



# AUTONOMOUS MOBILE RESCUE ROBOT IN DISASTER ZONES

Ananya M<sup>1</sup>, Ankitha Adi Gowda<sup>2</sup>, Anusha M K<sup>3</sup>, Dr. M B Anandaraju<sup>4</sup>

BGS Institute Of Technology And Visvesvaraya, Technological University Karnataka, India<sup>1-3</sup>

Professor and Head. Dept Of ECE, BGSIT, Mandya<sup>4</sup>

**Abstract:** Robotics has become a rapidly growing science that will enter the life of all classes of people. A project that uses robotics and detection method to help people and rescuers at the time of disasters by detecting alive human beings is proposed. Natural calamities like Earthquakes, Tsunami and man-made disasters bomb explosion, building collapse often occur and they cannot be stopped. They produce a devastating effect and find no difference among human and material. Therefore at that time humans are buried among the detritus and it becomes impossible to detect them. Only a timely rescue can only save people, who are buried and wounded. Detection by rescue workers like policeman, fire fighters and medical services is time consuming because of the vast area that gets affected. Human rescuers must make quick decisions under stress and try to get victims to safety at their own risk. They need to find the location, status of victims and the stability of the structures as fast and early as possible so that medics and fire fighters can enter the disaster area and save the victims. This project proposes a mobile robotic vehicle that moves in the disaster prone area for detecting humans in such devastating environments and helps to identify the victims during the rescue operations

## INTRODUCTION

The process of securing data from any means of unapproved access and data corruption through its entire life is said to be data security. With the continuous improvement in the field of technology, the data getting unsecured. Every now and then hackers are trying to hack one's data. Therefore the security of data is the most concerned thing in people's minds. The security of data can be achieved by either software means or hardware means. Nowadays hardware approach to protect the data is getting more attention. This is because by means of hardware protecting the data is more reliable, flexible and less complex. The hardware approach also gives minimal delay and provides more efficiency to data security. To protect the data from any unrecognized access there are two types of security algorithms. The first one is Symmetric security algorithms which cover Data Encryption Standard (DES) and Advanced Encryption Standard (AES). The second one is Asymmetric security algorithms which cover Rivest- Shamir-Adleman (RSA) & Elliptic Curve Cryptosystem (ECC). FPGA devices are practiced for a hardware approach to secure one's data.

## BLOCK DIAGRAM:



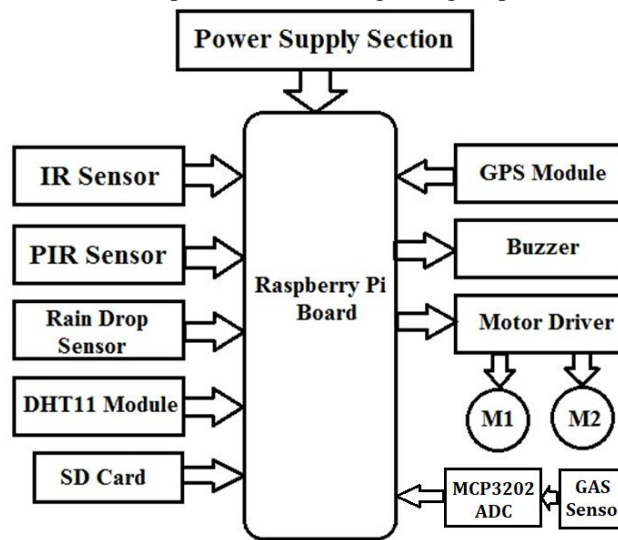
Fig 1. Embedded Systems Design



DESIGN METHODOLOGY

An embedded system is a computer system with a dedicated function within a larger, often with, real-time mechanical or electrical system constraints. It is incorporated as part of a complete device that often includes hardware and mechanical parts. Integrated systems today control many commonly used devices. 92% of all microprocessors are produced as embedded system components.

