

# Development of Child Rescue System Against Bore-Wells

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*ABSTRACT-* In present time, children fall in the Bore well due to the carelessness nature of the people in society. The currently available systems to save the child are less effective and costly too. Thus, the society is in need of a new technique which is more efficient and effective. In most cases reported so far, a parallel hole is dug and then horizontal path is made to reach the child. It is not only a time taking process, but also risky in various ways. The Borewells rescue system is capable of moving inside the same Borewells where the child has been trapped and performs various actions to save the child. CCTV camera is used to continuously monitor the child's condition. This system has a high-power LED which acts as a light source since light intensity inside the hole will be less. The advancement in the field of automation along with the mechanical design has a great impact on the society. This project includes series of process development from hand drawn sketches to computer generated design. The modern equipment's are implemented for various parts of the system since the system performs a life rescuing activity. The lightweight servomotors are implemented for the system's operations. Bore well rescue System is a human controlled computerized system embedded with additional safety devices.

**Keywords:** Integrated Camera, Mic, Video/Audio I/O, Arms

## I. INTRODUCTION

Bore-wells in India almost diminished the water problem in all areas (houses, agriculture and industries). Increasing demand and reduced ground water levels causes to drill bore-wells even deeper and bigger in size over time. In the year of 1970, the average bore-hole size is 2.5 inches, in 1980 it is 4 inches, in 1990 the size has been increased to 7 inches and in 21<sup>st</sup> century it is more than 14 inches. The drilling technology available has made no compromise in depth of a bore-wells to get water. However, there are no such standard rules in India like bore hole diameter, depth of the bore-well for drilling and sealing the dry bore-wells. In normal cases truck mounted driller, drills with a starting diameter of 4.5 inches. The size of the hole is also depending on geological structure of the area. In Rajasthan and Gujarat, the diameter can go up to 20 inches starting from 14 inches. 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. The field of search and rescue robotics, while growing rapidly in this decade, is still relatively new. 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. 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. 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. It will be a lightweight 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 Bluetooth 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.

## II. LITERATURE SURVEY

**Chen, H., Chang, L., Design and Implementation of a ZigBee-Based Wireless Automatic Meter Reading System Przegląd Elektrotechniczny (Electrical Review)**

Today's major problem faced by human society is water scarcity, which leads to a large number of bore wells being sunk. These bore wells in turn have started to take many innocent lives. Bores which yielded water and subsequently got depleted are left uncovered. A suitably strong cap of bright color to cover the mouth of the bore will avoid such accidents. To aid in such rescue

we have proposed a system. The equipment is designed to operate off the 12volt battery of the rescue vehicle. The remotely controlled robot will go down the bore well and perform the action. The objective of the project is to construct and design a bore well rescue robot with the balloon to lift the child. The robot is operated through PC using wireless ZIGBEE technology and using wireless camera.

**N. Suresh Kumar, Konjeti V K V L Pavan Kumar, G. Mahesh.**

This paper presents a proactive approach to prevent child fatalities at the umpteen open uncapped bore-wells in India, which is based on communications using Infra-Red signals. When the IR signal, placed two inches diametrically under the ground surface of bore-well, breaks due to any obstructing object, a buzzer starts sounding as an alert and at the same time, a stake that is kept a few feet lower in the bore-well closes the bore in order to prevent the object from falling deeper into the well. The solution presented in this paper is a simple and yet easily scalable and highly cost-effective solution utilizing the proven technology of Infra-red Signaling.

**Sumit Pandey, Sanjay Kumar Shah, Shreekant Sah, Chandan Kumar Mahto, A. Sathyanarayanawamy.**

This paper is based on rescuing infants who have fallen into the bore-well. An abundance child death reports have been reported so far. Due to scantiness of water level, bore well are dig to more depth. The basis of this project is to rescue the infant. The rescue is done by digging a parallel pit, which takes more than a day and even have not found a genuine result. The high point of this project is that the child will be rescued before it reaches high depth, which is based on communications using Infra-Red Signals. When the IR signal, placed two inches diametrically under the ground surface of bore-well, breaks due to any obstructing object, a buzzer starts sounding as an alert in mobile phone. After a stake that is kept a few feet lower in the bore-well, closes the bore in order to prevent the infants falling deeper into the well. These accidents are substantially found in agricultural bore-well. The various risks associated with the rescue of infants can be minimized using this system.

