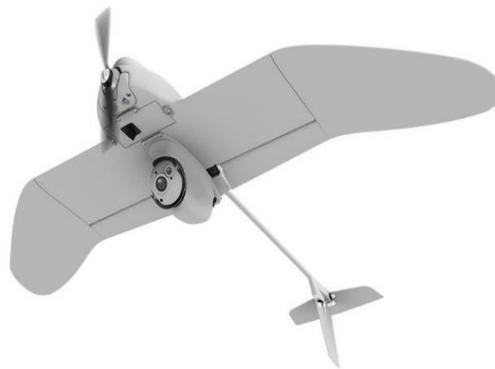


Fig.no.2 Showing WASPAE

Search or salvage is one more practice here robots utilized in the defence and assume a vital job in saving life's. Most losses occur because of the deferral in giving a vital guide to unfortunate casualties. Numerous nations are putting intensely in limiting the reaction time to save the people from most extreme unfortunate casualty.

The robots of search or salvage function are profoundly worthwhile in warfare. These could figure out how to look, trace, and salvage despite in atomic, organic, radiological, and synthetic conditions. These robots could be operated from the large distance remotely by person sitting at head quarters. The research work is going to make these robots self-governing. Vecna Technologies is creating Battlefield Extraction-help Robot (BEAR) as shown in fig. 3, who can safeguard fighters in war zone with no hazard to life.

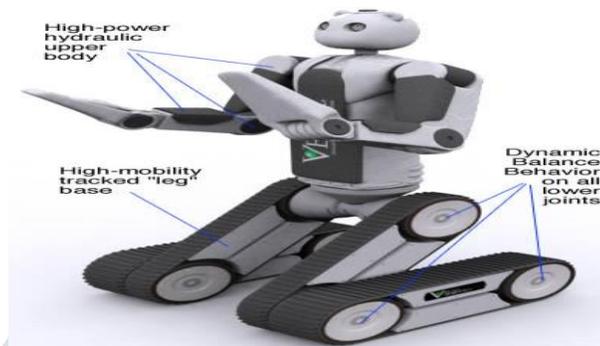


Fig. no. 3 Battlefield extraction

In the defence, robots used are sent in battle bolster function for hostile to submarine activities, lay down the mines, fire support, electronic fighting, fight harm the executives, strike missions, flying refueling, and so on. They likewise assume a fundamental job in basic missions because of their upgraded abilities and a specific level of independence. The capacities to accomplish data prevalence, limit blow-back, and battle adequately in urban regions against generally scattered powers are the favorable circumstances offered by robots. Innovative advancements in armed force robots have prompted and furnishing their weapons which offer deadly capacities on battle ground, alongside capacity to settle on choices without human intercession.

Mine freedom is an additional application here armed force robots could be sent for the surveillance of mine, zone leeway activities which recognize, evacuate landmines and even ocean mines. This robot limits the danger of unexploded weapons or different risky operations. The land robots and ROV's are utilized as mine freedom tasks. In 2016, the Russian army utilized a greetings tech "robot soldier" called as Uran-6 robots as shown in fig. 4, to tackle the noteworthy World Heritage site of Palmyra from Islamic State rule who lay down mines of explosives. An Uran-6 robot very efficiently utilized over there to defuse approximately around 3,000 dangerous gadgets which includes mines too.



Fig. no.4 Uran-6

Hazardous Ordnance Disposal (EOD) robots are utilized, which recognize or incapacitate traps, firecrackers, extemporized unstable gadgets, and different perilous questions in shut zones, structures, and automobiles. These were incorporated with bomb discovery frameworks. They can convey an assortment of payloads relying upon the EOD crucial. The few available EOD robots types are iRobot 510 PackBo, TALON, Remotec Andros, teodor, and Dragon Runner which have gigantic potential later on.



Fig. no.5 iRobot 510



Fig.no.6 Remotec Andros

Putting out fires robots are progressively being utilized to deliver fire circumstances to dodge losses. Fire fighting robots was first utilized by the US Navy. Later on, it were named as Shipboard Autonomous Firefighting Robot (SAFFiR). Putting out fires it can also recognize fire, actualize an expansive scope of fire stifling systems, which can withstand high temperatures for long duration, and react very quickly various kinds of developments. Fire fighting robot can distinguish fire break out, as it is outfitted with a suite of cameras, a gas sensor, and a stereo infrared camera, which help these robots to



Fig.no.7 Teodor



Fig.no.8 Dragon runner

discover the way during the smoke and control the fire.

Military hound is a kind of future machine develops to operate in various kinds of critical situations. Military hound is the quadruple robot that follows the bio-mechanism of a four-legged animal for movements with a smart system for recognizing faces as well as a tracking system to record its location and another feature like

turret gun to shoot an object. The robot-like structure of robot all it to move in various kinds of surfaces as well as four-legged structure support it to carry an excessive amount of load.

#### 4. Conclusion

Based on the literature review discussion various design for military applications but those robots are either wheel base or the robot which are design base on animal structure are not been design for military purpose. Military hound is a prototype concept of robot is developed for overcome this issue with help of present concept. And bring a robot which is helpful for all the taking battle with all recent issue to build better place.

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