International Journal of Advance Research in Science and Engineering
Volume No.07, Special Issue No.01, March 2018
www.ijarse.com
IJARSE
ISSN: 2319-8354

INTELLIGENT MODULAR ROBOTIC VEHICLE FOR DEFENCE AND DISASTER MANAGEMENT

Jadhav Vaibhav B[1], Jadhav Somesh S[2], Kadam Manik H[3], Jadhav Tejasvini S[4], Vibhute Amruta S[5], Didake V T[6]

[1.2.3.4.5]*Student, Mechanical Engineering Department, BVCOE, Kolhapur(India)*

[6]*Assi. Prof. Mechanical Engineering Department, BVCOE, Kolhapur(India)*

ABSTACT

Detection and removal of buried landmines is a serious concern all over the world. As manual method will no longer work and requires large man power in higher risk,area of work is much larger. At natural disasters and gas leak conditions it is difficult for the rescue team to operate at instance. So a smart robotic system must be generated to operate in such conditions. This work deals with development of a smart robotic system which can operate easily as well as can detect landmines, hazardous gases and fire in the way and informing the operator. Also it is capable of surveillance, most of all modular base which makes it versatile for any further applications.

Keywords:land mine, modular,robotic vehicle, surveillance,**etc**

I. INTRODUCTION

In 21 St Century, use of technology in every field is increased and it must be used as it eases the operation to be carried out. In similar ways defense is a field where new technology is used for surveillance, assisting the soldiers in various field operations like mine detection, disaster management etc.; which results in reduced risk, efforts with minimum human interface.

Use of landmines in battlefield is a threat to enemy. But the buried landmines many times cost the country in loss of lives of their own soldiers as keeping track of the buried landmines is difficult task. Also detecting and removing the landmines by using manual method is going to take a lot of time as there are reportedly around 50 to 100 million landmines buried all over the world.So generation of smart robotic system having a metal detector, an arm to handle the landmines and manipulator to operate the mines with a robust design is need of current era.

Also in populated areas natural disasters and gas leakages in mines a responsive and smart system should be generated. As it becomes difficult for rescue team to operate at that instance and provide help. So a smart robot which can navigate through areas and provide sufficient information is important.

II. PRESENT SCENARIO

Numbers of research work have been carried out in this topic by many scholars and researchers. Here is the summary of most successful research work,

Plett et. al.[1] Plett et al detection method uses microwave sensor and an artificial neural network pattern to detect landmines. This work had shown that this method is helpful in detecting antitank mines. The drawback of this method is level offalse alarms may be made arbitrarily low and system's compensability.

Pedro[2] Pedro's method involved image processing. That is detection of small non metallic landmines by image processing. The dynamic thermograph is used to analyze set of infrared data sequences and the image processing is done through filtering, feature extraction, gray scale morphology and segmentation. The drawback of this method is ambiguity of target signal and image processing level is limited unless the sensor provides good information about the target.

Sathyanath et. al.[3] Sathyanath proposed a system named as Artificial Immune System (AIS). The Artificial Immune System based on Intelligent Multi Agent Model (AISMAM) when applied to mine detection and diffusion, the results proved that AISMAM solved the problem successfully.The detection of mines is carried out by deploying mobile robots having enough intelligence, communication and coordination to detect and diffuse the mines. The drawback of this system is it lacks multitasking robotic equipment which will be helpful in urbanized areas also for disaster management.

Schavemaker et. al.[4] Schavemaker developed a vehicle mounted with infrared camera, a ground penetrating radar and metal detector.This system is used for detection of anti human landmines.

