# Alive Human Detection Using UGV

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***Abstract-*** *In this paper, a different approach for detecting alive human body in an inaccessible area using an unmanned ground vehicle is proposed. Human detection in area or environment which is difficult to access, can be done by employing an automated system. The alive human detection using UGV proposed a system which uses on-board camera, which is used for identification of human, a set of sensors like pulse sensor, temperature sensor which is used to detect and analyze the condition of the human body and then transmit message to a control room. For detection of human body, the system first check whether it is human or a non-living thing. After this the different kinds of sensors are used, which takes the input by analyzing the conditions. This system describes operation of UGV in detecting alive human body and requires small set of data and very less processing time. In this way, processing time, transmission of data is reduced which results in high performance of system detecting for alive human in structurally unsound or collapsed buildings and hazardous material situations.*

***Keywords***- Human detection, Rescue, Sensor,UGV.

## I. INTRODUCTION

A disaster is a sudden, extreme event that seriously disrupts the functioning of society and causes human, and economic or environmental losses that exceed the society's ability to cope using its own resources. Though often caused by nature which include earthquakes, windstorms, floods, it can also occur by human carelessness, negligence or bad judgement often without warning. Every year around 90,000 people are killed and close to 160 million people get affected worldwide. Generally, the rescue operation is carried out by human and trained dogs which is very risky and the rescuer may become a victim. In most of the cases, it becomes almost impossible to reach out to the affected area and perform the rescue operation. To overcome this problem, a UGV is deployed with some integrated set of sensors which carry out the required rescue operation. The need for a widely available, cost-effective search and rescue robot became increasingly evident following the terrorist attacks in the United States on September 11, 2001. This was the first true deployment of robots for search and rescue operations. Since that time, robots have been used in various disaster and hazardous materials situations

An unmanned ground vehicle (UGV) is a vehicle that operates while in contact with the ground and without an onboard human presence and can be used where it may be inconvenient, impossible to have a human operator present. The vehicle will have on board camera mounted on the UGV itself to detect a human face, GPS module to detect location, a set of sensors to observe the human body and condition. Based upon this, vehicle will autonomously make decisions about its behavior and pass the information to human operator at a different location who controls the vehicle through teleoperators will act upon.

Existing System of rescue: -

1. Mountain rescue is related to search and rescue operations specifically in rugged and mountainous terrain.
2. Ground search and rescue is the search for persons who are lost or in distress on land or inland waterways. Some ground search teams also employ search and rescue dogs, Search and rescue dogs detect human scent.
3. Air rescuerefers to the combined use of aircraft such as flying boats, amphibious and non-amphibious helicopters equipped with hoists and surface vessels, to search for and recover survivors of aircraft downed at sea as well as sailors and passengers of sea vessels in distress, autonomous UAVs(Universal Air Vehicles)use to rescue the survivors on land.

Disadvantages of existing system: -

These techniques cannot be carried out in many cases for manual like in the case of a mini jet crashes in an inaccessible and a remote place like the very dense of Amazon, Africa.It's very difficult to trace the missing person in the huge forest, and if at all the person in the forest is found it is very difficult for the manual rescue operation to be carried out due to many life threatening creatures, .and it really consumes a lots of man force to scan such a huge forest. Whereas in the case of aerial rescue operation the aerial

instruments are ineffective in forests since objects lying on the ground are not visible to these devices.

## II. RELATED WORKS

This section gives an overview of the related research that has been done regarding autonomous navigation for unmanned aerial vehicles with their advantages and disadvantages.

**Matthies, Larry, et.al** developed a real time stereo vision system that uses Data cube MV-200 and a 68040 CPU board to sense terrain geometry and composition underday, night and low visibility conditions. It provides sufficient quality of the range data and detect obstacles during off-road autonomous navigation and work in a limited range. But stereo still considered too computationally expensive for unmanned ground vehicle.

