

Child Rescue System from Borewell

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ABSTRACT: Nowadays a greater number of incidents happen on unclosed borewells which are turning into death pits. Many children fall into these borewells and losing their lives. The main purpose of borewells is to save lives, but these borewells being unclosed become problem to many children lives. In many cases the rescue operations are done by large machines and lot of manpower involvement. Usually this rescue operation is very lengthy, complicated, and very time taking processes. This paper presents a simple and effective method to save the child from the borewell. The existing method to save the child is to dig a parallel pit adjacent to the borewell. This process is hard, lengthy, and risky to rescue the trapped child. In the proposed technique the mechanical setup will be sent inside the borewell channel and moves its gripper arm accordance with the user command given. The total hardware system is interfaced with the PC and Arduino setup is used to control the mechanical set up.

Keywords: Method of Rescue, Rescue Operation

I. INTRODUCTION

India being an agricultural society, farmers depend mostly on groundwater for water system. With increasing population, lesser land of their own and urbanization more intense bore wells are borrowed for groundwater deliberation. After yielding the water, the borewells would leave uncovered, so that majority of children accidentally go near to the well and falls into it, which is the only reason behind these sad problems presently. In many cases the rescue operations are more difficult 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 borehole contains rocks, then the chances of saving the child becomes difficult. At present there is no proper method for solving this problem. The holes drugged for the borewells are around 700 ft deep. A bore well is a well of 4.5-12 in diameter drilled into the earth for water. This bore wells are mostly used for agricultural purpose and the depth of the bore well can vary from 150 feet to 1500 feet. The major problem faced by the people was water scarcity. Due to the water scarcity and depletion of underground water more borewells are drilled on the surface of earth and due to water scarcity, more borewells

are being sunk. In many areas, we can see the borewells are drilled and leaved as it is without any proper covering. This abandoned borewells become death pits and taking lives of many children. The main reason for occurring this type of accidents due to the carelessness and playful activities of the children. The holes drugged for the borewells are deep around 700 feet. In this case, the rescue of children from such deepest borewells is quite challenging and requires more time to do the rescue operation. The rescue of trapped children is not only difficult but also risky.

II. EXISTING TECHNIQUE

Now a days's robots are designed to help the human operators in the rescue mission. Usually the rescue team follows the parallel pit method to save the trapped child from borewell. If a child falls under the borewell and get trapped, first the rescue team find out at what depth the child was trapped and he/she alive or not. If the depth of the trapped child is less, then they will dig a parallel pit adjacent to the borewell. If the depth of trapped child is more then the parallel pit method does not work because it requires more manpower and consumes more time to do the rescue operation. Then by using earth moving vehicles rescue team will dig the parallel pit next to the bore hole. This process takes a lot of time. During this process, the child may suffer due to lack of oxygen and lack of visualization may turn the situation worst to the rescue team.

In the proposed method a lightweight machine sent inside the bore well pipe and holds the trapped body systematically. The robot is operated through a PC using wireless technology. In few cases the rescuing robots are also used. Even though all these inventions and methods exist still there are only 25-30% chances of survival.

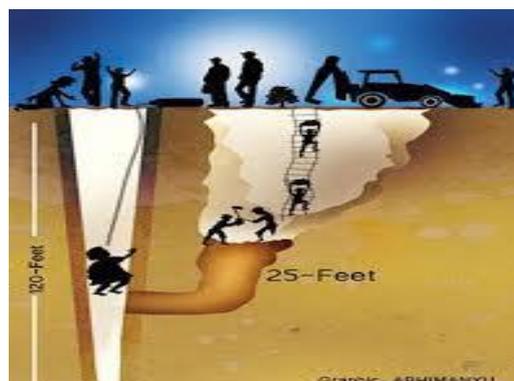


Fig. 1 Parallel Pit method

III. PROPOSED TECHNIQUE

Even though there are lot of methods existing to save the child from open borewell, still there is a need of simpler and more sophisticated rescue equipment. Here we are using the methodology called Arduino based child rescue system from borewell. In this system there is not necessary to dig the parallel pit adjacent to the bore well up to the depth of the child where they stuck. Hence this method does not depend on more human resources, and machinery. Therefore, the delay involved in this accumulation of resources may be reduced and there will be a less chance to save the child alive. This method consists of highly advanced microcontroller, well developed accurate hand gripping mechanism (capable of carrying loads about 20kg) and a visual feedback system using a high-resolution camera the project is implemented successfully.

