

Borewell Rescue Robot Using Bluetooth

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ABSTRACT

The aim of this proposed system is to give an innovative concept to handle the bore well rescue Operations without human intervention and to inspect any type of leakage in the pipe. Normal operation of child rescue is done by using big machines with large manpower involvement. It takes more time to rescue a child from the bore well and to check any kind of irregularities in pipe. The three finger mechanisms are employed in this design to go inside the pipe. The three finger mechanism is circumferentially and symmetrically spaced out 120o apart. The robot is made adaptive so that it can adjust its three finger mechanism according to the pipeline dimensions. This structural design makes it possible to have the adaptation to the diameter of pipe and to have adjustable attractive force towards the walls of pipe. In this proposed system, the condition of trapped child is captured with USB Camera and monitored on laptop. LM-35 Temperature Sensor is interfaced with Arduino to sense the temperature inside the bore well and to display it on terminal display on laptop. The robot structure consists of power supply, development board of Arduino and gear motors. Adding a claw or gripper was the initial hurdle for which additional power supply and DC gear motor were needed. The proposed system is intended to reduce the risk involved during the child rescue operation by analysing the situation and also to provide an option detect any leakage inside the pipe.

Keywords : Robot, Bluetooth, Arduino.

I. INTRODUCTION

The bore wells are sometimes left open without any proper covering. The rescue operations in many cases are more risky even to the rescue team members. A small delay in this whole process may reduce the chances of saving the child. If the area near the bore hole contains rocks below certain depth, chances of saving the child becomes very less. Whatever may be the case the rate of success depends on lot of factors like time taken for transportation of machinery to the situation, human resources and mainly the response time of various government organizations. At present there is no proper method for dealing with this

problem. The holes drugged for the bore wells are around 700 ft deep.

A bore well is a well of 4.5-12 in diameter drilled into the earth for retrieving water. This bore wells are mostly for commercial/industrial purposes. A bore well is cased in the region of loose sub soil strata open in hard rock or in crystalline rock. High grade PVC pipes are used for casing in bore wells. The depth of the bore well can vary from 150 feet to 1500 feet.

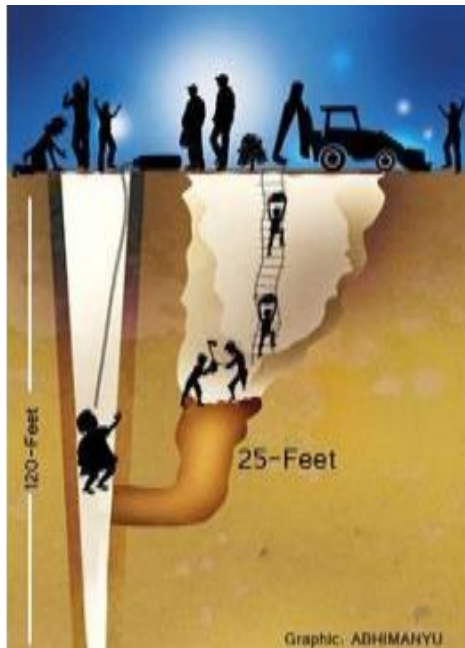


Fig1: Image of working for the baby rescue operation

II. EXISTING RESCUE METHODS

A. Parallel pit method

Now a day's robots are designed to help the human operators in the rescue mission. Rescue team normally follows the parallel pit process to save the child. First the team will find the depth of the child in the bore well by using a rope. Then earth moving vehicles are used to dig the parallel pit next to the bore hole. This particular step may take time. During this process the child may suffer due to lack of oxygen and the lack of visualization may turn the situation worst to the rescue team. In another method a light weight machine as shown in fig6 is sent inside the bore well pipe and holds the trapped body systematically. The robot is operated through a PC using wireless Zigbee technology. In some cases the rescuing robots are also used. Even though all these inventions and methods exist still there are only 25-30% chances of survival

III. LITERATURE SURVEY

The field of search and rescue robotics, while growing rapidly in this decade, is still relatively very harmful have been proved. Outside of controlled environments, humans have only performed

sophisticated manipulation tasks when operated for rescue operation. In normal rescue operation, a parallel pit is dug deep to achieve the child and adjacent holes are made to the walls of bore well. A common method used to find the depth of child is the use of rope. 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.

