RESCUE DEVICE FOR LIFTING INFANTS STRUCK IN PITS

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Abstract- Now a days child often fall down in the borehole which is left uncovered and get trapped. It is very difficult and also risky to rescue the trapped children. A small delay in the rescue can cost the child his or her life. The objective of the project is to construct and design a bore well rescue robot (i:e to rescue a trapped baby from bore well). This project is a human controlled robot that gives an insight view of rescuing the baby safely and steps taken to achieve this. The project aims in designing "Robot to rescue of a child in a borehole" which is capable of moving inside the pipe according to the user commands given from PC. The project also used for Picking and Placing of objects based on arm design. The robot is operated through PC using wireless RF technology and using wireless camera we can view both audio and video on the TV. This robot has a high power LED which acts as a light source when light intensity inside the pipe is low. It is a low cost robot used to monitor the changes of different parameters in the industrial pipes.

Keywords: L293D H- bridge motors, Motor control, Robot, Robot arm, Wireless camera, RF technology

I. INTRODUCTION

The advent of new high-speed technology and the growing computer capacity provided realistic opportunity for new robot controls and realization of new methods of control theory. Robotics is one field within artificial intelligence. It involves mechanical, usually computer-controlled, devices to perform tasks that require extreme precision or tedious or hazardous work by people [1]. The field of search and rescue robotics, while growing rapidly in this decade, is still relatively new [2]. Robots have been very successful at manipulation in simulation and controlled environments. Outside of controlled environments, robots have only performed sophisticated manipulation tasks when operated by a human [3]. This technical improvement together with the need for high performance robots created faster, more accurate and more intelligent robots using new robots control devices, new drivers and advanced control systems.

The presented robot control system can be used for different sophisticated robotic applications. One particular aspect of the rescue robotics domain eases the fruitful combination of highly challenging basic research and application oriented developments for large markets. This is the fact that rescue robots strongly benefit from autonomy while there is a human in the loop [4].Recently, many accident reports of children (and even adults) falling in open bore-wells have appeared in the print and the electronic media. Very few of the victims have been saved in such accidents. To overcome such problems of these rescue operations, we have an alternative (feasible) proposal [6]. We are developing a robot machine that cantake out the trapped body in systematic way. It will also perform various life-saving operations for the sufferers such as oxygen supply. It will be a light weight machine that will go down into the bore well pipe and hold the trapped body systematically. In this alternative scenario, there will be no requirement of digging any hole parallel to the bore-well. The remotely controlled robot will go down the bore well and perform the action. A lot of other hassles will also be avoided by this alternative technique [6]

II. PROJECT DESCRIPTION

Objectives:
The objective of the project includes:

1. Wireless controlling of Robot through PC using RF Technology.
2. Live Audio and video can be seen on TV.
3. Implementation of pick and place concept to the robot.
4. DC motor based gripper operation for robotic arm.

III. LITERATURE REVIEW AND RELATED WORK

When the accident reports of children (and even adults) falling in open bore-wells has appeared there is no proper technique to rescue victims of such accidents. When the make shift /local arrangements do not work, Army is called in. In most cases reported so far, a parallel hole is dug up and then a horizontal path is made to reach to the subject's body. It is not only a time taking process, but also risky in various ways. Moreover it involves a lot of energy and expensive resources which are not easily available everywhere. These ad-hoc approaches involve heavy risks including the possibility of injuries to the body of subject during the rescue operations. Also, the body may trap further in the debris and the crisis deepens even more [6].

Figure 1 : Army members working for the borehole Rescue

Figure 2: Depth of a borehole

Available solutions

(i) So far there is no proper solution available for giving relief in such accidents. Generally, a hole parallel to the bore-well is dug up then a horizontal path is created to reach to the subject's body. But it takes too much time to save the life of the sufferer. Moreover, it involves a lot of energy, and expensive resources which are not easily available everywhere. It also involves possibilities of damaging the body of sufferer during the rescue operation loom large.

