



# An Antigravity Hovering Vehicle for Agricultural Automations and Rescue Handling

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**ABSTRACT:** An existing idea that can be modified for the betterment of life is an invention. Amphibian ranger is a clone of an existing mechanism “hovercrafts”. The same technology has been used for the basic working of amphibian Ranger. It is multipurpose since this vehicle can be used both for agricultural purposes and rescue operations. It is designed to move on in fields of large area to spray pesticides or to spread fertilizers. The night vision enables to continuously monitor the agricultural land without any disturbance. At present due to the increase in temperature farmers hardly do their work and this lead to sunburn and dehydration. And it has been reported that many people in rural areas were subjected to snake bite when moving through cultivations at evening. Amphibian ranger an automotive vehicle can solve all these problems. This type of vehicle can equally ride over ice, water, marsh, or relatively level land .It uses GPS module to find and locate the vehicle records the coordinates of its location, and transmits these coordinates to our laptop/pc/mobile via a wireless RF interface. Video Surveillance can be done using this vehicle on the vulnerable places where humans cannot get into. It is also an autonomous robotic vehicle that moves in the natural calamity prone area and helps in identifying the alive people and rescue operations.

**KEYWORDS:** Hovercraft, GPS, RF interface, Amphibian Ranger

## I.INTRODUCTION

By the advent of technology agricultural sector also should get boost up with other sectors. Because one of the basic need of human is food. Agriculture is humankind’s oldest and still its most important economic activity, providing the food, feed, fibre, and fuel necessary for our survival. With the global population expected to reach 9 billion by 2050, agricultural production must double if it is to meet the increasing demands for food and bioenergy. Given limited land, water and labour resources, it is estimated that the efficiency of agricultural productivity must increase by 25% to meet that goal, while limiting the growing pressure that agriculture puts on the environment.

Modern farmers are already high-tech. Digitally-controlled farm implements are regularly in use. There are partially and fully automatic devices for most aspects of agricultural functions from grafting to planting, from harvesting to sorting, packaging and boxing. Farmers use software systems and aerial survey maps and data to guide their field Operations. They also use auto-steer systems included in many new tractors (or buy kits that do the same thing) that follow GPS and software guidance. Some farmers are already transitioning some of their operations to full autonomy. Thus forward-thinking farm owners today may be able to skip over slow, incremental improvements and jump directly to robotic and autonomous automation. But are the robots ready? Amphibian Ranger is a perfect solution for this problem.

Natural calamities do occur and they are unstoppable. But humans are becoming increasingly aware in the concept of intelligent rescue operations in such calamities so that precious life and material can be saved though calamities cannot be stopped. Still there are lots of disasters that occur all of a sudden and Earthquake is one such thing. Earthquakes produce a devastating effect and they see no difference between human and material. Hence a lot of times humans are buried among the soil and it became impossible to detect them. A timely rescue can only save the people who are buried and wounded. Detection by rescue workers becomes time consuming and due to the vast area that gets affected it becomes more difficult. So the project proposes an autonomous robotic vehicle that moves in the natural calamity



prone area and helps in identifying the alive people and rescue operations. A unique Passive Infrared sensor is used in the project which emits infrared rays to detect humans. As live human body emits thermal radiation it is received and manipulated by the PIR sensor to detect humans. Once the people are located it immediately gives audio alert visual alerts to the authorities so that help can reach the live person so fast. This PIR sensor is placed on a moving all direction robot that can maneuver in the calamity prone areas.