III. COURSE OF ACTION

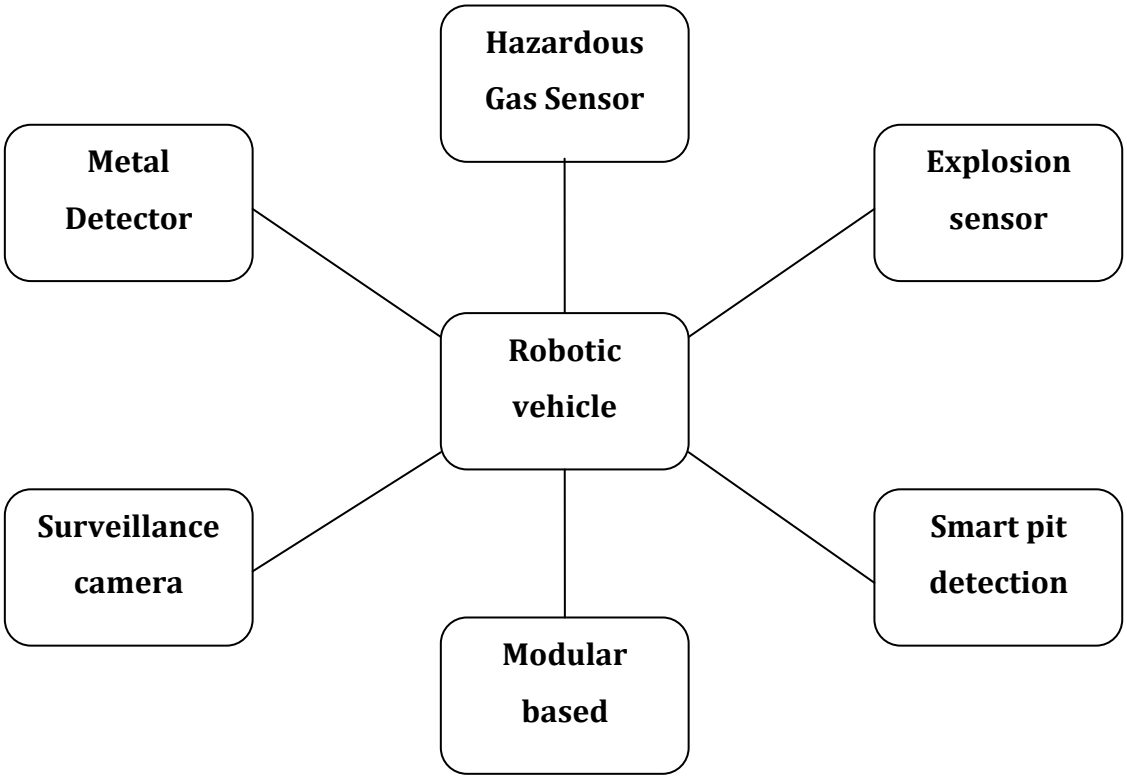
All this research carried out in this field are of great use but has some limitations, as it lacks multitasking robotic equipment which will be helpful inurbanized areas also for disaster management. These all developed systems are limited to specific work. So this is a major hurdle and an efficient solution needs to be developed. This project deals with development of a multitasking robot which can be used for detection of landmines, as well as fire, handling disaster related situations, intelligent enough to operate accordingly as well as constructed on modular plug and play approach so that making it more versatile and can be used for surveillance also.

This robotic vehicle is constructed with track links which helps it to operate on rough surfaces. To detect the landmines the metal detector is attached onto it. Themetal detector continuously scans the surface and if it detects mine it stops at the place informing the operator by initiating an alarm. The flame sensing module attached on the robotic vehicle detects high temperature obstacles in path and alerts the operator about it.The hazardous gas detecting module detects any hazardous gases in its surrounding and informs the operator about it which will be helpful in minesand sewers also. The robotic vehicle geared with above discussed module has to operate in different terrain conditions. To fulfill this smart pit detection module helps the robotic vehicle to

detect pit or ditches in its path. The robotic vehicle is developed in modular approach which makes it ready for any further applications.

This whole assembly of drive mechanism with all modules operates on solar energy.The solar panel, battery etc are mounted on vehicle. Along with that, this robotic vehicle has a wireless camera mounted on it for surveillance. This robotic vehicle is operated and controlled with wireless joystick and display device. The robotic vehicle is smarter as it stops when it detects mines, explosion or pit in front of it.

IV. BLOCK DIAGRAM



BLOCK DIAGRAM OF MODULAR VEHICLE

V. CONCLUSION

This robotic vehicle is capable of detecting mines within its proximity. The composition of modules like flame sensor, hazardous gas sensor, smart pit detection sensor, metal detector and wireless camera for surveillance makes it smarter and advanced. So it can be useful in defense applications, also disaster management in fire brigades, in mines for hazardous gas detection etc.It can be used to provide food and medicines during disaster related situations. And modular base makes it more versatile and future ready for any other application.

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