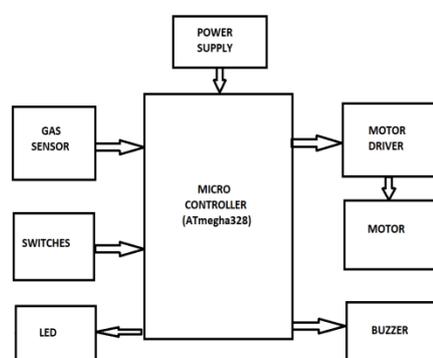


Fig.2 Block diagram of Proposed method

In this project gripper mechanism will be connected to the DC motors, with the help of switches we can operate the gripper mechanism up and down. All the parts of the system are controlled manually outside the borewell using 2 DPDT switches (1 for rotating DC motor and 2 for the opening and closing the claws). System is taken inside the borewell using pulley and rope mechanism to reach up to the child by watching through camera. Child live position is captured through camera. This system consists of two arms which is very soft so that it does not hurt the child while gripping. Then the system is rotated using DC motor according to the child position. Finally, the child is gripped from suitable position and then the system is taken out from the borewell by pulling the rope.

IV. COMPONENTS

1. PICK AND PLACE ARM

The pick and place mechanical arm or robotic arm is a human controlled based system that detects the object, picks the object from one particular place and places at the desired location. This gripper mechanism will be connected to the DC motors with the help of switches we can operate the mechanism.



Fig. 3 Pick and Place arm

2.SWITCHES

It is an electrical component that can connect and disconnect the conducting path in an electrical circuit. It is used to network multiple computers together. In this project with the help of switches we can operate the gripper mechanism. Switches are used to move the gripper mechanism up and down.

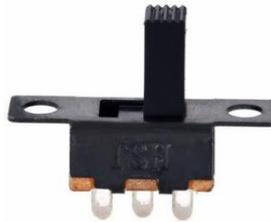


Fig. 4 switch

3. DC MOTOR

A DC motor in simple words is a device that converts direct current (electrical energy) into mechanical energy. It is a vital important for the Industry today.



Fig..5 Dc motor

4. GAS SENSOR (MQ2)

Gas sensor is used to detect the various gases such as H₂, LPG, methane etc. Here we are using MQ2 gas sensor to detect the harmful gases under the ground. MQ2 stands for the sensor having sensitivity towards gas.



Fig. 6 Gas sensor

5.BUZZER

It is also known as a beeper and it is an audio signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows.

Buzzer is used to get the beep sound.



Fig. 7 Buzzer

6.Motor Driver (L293DIC)

It can control the set of two DC motors simultaneously in any direction. The motor driver consists of L293D IC which has 16 pins. There are some advantages of motor driver such as, High level functionality, low power consumption, better performance and it is easy to operate.



Fig.8 Motor driver

7. MICROCONTROLLER(Atmega328p)

Microcontroller is the byproduct of the development of microprocessor with CPU and other peripherals and it is the brain of computer system. It is more reliable.

Features of Atmega328p:

- Low power consumption, High performance
- Contains 32KB flash memory, 2KB of SRAM.
- It is an 8-bit microcontroller based on AVC RISC architecture.
- It has 28 pins in which many pins of the chip have more than one function.