(ii) In some cases makeshift arrangements are made to pull out the body of sufferer. In such methods some kind of hooks are used and sufferers' clothes or body organs get caught hold of. This may cause wounds on the affected body[6].

Possible Alternative Solutions
To overcome such problems of these rescue operations, we have an alternative (feasible) proposal. We can develop a robot machine that can take out the trapped body in systematic way. It will also perform various life-saving operations for the sufferers such as oxygen supply. A video camera to observe the actual situation closely and continuous interaction with the sufferer could also be attached [6]. It will be a light weight machine that will go down into the bore well pipe and hold the trapped body systematically. In this alternative scenario, there will be no requirement of digging any hole parallel to the bore-well. The remotely controlled robot will go down the bore well and perform the action. In critical industries where human presence is avoided there we can use robot**s** which are programmed to do a specific operation.

Control Block Diagram:
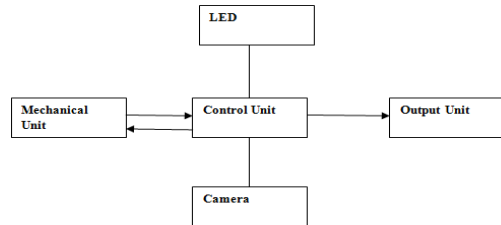


Architectural Block Diagram
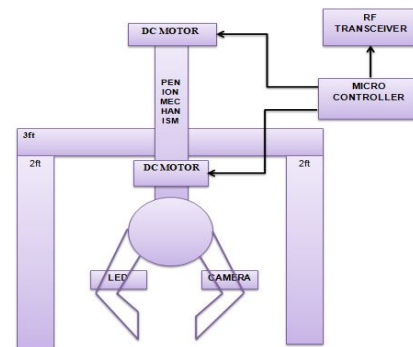
IV.HARDWARE & SOFTWARE DESCRIPTION

The project uses RFID technology, Embedded systems and a mechanical unit for the rescue .Special graspers are used to lift the child from the pits or bore-well. Microcontroller controls two dc motors. Microcontroller controls LED. Wireless camera records child status and these records are sent back to controller unit through RF Transceiver. The whole system will be tested by using a child model (toy) in a dry bore well. The total time taken for the rescuing operation is one hour.

RF Transceiver
An **RF module** is a small electronic circuit used to transmit and receive radio signals..HT12E IC is a transmitter integrated circuit of 2^{12} series is used in this project for transmission. HT12D IC is a receiver integrated circuit that belongs to 2^{12} series for reception.
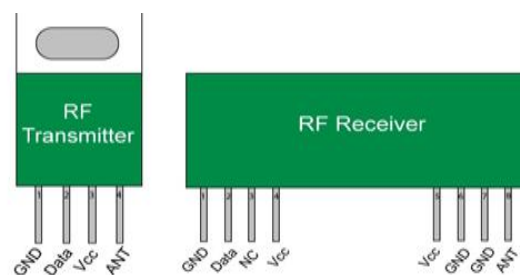
Microcontroller (AT89S52)

The Atmel microcontroller AT89S52 is a powerful device which provides a highly flexible and cost effective solution to many embedded applications.


DC Motor

DC Motor uses electrical energy to produce mechanical energy, very typically through the interaction of magnetic field and current carrying conductors.

It is used to control the movements of the grasper in the robot.

Pinion Mechanism

Pinions are small gears with a relatively small number of teeth which can be mated with rack gears.They are designed to translate rotational into linear and viceversa.These gears are used to move the Robot either forward or backward and sideways.
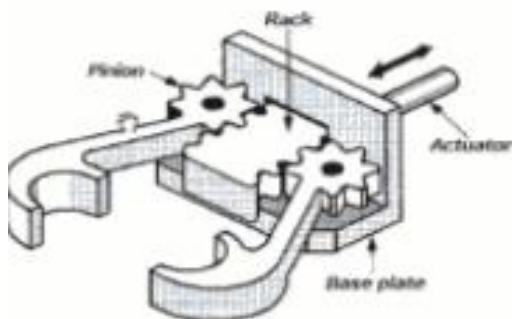
Camera

The camera is with 1.2GHz,with audio receiver unit with manual adjustment. Linear Transmission distance:50-100mTransmission Signal: Audio, Video

Receiving Signal: Audio, Video.