## II. FEATURES OF AMPHIBIAN RANGER

- The main peculiarity of the vehicle is Tireless. It has great speed compared to other vehicles. These vehicles can attain higher speeds than land vehicles(newly developed sowing machine) and marshy vehicle(transplanting vehicle) and use much less power than mini helicopters of the same weight .This type of vehicle can equally ride over ice, water, marsh, or relatively level land. It would make water pretty much a non-obstacle. Instead of having to go around a field, or find bunds to cross, you just travel in a straight line across the water it since allows to cross marsh lands without sinking and destroying the marsh itself.
- The soil condition of paddy fields is very soft and the sinkage is very high .Moving through this soft soil is very difficult even for a single farmer, thus pulling or pushing a device through the field is even a hectic and hard task. Ordinary remote controlled vehicles which having tires are failed to move on this type of marshy areas. That is reason why we thought of using principle of hovercraft to carry the farming mechanism over the field, so that this vehicle can hover the ground easily and remote control to control the farming mechanism means that farmer doesn't have even to step into the field. He can just stay at outer field and the control the vehicle and control farming operations through his remote.
- The benefit of this hovercraft idea is that now, work done by farmer is tremendously reduced, all he has to do is control the vehicle through the remote and make sure that the device is moving in straight line and just ensuring that the farming happens in required manner. This means that the energy expended by the farmer is greatly reduced and thereby the area that can be covered by the farmer in a single day is far more than that covered by the farmer in a single day is far more than that covered by the conventional method.
- The other unique characteristics of this vehicle make it one of the most environmentally friendly vehicles. One of these characteristics is the s low "footprint pressure." The pressure that it exerts on its operating surface is conservatively 1/30th that of the human foot! The average human being standing on ground exerts a pressure of about 3 lb per square inch (20 KPa), and that increases to 25 lb per square inch (172 KPa) when walking. In contrast, this vehicle exerts a pressure of only 0.33 lb (2.2 KPa) per square inch - even less as speed increases. This "footprint pressure" is below that of a seagull standing on one leg! They have literally flown over a pedestrian without inflicting harm.

The importance of amphibian ranger in field of rescue operations include:-

- RECONNAISSANCE AND MAPPING: It is an especially important task in wide area rescue situations created by natural disasters. In these situations, assessment of situation is needed to launch search and rescue missions successfully. In this task unmanned aerial vehicles could be very useful.
- SEARCH IS ANOTHER ESSENTIAL TASK: Victims has to be found first in order to rescue them. In order to use robots for search in wide area S&R situations they'd have to do the work at least as efficient as humans can. Whether it is possible is a disputable question. However, there are big hopes that robots will aid search missions in urban search and rescue situations in a foreseeable future. Small unmanned ground vehicles could penetrate the rubble deeper than humans or canine rescuers can, thus enabling the rescuers to find victims at a faster rate.
- Around in-shore, shallow and tidal areas, or an mud flats, sand-banks or frozen seas and lakes, it is virtually impossible for conventional boats to provide a comprehensive search and rescue service.so Amphibian ranger is perfect solution to this problem.

### III. PRINCIPLE OF HOVERCRAFT

A hovercraft also known as an air-cushion vehicle or ACV is a craft capable of travelling over land, water, mud or ice and other surfaces. Hovercrafts are hybrid vessels operated by a pilot as an aircraft rather than a captain as a marine vessel.

Hovercraft use blowers to produce a large volume of air below the hull that is slightly above atmospheric pressure. The pressure difference between the higher pressure air below the hull and lower pressure ambient air above it produces lift, which causes the hull to float above the running surface. For stability reasons, the air is typically blown through slots or holes around the outside of a disk or oval shaped platform, giving most hovercraft a characteristic rounded-rectangle shape. Typically this cushion is contained within a flexible "skirt", which allows the vehicle to travel over small obstructions without damage. Hovercraft can be powered by one or more engines. Small craft, such as the SR.N6, usually have one engine with the drive split through a gearbox. On vehicles with several engines, one usually drives the fan (or impeller), which is responsible for lifting the vehicle by forcing high pressure air under the craft. The air inflates the "skirt" under the vehicle, causing it to rise above the surface. Additional engines provide thrust in order to propel the craft. Some hovercraft use ducting to allow one engine to perform both tasks by directing some of the air to the skirt, the rest of the air passing out of the back to push the craft forward.