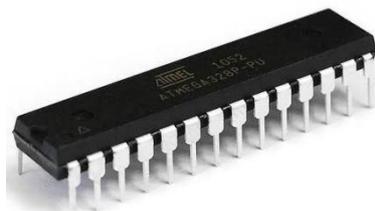


Fig. 9 microcontroller

V. ADVANTAGES

- Manually operation has been reduced to major extent.
- Less manpower required.
- High sensitivity
- Fast response
- Stable performance and long life
- Efficient and low-cost design
- Low power consumption
- Easily operable

VI. APPLICATIONS

- It can be implemented for large industries
- Used in fire services

- Used in industries to store the hazard materials under the ground.

VII. RESULT

The proposed system is tested with a test object (stuff doll) and observed the performance of the system and completed in very less time compared to traditional methods. The project has been designed keeping the possible practical issues in mind. The system can be made strong enough to sustain all possible loads. A high-resolution camera is used in the system to identify the position of the body inside the borewell. The gripper mechanism is operated by using switches to rotate the arm (up and down) and to open and close the grippers on the arm as shown in fig.

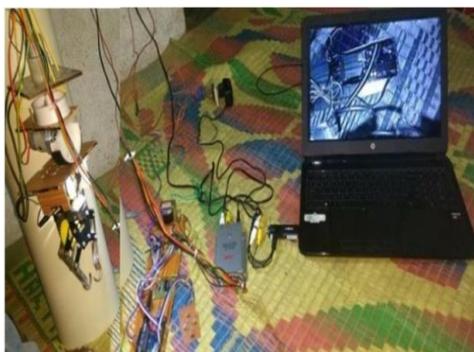


Fig. 10 Gripper mechanism and visual feedback from the camera

VIII. CONCLUSION

Child Rescue System is mainly designed to save the many lives of children who fall inside the borewell. In the past several years, lots of lives had been lost by falling into the borewells. The process of digging a pit adjacent to the borewell is very dangerous and time-consuming process. By using motors, arms, and advanced technology the project can be implemented successfully. This can be stated that the proposed system can save the lives of many children who fall into the bore well in future.

REFERENCES

- [1] “Design of a wireless Sensor Fusion System to analyze Conditions inside Bore Wells”, K. Sridhar 1•C. R. Hema2 • S. Deepa3 Published online: 12 April 2016 Springer Science

Business Media New York 2016 Wireless Pers Common (2017) 94:1951-1962 DOI 10.1007/s11277-016-3277-4.

[2] Kurukuti, Nish Mohit, Et A1. "A Novel Design of Robotic System for Rescue in Bore Well Accidents." 2016 International Conference on Robotics and Automation for Humanitarian Applications (Raha). IEEE, 2016.

[3] Sridhar, K.P., and C. R. Hema. "Design and Analysis of a Bore well Gripper System for Rescue." Arpn Journal of Engineering and Applied Sciences 10.9 (2015):4029-4035.

[4] V Venmathi, E Poorniya, S Sumathi," Borewell Rescue Robot, International Journal of Computer Applications, 1(3), 2015, 14-23.

[5] K Saran, S Vignesh, Marlon Jones Louis, "Bore-well Rescue Robot", International Journal of Research Aeronautical and Mechanical Engineering, 1(4), 2014, 61-80

[6] Gopinath, S., T. Devika, L. Manivannan and N. Suthanthira Vanitha "Rescue Child from bore well using Embedded System."

[7] Pal winder Kaur, Ravinder Kaur, Gurpreet Singh, "Pipeline Inspection and Bore Well Rescue Robot", International Journal of Research in Engineering and Technology, 2(5), 2014, 04-12.

[8] S. K, V. S and M. J. Louis, "Bore Well Rescue Robot, " International Journal of Research In Aeronautical And Mechanical Engineering, vol. 2, no. 4,pp.6180,, April, 2014.

[9] B Bharath, B Ruchitha Samuel, "Design and construction of rescue robot and pipeline Inspection using ZigBee", International Journal of Scientific Engineering and Research, 1(2), 2013, 42-49