High Power LED

This Robot has a high power LED which acts as a light source when light intensity in pits or bore-wells is low.The high power LED allows the robot to see everything and assist the wireless camera to capture the images.

Embedded C

It is a 'mid-level', with 'high-level' features (such as support for functions and modules), and 'low-level' features (such as good access to hardware via pointers) C is the most common Embedded language 85%, of embedded applications are coded in C.. C , when used correctly is as safe and robust as any other high level language.It directly manipulates the hardware and memory addresses.It is very efficient, It is popular and well understood.

Special Graspers

Pulling of child is made possible by special graspers, which can grasp the shoulder or the wrist or the ankle of the child. These have been specially designed and fabricated to provide open and close control at one end and facility to extend it by adding additional pipes. A safety rope is provided which acts as a support for the grasper. It is possible to lower the grasper up to 40 feet inside the bore well and the depth of reach can be increased by adding pipe.

V.METHODOLOGY

The first step is to visualize the child this is done by lowering the CCD Camera inside the bore well or any other places.

- With the aid of CCD camera the location (depth) and position of the child can be determined.
- Using the blower fresh air is supplied to the child through hoses.
- Type of grasper and grasper arm is selected based up on the position of the child.
- Assembling the mechanical unit for the required depth.
- With the aid of both visualizing and mechanical unit the child can be grasped.
- After grasping, the child can be rescued.

- After the rescue, first aid is to be provided to the child by the medical team.

Testing

The whole system was going to be tested by using a child model (toy) in a real dry bore well.

- Initially the child model was made to trap inside the bore well (approximately to 15 feet depth).
- Then using the visualizing unit, the location and position of child model (toy) was determined.
- Using the blower, fresh air was supplied through the hoses.
- The grasping arm and the grasper were selected based upon the position of the child model (toy).
- Assembling the mechanical unit for the required depth and child model (toy) was recovered.
- The total time taken for the rescuing operation was one hour.

APPLICATION

His project can be implemented in rescue operations and also in industrial areas such as mining, military, shipping etc.It is also used for the picking and placing of objects based on the arm design.It is a low cost Robot used to moniter the changes of diffferent parameters in the industrial pipes.

REFERENCES

[1] Shukla Shubhendu S, Jaiswal Vijay, Applicability of Artificial Intelligence in Different Fields of Life, InternationalJournal of Scientific Engineering and Research, pp. 28-35, 2013.

[2] R.M.Voyles, S. Povilus, R. Mangharam ,Kang Li. RecoNode: A Reconf gurable Node for Heterogeneous Multi-Robot Search and Rescue. Real-Time and Embedded Systems Lab (mLAB), 2010.

[3] C. Kemp, A. Edsinger and E. Torres-jara. 2007, Challenges for Robot Manipulation in Human Environments.IEEE Robotics & Automation Magazine, 2007 pp 20-29.

[4] Birk, A and Carpin,S., 2006., Rescue Robotics - a crucial milestone on the road to autonomous systems., Advanced Robotics Journal., 20(5)., pp 1-11.

[5] Chen, H., Chang,L., 2012, Design and Implementation of a ZigBee-Based Wireless Automatic Meter Reading System Przegląd Elektrotechniczny (Electrical Review), pp 64-68

[6] www.sparktherise.com

[7] www.mobiusconsulting.com

[8] www.wikipedia.com

[9] www.microchip.com

[10] www.allaboutcircuits.com

[11] www.howstuffworks.com

[12] www.delnet.com

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