**Maria T.et.al** presented a paper in which a dynamic visual attention method used to segment the scene into moving objects-vehicles and pedestrians-and background, without using a reference image or modeling the background. Its disadvantageis that parameter this parameter tuning does not depend on each different situation stored in a video sequence taken from the camera, but only on the predefined attention focuses and also this method model used to monitor static environments

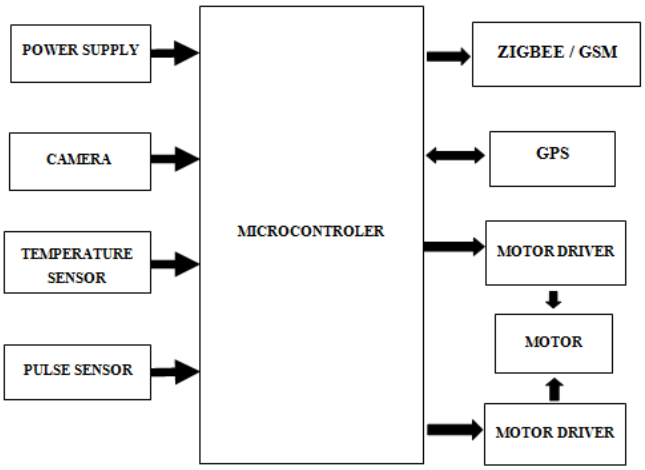
**Massimo Bertozzi.et.al** proposed a terro max vehicle which could move autonomously only up to 68kmph but it can't work during the night and its performance is not impressive because of vehicle size and height.

**Durst.et.al** authors proposed a new environment called Autonomous Navigation Virtual Environment Laboratory (ANVEL). It uses video game technology and physics-based modeling techniques to provide an M&S toolkit that is intuitive, interactive, and physically meaningful for unmanned ground vehicle but it mainly operates during off road navigation and UGV can detect and avoid obstacles in static environment.

**Goodrich,m., cooper,J.L., adams,J., Humphrey,c., Zeeman, R and buss, B.** presented a paper in which he described- Wilderness Search and Rescue can benefit from aerial imagery of the search area. Using results from formal analyses of the WiSAR problem domain, we summarize and discuss information flow requirements for WiSAR with an eye toward the efficient use of mUAVs to support search. Since the likely location of a missing person is key in determining the best paradigm given the circumstances, we report on preliminary efforts to model the behavior of missing persons in a given situation. Throughout the paper, we use information obtained from subject matter experts from Utah County Search and Rescue, and report experiences and "lessons learned" from a series of trials using human-robot teams to perform mock searches.

**Molina, P., Colomina, I,** project named CLOSE-SEARCH, which stands for 'Accurate and safe Navigation UAV-based low-cost Search-And-Rescue (SAR) operations'. The main goal is to integrate a medium-size, helicopter-type Unmanned Aerial Vehicle (UAV), a thermal imaging sensor and an EGNOS-based multi-sensor navigation system, including an Autonomous Integrity Monitoring (AIM) capability, to support search operations in difficult-to-access areas and/or night operations.

## III. PROPOSED METHODOLOGY




**BLOCK DIAGRAM**

### Locomotion

A simple wheel that can run on a flat surface for a demonstration has been chosen and these wheels can be changed according to the surrounding. Two motor drivers are used which are connected to a motor, these motor drivers are nothing but just like a relay which act as a switch used to turn on the motor which indirectly help the vehicle to move.Tracks on the arm instead of a wheel can also be used as an option since tracks supply traction along the entire arm without an increase in complexity over wheels on the end of rotating arms.

### Controls

An LPC2148 microcontroller can be used, because of the availability of the microcontroller and for its simplicity of

use. Other alternatives are far more expensive and more complex. This choice of controller also influenced the choice of communication device.

**Communication**

GSM technology, here we make use of the sim card for transmitting the rescue operation message to the rescue squad with the exact location of the place of incident so that upon reception of the message the rescue team would reach the sport for evacuations of the person who is in immediate need of medication.

**Location**

GPS or Global Positioning System is used to located the exact location of the object using the help of satellite it uses the three-dimensional parameter i.e. the longitude, latitude, and attitude of the objection and hence gives the position of the object

**Power**

A power supply is a device that supplies electric power to an electrical load. A rechargeable battery can be used.

**Camera**

It is used to capture image and using image processing detects the object captured by the camera.

**Sensors and ADC**

The temperature sensor which is used to measure human body temperature, read the temperature and compare with the critical temperature to detect human body is alive or not.