### IV. MECHANICAL PART DESIGN

CONCEPT OF EVOLUTION: was based on a motion possibility on more than 1 medium (ice, water land gullies) by breaking the forces of friction. The peculiar shape has been obtained from a living organism (mice) as its pace movement through cultivations.

CONSTRUCTION: The main part of the system is a thruster that produces thrust to produce air cushion that helps the vehicle to hover through any surface. It includes an EDF- electric duct fan constructed using BLDC, electronic speed control (ESC). The pitch and angle of the propeller is design to produce maximum thrust.

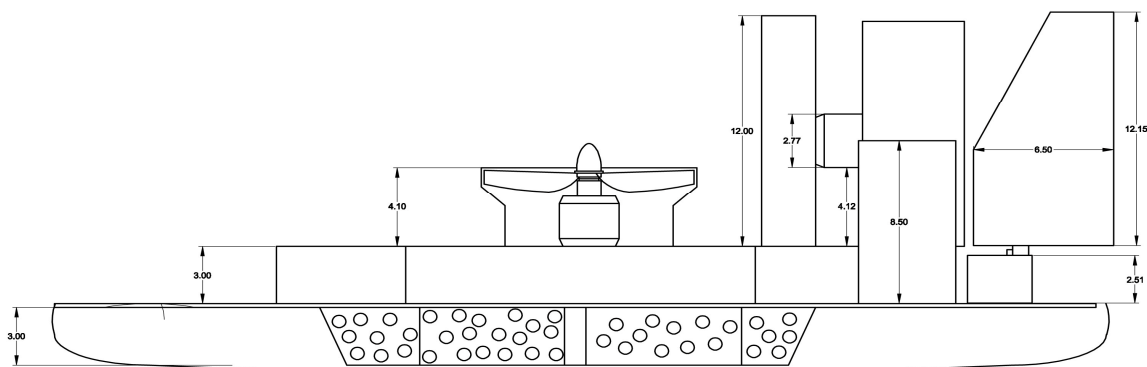


Fig.1 Side view of Amphibian Ranger

An effective thruster is developed by high precision cutting and tilting of propellers. In case of the thrust system, it is the acceleration of a mass of air that produces the thrust. Newtonian physics states that every action has an equal and opposite reaction and this is exactly what causes the thrust, accelerating air out of the hovercraft causes a thrust propelling the hovercraft forward. The basement is constructed using flexi board for better handling and to reduce the weight. The basement (fig.3) was created with proper dimensions to a shape of mice. The skirt of the mechanism that provides air cushion was made by a synthetic resin.



Fig. 2 First prototype

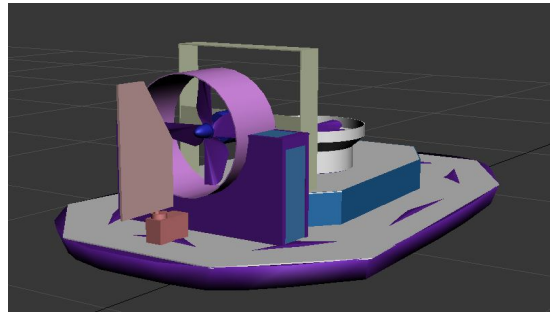


Fig. 3 Cad view of Final prototype

Thus our first prototype was evolved based on the above mentioned procedures of construction. The prototype (fig.4) worked successfully and was tested in various medium.