The alternative solution to this problem is the use of robotic systems which can move down the pipe and bring the subjected body out of it properly and safely. Robots have been very successful at manipulation in simulation and controlled environments. 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 whole 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. This is proposed system consist of 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 whole parallel to the bore-well. The remotely controlled robot will go down the bore well and perform the action of trapping baby outside the bore-well using 3 finger mechanisms. The 3 finger mechanism is controlled using laptop. We are also using temperature sensor to measure the temperature of the baby trapped surrounding.

IV. SYSTEM BLOCK DIAGRAM

The generalized block diagram of bore well rescue robot is shown as below. The block diagram consist

- Arduino
- Dc Motor
- Servo Motor
- DC Motor Driver
- Temperature Sensor
- O2 sensor
- Camera
- Bluetooth Module
- Power Supply

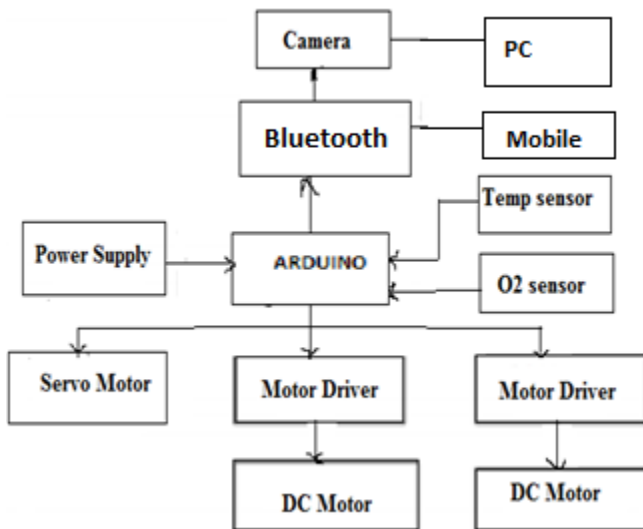


Fig2: Block Diagram of bore well rescue robot

The bluetooth is connected to the PC with serial port where we can give instructions to operate the robot when it is in the bore well[2]. Power supply of 12V is given to Arduino which is regulated to 12V by voltage regulator (7812). Bluetooth from the receiver will receive the instructions from transmitter and sends to the Arduino. Programmed to operate the robot is preinstalled in Arduino and is run from PC. From Arduino Dc motor drive circuit is connected and DC motors are instructed to go forward and reverse. We have 4 dc motor with 2 motor driver for movement of robotic arm.

Temperature sensor and gas sensor are used for sense the temperature and oxygen levels in bore well and display on PC. CCTV camera is used for monitoring the position of the robot with visual representation on

PC. Servomotor is used for the movement of rod with airbag.

Arduino used to controlling all the system. Robotic arms are used for holding the child by using the pulley child get out of from bore well.

The robot will perform the following steps for performing the task:

- The robot firstly goes down in the bore well pipe with the help of pulley which is controlled by one of the DC motor in the system.
- The video camera mounted on it gives the insight view of the position and location of the child. This video will be monitored on PC / laptop.
- The robot then grasps the target by contracting or expanding its gripper of arms according to the requirement.
- The sensing unit in system helps to provide information about levels of temperature and oxygen in the depths of the bore well.
- The robot holds the target tightly and brings it out of the bore well safely for bottom support safety air bag is provided.

V. ADVANTAGES AND APPLICATION

ADVANTAGES

- Since the child is rescued from the existing whole itself, the rescue time will be much lesser than the conventional time so that there is no need of digging the parallel hole beside the existing hole.
- High reliability
- Video surveillance.

APPLICATION

- As bore well child saver: - The main application of the machine is in the rescue operation of the child from the bore well.
- As pipe cleaning machine: - This machine can be used in pipe cleaning. It can drive through long pipes and with a rotary brush as an end effector fitted at front will serve the cleaning operation of dirty pipes. As the inside surface of the pipes may be wet and slippery the high quality wheels are capable to grip on the wet surface.
- As Pipe inspection machine:- In pipe manufacturing industries the final product is required to go through inspection process for quality control and prevent any leakage in pipes or any oil, gas pipe lines are to be surely free from any kind of leakage and damage as it may cause huge destruction if any kind of accidents takes place. This inspection machine loaded with Special inspection instruments like sensors, x-ray are capable to inspect pipes, thus can detect any kind of defect which may be the reason for a serious accidents.

VI. CONCLUSION

This is prototype for rescue operation who are falling in bore well. This is mostly useful technology used in our project with easy rescue operation. This is less time consuming and safe for all human being during such rescue operation.

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