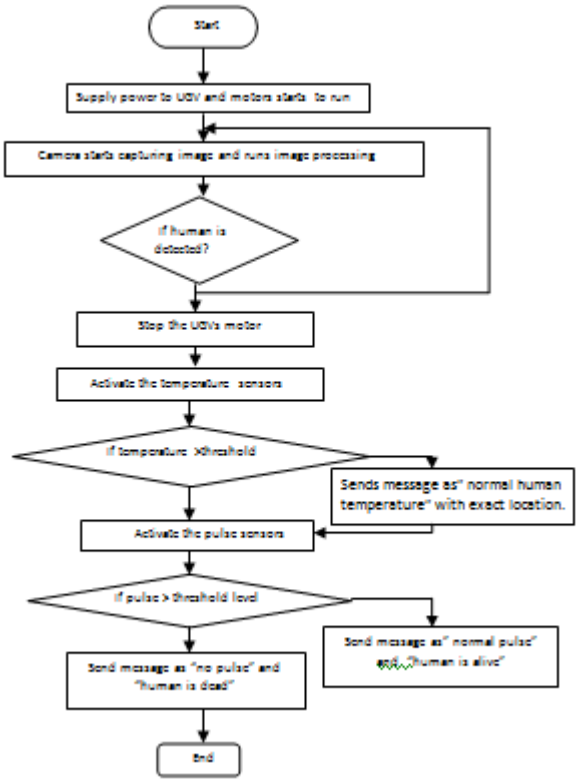
The Pulse sensor is used to sense the pulse which confirms a body is alive or not when temperature sensor may fail to detect.

ADC is a system that converts an analog signal into a digital signal. Typically, the output is a two's complement binary number that is proportional to the input. An ADC may also provide anisolated measurement such as an electronic device that converts an input analog voltage or current to a digital numberproportional to the magnitude of the voltage or current.

**Additional Features**

For location and position determination, the robot was fitted with an accelerometer, arm orientation sensors and a GPS to show the position and orientation of the robot as well as the orientation of the arms. In the event that the robot is flipped upside down, the software on the laptop automatically correct camera view and control orientation so that the operator may continue to operate the robot normally.

## IV. FLOW CHART




## V. HARDWARE RESULTS


**Fig: - Looking for the people**

**Fig: - Measuring pulse rate**

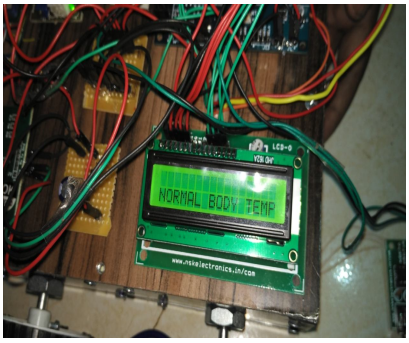



**Fig: -Showing body temperature**

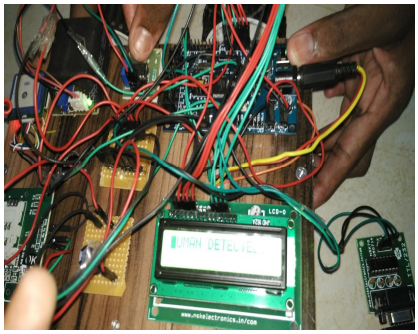


**Fig: - Message sent "human detected"**

## VI. CONCLUSION

The goal of this project was to design a prototype of low-cost robot for first response reconnaissance in structurally unsound or collapsed buildings and hazardous materials situations. The prototype produced has a ground speed of 60 rpm, battery life of approximately 45 hours, wireless range of several kms using GSM, weighs 1.5kg and has a high level of mobility. The future works can be done in the existing equipment which will add few new features. The prototype designed by the team has only one camera, placed at the front of the vehicle. This presents a problem if the robot gets stuck in a dead end and has to back out. To nullify this,a second camera to the front and a pair of cameras to the back of the vehicle can be added to allow 3-D viewing by the operator, whether traveling forward or backward. Another improvement can be done by using tracks on the arm instead of a wheel. Tracks supply traction along the entire arm without an increase in complexity over wheels on the end of rotating arms. This design would allow the robot greater mobility than simple wheels and more traction than a wheel on an arm. Further improvements would involve adding more sensors. The primary candidate for addition would be a thermal imaging camera, allowing the robot to see surface heat on obstacles to precisely locate a survivor.To allow more utility in hazardous materials situations, the robot would have additional sensorsfor air purity,temperature, pH, radiation,etc. It wouldbe fully water-sealed to further resist contamination, as well. Motor breaking is a bit of an issue for the current model. If the arms are not straight the weight of the body causes it to drop back down. Instead of using the current gear system, a worm gear would be applied. This would eliminate the need for electrical or software solution.

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