### V.ELECTRONIC PART DESIGN

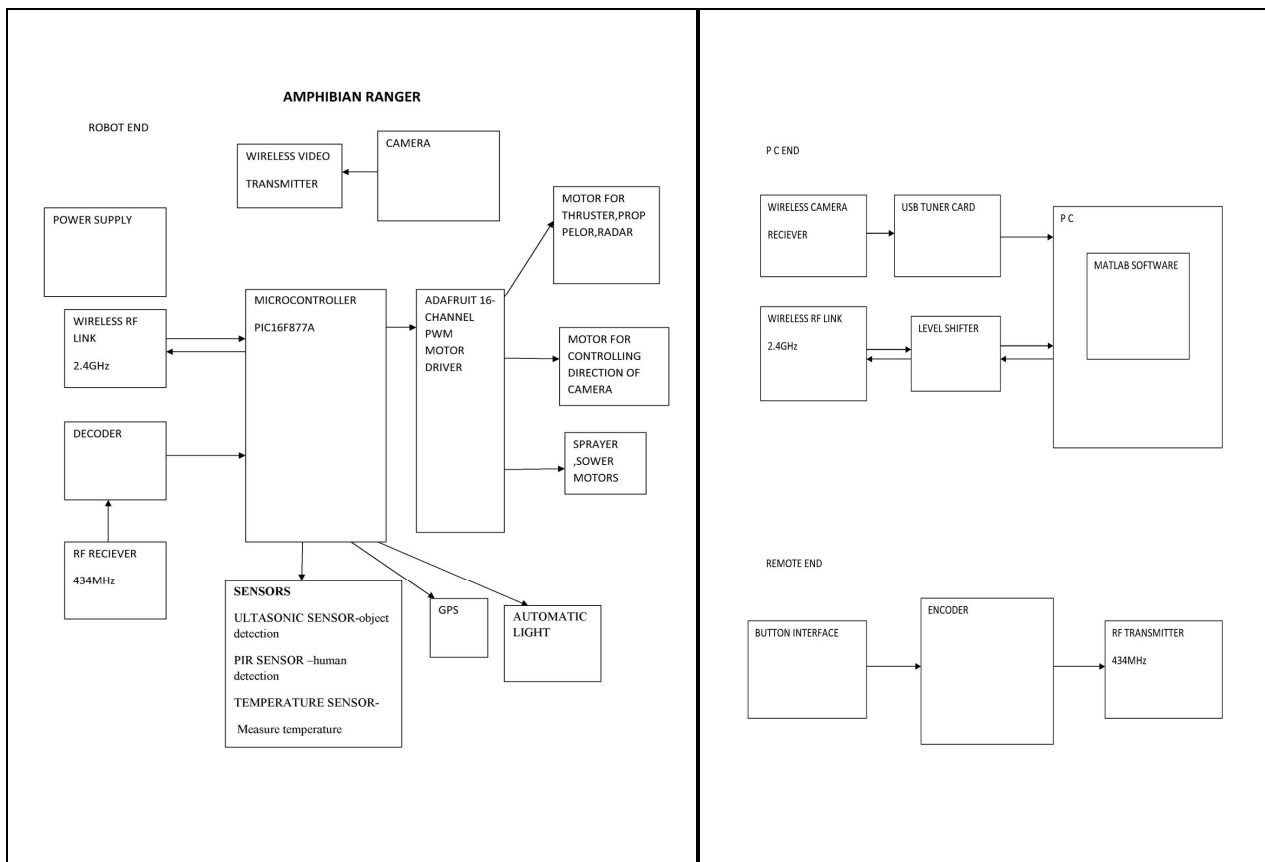


Fig. 4 Block Diagram

This project is developed for the use in agricultural areas such as harvesting and sprinkling fertilizers and water in fields. The robot will work in both automatic mode and manual mode according to the user choice. The robot is controlled by a remote unit. The hardware structure of robot includes motor unit and tank – pump unit for spraying. The heart of the circuit is PIC 16f877a microcontroller in robotic vehicle and in arduino in the remote control part. The



remote and robots communicates with a RF module . An Adafruit 16 channel 12 bit PWM Driver is used to drive the motors in the robot .The wireless camera provided in the robot capture image and pass to pc for processing .The PC is equipped with matlab software .

## VII. CONCLUSION

Engineers are inventors. They engineer their inventions for the betterment of human life and their existence. Our project is one of the updating of hovercraft mechanism which allows it to move through agricultural field to fulfill agricultural needs. It is much flexible in this field and can also be used for other purpose like rescue or monitoring areas.

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