**P. Thangaraj, D. S. Gavaskar.**

In India past one decade, there have been several borewell accidents where especially children accidentally fall into open borewell holes. Many systems and mechanism were found to rescue the children from the hole. Resolving this idleness becomes critical as because of human interacts. The small delay in the rescue can affect the life of the children. The main objective of this survey is to find the various techniques and mechanism which is used in the rescue operation. From this survey we observed that the borewell data can be analyzed by using the sensors fusion and the robotic arm. The borewell using the sensor fusion will helps the rescue operation in short time period. The source of the paper is obtained from the various digital libraries. In this we analyzed the borewell accidents between the years 2006-2017. Based on criteria 12 articles is reviewed and brief by the various mechanisms were commercially. Behind the review 11 papers has been elucidate the system functionality and also solve the criteria-based analysis. From this we wrap up that most of the rescue operation is thrive because of the sensor fusion, robotic arm, wireless technology and IOT Techniques. Keywords Borewell, Camera, Child rescue, LCD, GSM, Microcontroller, Robot arm, Sensor fusion.

**Nitin Agarwal, Hitesh Singhal, Shobhit Yadav, Shubham Tyagi, Vishaldeep Pathak.**

Human life is precious. Our bore well child recue system is a significant attempt to save the life of the victim of bore well accidents. Besides this, the unique capability of climbing through vertical and inclined pipes makes wide scope of application for this machine in manufacturing industries and other relevant fields. In the current design of bore well child saver machine has been made to suit every possible situation may occur in rescuing operation. Further, we would like to conclude that with the help of our project, we would be able to rescue the child safely within short period of time.

P. Sumathi, A. Monika, R. Dhanashree

In India for past few days people are facing a distressed cruel situation like child have fell in the bore well and struck in the hole which is uncovered and getting trapped. Rescue of trapped child from bore well is very risky and difficult process when compared to the other accidents. It takes more than a day to save the child. Here, in this paper the child who is stuck inside the hole is to be saved by the clipper which pick and place the child with the help of remote controller. The clipper is left inside manually by the rope tied up at its hands. In this alternative scenario there will not be any requirements of digging hole parallel to the bore well. The child can be saved within a short period of time without any difficulties.

### III. METHODOLOGY

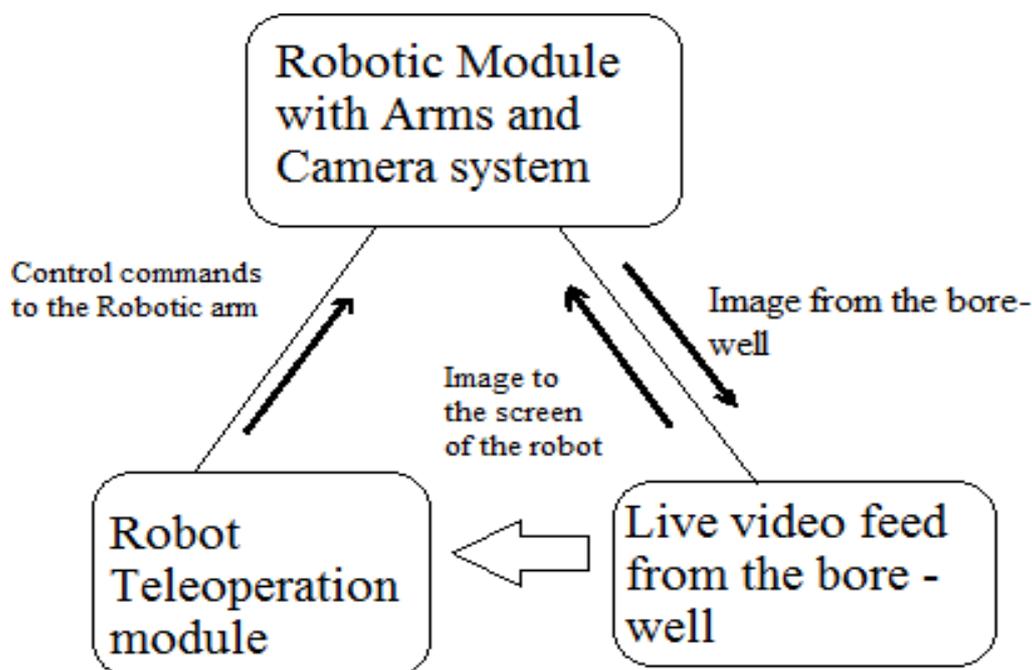


Fig 1. Block Diagram of the designed system

### IV. WORKING PRINCIPLE

All the parts of the system are controlled manually outside the Borewells using 2 DPDT Switches (1 for rotating DC motor clockwise and anticlockwise, 2 for the opening and closing of the claws). System is taken inside the Borewells using pulley and rope mechanism to reach up to the child by visualizing through camera A/V output. Child live position is captured through camera and communication is done with the child with the help of mic and an operational amplifier 7805. The harness of the system used in two arms is very soft so that it does not hurt the child while gripping. The system is rotated using DC motor according to the child position the child is gripped from suitable position and then the system is taken out from the Borewells by pulling the rope.