Examples of typically incorporated computer properties, compared to general-purpose counterparts, are low power consumption, small size, varying performance and low-cost unit cost. This is at the expense of limited processing resources, which makes them much harder to program and interact. However, by building intelligence mechanisms at the top of the hardware, taking advantage of any existing sensors and the existence of a built-in network can best manage the available network and unit resources. For example, intelligent techniques can be designed to manage the energy consumption of embedded systems. Modern embedded systems often incorporate microcontrollers (i.e. CPUs with memory or peripheral interfaces) but common microprocessors are also commonly used (using external memory chips and peripheral circuitry interfaces), especially in more complex systems. In any case, the processor or processors can be used typed ranging from general-purpose specialized in some kind of calculations, or even designed for the application. A common standard of dedicated processors is the digital signal processor (DSP).



WORKING

```

raspberrypi login: pi
Password:
Last login: Tue Jul 25 11:48:53 UTC 2017 on tty2
Linux raspberrypi 4.9.35-07* #1014 SMP Fri Jun 30 14:47:43 BST 2017 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.

SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to set a new password.

pi@raspberrypi:~$
    
```



Then, use the following login name and password

**raspberrypi Login: pi**

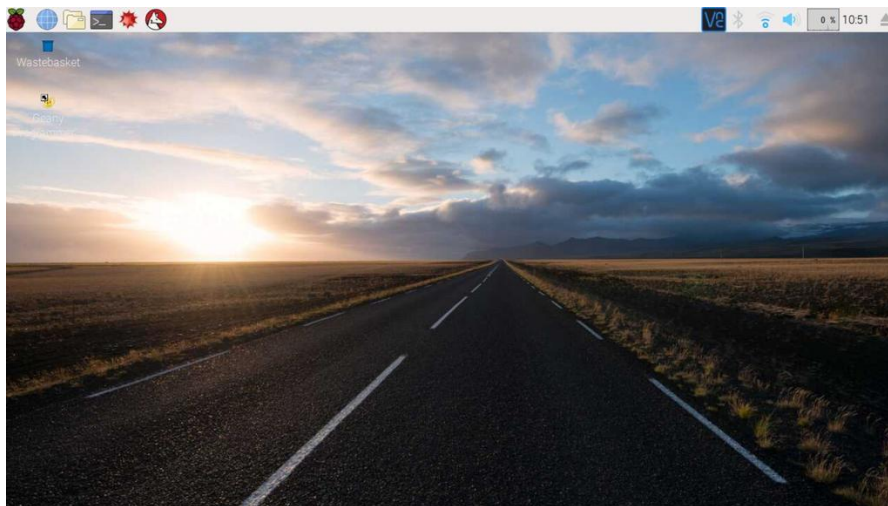
**Password: raspberry**

• This is the default user name and password. You can change the password after the first login.

The above command window can be used to operate Raspberry Pi.

To get GUI environment on Raspberry Pi, use below command,

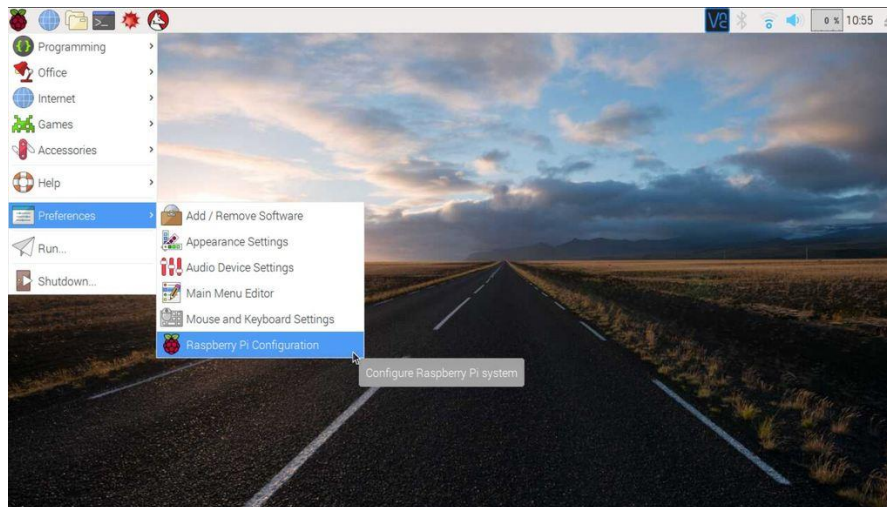
And we will get Home Screen of Raspberry Pi as shown below:



On display, there is a symbol of **raspberry** to the top-left corner of display. After clicking on it, we will get menu as shown below,



- As we can see, the Raspbian OS has installed Python 2 & 3. It also has different programming IDE like Geany, BlueJ Java IDE, etc. As raspberry pi 3 has On-chip Wi-Fi, we can connect it to the network and will get access over Internet.
- We can also change password of “Pi” user.
- To change password, click on **preferences** and then select **Raspberry Pi Configuration** which will provide a pop-up window.



- Then, click on change password option shown below.

### CONCLUSION

The goal of this project is to provide a rescue robot which is capable of saving the lives of victims in the disaster environment. During disasters, the main purpose of rescue Operation is to rescue the large number of people in the shortest time, while minimizing the risk to rescuers. The existing rescue robots are capable of detecting victims but they alone are not sufficient to save the victim. Instead, it requires a rescuer to get the victim out from the hazardous situation. This project proposes a new method for detecting and rescuing the surviving humans in destructed environment using an autonomous mobile rescue robot. The robot uses three units to perform this operation and these three units are inter-related to each other. The first unit is the detection unit, which moves into the debris and searches for the alive Humans. The second unit is the pick and place unit, it manually controls the pick and place operation performed on the victims to rescue them without the help of a rescuer. The third unit is the control unit, which is used to control the movement of rescue robot. This robot is equipped with various sensors to monitor rainfall, water flow, temperature and humidity. The sensors used in the development of this project are easily available and cost effective than the existing Urban Search and Rescue Robots.

### FUTURE SCOPE

This rescue robot is developed on small scale and is cost and energy efficient. It has bright and wide future because of its capability to save large number of people in the short time by minimizing the risk to rescuers. Robot can further be equipped with camera and speaker or recorder to interact with the victims and assure them of nearby help. Adding more number of DC motors to the rescue robot can further enhance the movement and speed of the robot. This complete system can be made automated by using high technology.

### REFERENCE

- [1]. V S Geetha Bharathi and S Sudha, Alive human detection in disaster zones using manually controlled robots, IJIRCCCE Vol 03, Special Issue 2, March 2015.
- [2]. Alireza Pouransari, Hadi Pouransari and Mohammad Madadpour Inallou, Intelligent rescuer robot for detecting victims accurately in natural disaster, 2nd International Conference on Knowledge-Based Engineering and Innovation (KBEI), November 5-6, 2018.
- [3]. R Shwetha and H K Chethan, Automatic and manual controlled alive human detection robot during disaster management, International Journal for Technological Research in Engineering, Vol 01, Issue 11, 2014, pp 2347-4718.
- [4]. Mauricio Correa, Gabriel Hermosilla, Rodrigo Verschae and Javier Ruiz-del-Solar, Human detection and identification by robots using thermal and visual information in domestic environments, 2012, pp 223-243.
- [5]. Wasif Naeem, Robert Sutton and John Chudley, Modelling and control of an unmanned surface vehicle for environmental monitoring, UKACC International Control Conference, September 2006, pp 1-6.
- [6]. Usha Tiwari, Rahul Kaushik and Shradha Subramaniyan, A technical review on human rescue robots, VSRD-IJEECE, Vol 02, Issue 3, 2012, pp 127-134.
- [7]. Amon Tunwannarux and Supanunt Hirunyaphisutthikul, Design features and characteristics of a rescue robot, International Symposium on Communications and Information Technologies (ISCIT), 2005, pp 1047-1051.