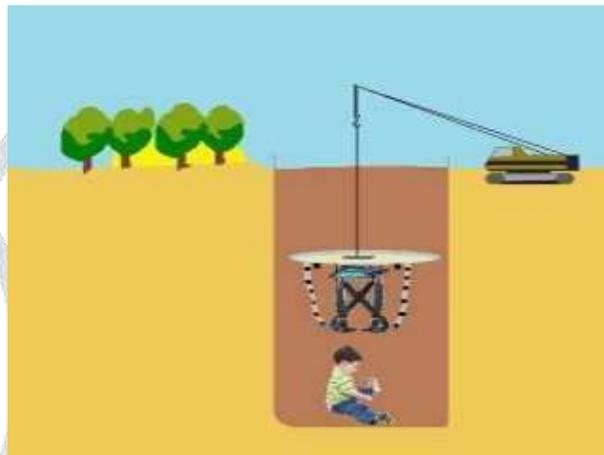
Hence, the child can be safely taken out from the Borewells using this mechanism.

#### COMPONENTS:

- Arduino
- IR Sensor
- DC Motor
- Driver Circuit
- Electromagnetic Relays
- Wi-Fi Module
- Rack and Pinion

- Sheet metal
- Grappling hook
- Pinhole Cameras
- Smartphone interface

Our proposed system consists of mainly two round plates. The full hardware system has been illustrated by the. A mechanical system will be attached to the higher plate which will try to release two linear actuation units which will hold the system in position by pushing the wall of the bore-well. Another mechanical gear system will be attached which will rotate the lower plate to get position it in plane with the victim. Two arms will be attached to the lower plate. Two high resolution cameras will be attached downwards in the lower position of the lower plate. The high-resolution cameras will provide the view of the well environment which will be highly helpful in telecom the two arms. As the bore well environment is a dark environment the system will be having lights which will provide enough lighting conditions for the operation of the system. The pneumatic arms will be having another two individual cameras for each arm which will publish the view of the arms. A chest mount harness will be attached with the system which will be highly essential in picking up the victim from the bore well.



**Fig.2. Previous Existing Method**

The systemic arms will be tele operated to attach the straps of harness around the victim. As from the upper mounted cameras we can only observe the upper view of the situation, the task will get complicated if the victim will not be cooperative or get senseless. As the system attaches the harness to the victim, the victim would be ready to pick up. As various commercial harness is available today we choose to use the chest harness to reduce the complexity of the task. A chest harness is capable of lifting a 15 yr. old boy easily. The chest harness lifting a boy is shown in Fig.2.

#### WORKING

- All the parts of the system are controlled manually outside the Borewells using 2 DPDT Switches (1 for rotating DC motor clockwise and anticlockwise, 2 for the opening and closing of the claws).
- System is taken inside the Borewells using pulley and rope mechanism to reach up to the child by visualizing through camera A/V output.
- Child live position is captured through camera and communication is done with the child with the help of mic and an operational amplifier 7805.
- The harness of the system used in two arms is very soft so that it do not hurt the child while gripping.
- The system is rotated using DC motor according to the child position The child is gripped from suitable position and then the system is taken out from the Borewells by pulling the rope.
- Hence, the child can be safely taken out from the Borewells using this mechanism.

#### V. RESULT

All the objectives had been fulfilled successfully and thus we are able to design a child rescue system to save live. child rescue system is designed with two arms, integrated camera, LED lights, audio and video. The system is capable of moving inside the Borewells from the same hole and perform the rescue operation. The digitally integrated camera helps to view the position of the child. There is a mic in the camera which helps to interact with the child. The photo of our project is shown in fig.3. Thus, the designed system is helpful in saving the child trapped inside Borewells. It can replace all the old existing technology as it is safer and takes very less time. Saving a life is a big task and we have

successfully made this project in order to rescue child in future in lesser time. The existing technology was very much costlier than the cost of our project. We have used the light weighted servo motors so that the system is not heavy and it is precise.

## VI. FUTURE SCOPE

In future we can use this project in several applications by adding additional components to this project. The structure is made strong enough to sustain all possible loads, though it can be flexible at the same time to adjust wider range of bore diameter and any change in the diameter of bore. we can send these robots to dangerous zones by connecting smoke sensor to the robot we can get the information related concentration of smoke or gases in respective fields and sensor will detect the poisonous gas and it gives information to the Microcontroller and microcontroller gives the information to the transceiver from that we can get the data on the PC side.

## VII. CONCLUSION

Human life is precious. Our bore well child rescue system is a significant attempt to save the life of the victim of bore well accidents. Besides this, the unique capability of climbing through vertical and inclined pipes makes wide scope of application for this machine in manufacturing industries and other relevant fields. In the current design of bore well child saver machine has been made to suit every possible situation may occur in rescuing operation. Further, we would like to conclude that with the help of our project, we would be able to rescue the child safely within short period of time.

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