



Smart Borewell Child Rescue System through Wireless Monitoring

¹B.Hemalatha, ²Somavarapu Lokisha, ³Chillakuru Kamalakar Reddy,
⁴Gandu Jagadeesh, ⁵Nakkala Guruteja ⁶M. Gunanjali

¹Assistant Professor, Department of ECE, Siddharth Institute of Engineering and Technology, Puttur, Andhra Pradesh, India.

²³⁴⁵⁶B.tech Student, Department of ECE, Siddharth Institute of Engineering and Technology, Puttur, Andhra Pradesh, India..

Abstract: - In India, there have been several accidents of children falling into abandoned bore wells which are left uncovered. 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. Children with less awareness of their surroundings get trapped by the bore wells, accidentally. Although the rescue operation is ongoing, many factors, such as lack of sufficient oxygen, rising temperature, cause another risk for child in such depth. Rescuing children from such situations is a challenging task. Without major risks, the proposed system rescues the child. Children involuntarily fall into the bore well which yielded water and left revealed. 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. The process of saving the trapped child into bore well is relatively challenging. The currently available systems to save the children are less effective and costly too. At present, the rescuing task is accomplished by the method for burrowing a parallel pit close to the bore well with the same depth of the child and makes a passage that interfaces with the two wells. It takes about 30 hours to burrow the new well. By that period the child would have passed on. It consists of rescuing system module. The safeguarding instrument is about a robot gadget fit for moving underneath the bore well bolstered with their user directions, equipped with robot arm. The robot arm is utilized to save the child. Saving child using pick and place robotic arm.

Index Terms – Robotic Arm, DC Metal Gear Motor, Bore Well, Arduino UNO etc.

1. INTRODUCTION

In present scenario there have been several incidents reported on abandoned borewells which are turning in to death wells. Many innocent children are being trapped into these borewells and losing their lives. The actual purpose of borewells is to save lives, but these borewells in turn have started taking many innocent lives. In several cases the rescue operations are done by big machines and lot of man power involvement. Usually these rescue operation are very lengthy, complicated and very time taking processes. This project presents a simple and effective method to rescue the child from the borewell. The traditional way to rescue the child is to dig a parallel pit to adjacent to the bore well. This method is difficult, lengthy and also risky to rescue the trapped child.

The expected number of wells and bore wells in India is now around twenty-seven million, with bore wells accounting for more than 50 percent. Growing water scarcity is being standard as the most important problem in India. Since the water level is decreasing day by day so more number of people are affected. Bore wells are constructed to fulfill the needs. These bore wells are left unclosed after finding that ground water is not abundant in the place. Bores yielded water and subsequently got depleted are left uncovered. The bore wells in turn have started to take many innocent lives. Small children without noticing the bore well slip inside and get trapped. There is no proper technique to rescue method for

such accidents. In most cases a parallel hole is dug up and then a horizontal path is made to reach to the baby. It takes nearly 30 hours to dig the parallel pit, by that time the child would have died. It is a time taking process, and also risky in various ways. Moreover, it requires lots of energy and expensive resources which are not easily available everywhere. There is possibility of injuries to the child inside the well. In most of the cases the child rescue operation was ended with failure. To lift the child out the narrow confines of the bore well is also not very easy. In some other methods a kind of hooks and grapes is employed to hold the child's clothes and body. This may cause wound on the body of the child.. The most common thing in those incidents was a fact of lack of technology. This didn't stopped hear yet.



Fig. 1. Image of a bore-well .Image taken during the rescue operation

Many developments has been introduced in an science and technology, which brings an lot of improvement in science and it leads to an development of an country, on the other side the major problem faced by an all is an water scarcity. The level of water become down, so many holes has been dugged and left uncovered properly. Recently in a Punjab the accident has occurred due to the carelessness and improper coverage of a hole, 3 years old child has been fell into a bore well, and after a long time child has been rescued. The time taken for an rescue process may takes about more than 3 days .The main cause for an death is that an rescue process it takes more time ,and an oxygen that is present inside an hole is insufficient, and presence of many toxic gases inside an bore well leads to an death pits of many children. Recently, in Tamilnadu an 2 years old child surjith has been fell into a bore well which is left uncovered properly, he has been fallen due to the play full activities and the carelessness of the parents. They try to rescue a child from a hole by manual process but they couldn't adopt the technology. No more equipment were available still now for rescue process .so they use of an big machines for an rescue process .The time taken to bring these equipments takes More than one day. They tries to rescue a child manually, the level of a child has gone down. So they use of a new Technology, by paralleling digging a horizontal hole and by rescuing the child. While drilling a parallel hole and vibrations causes ground quakes and disturbs the child. The hole is fully covered with sand which leads to a death of a child inside a hole In order to overcome this problem, we are adopting a new Technology "IMPLEMENTATION OF SAFE CHILD RESCUE SYSTEM FROM A BOREWELL USING ARDUINO". The main aim is to achieve a 100% successful implementation and rescue process .The child is rescued safety without an major injury. The time is taken up for a rescue process is lesser than conventional ones.

The organizational framework of this study divides the research work in the different sections. The Literature survey is presented in section 2. Further, in section 3 shown Existing System is discussed and in section 4 shown in proposed system, In section 5 Experimental Results work is shown. Conclusion and future work are presented by last sections 6.

2. LITERATURE SURVEY

Sakhale et al (2015) designed a machine to rescue a child from the bore well. The robotic machine operates at 12 volt battery and controlled by a remote system. This system is supported by a gripped tyre and rope pulley drive and essential components. The infrared waterproof CCD camera and high resolution monitor are used for visualizing the situation inside the bore well. This machine goes down into the bore well and holds the trapped body systematically.

Palwinderkaur et al (2014) described the rescuing a trapped child from the bore well without human intervention. In this rescuing process, the robot consists of gear motor, camera, and a sensor. USB camera is connected to the monitor of PC. The temperature sensor is used to sense the temperature in the bore well. The robotic system is designed with wheeled leg mechanism. This mechanism helps the robot go inside the bore well and the legs are circumferentially and symmetrically spaced out apart.

Bharathi et al (2013) described designing a robot for rescuing a trapped body from bore well. The rescuing robot is fully operated through PC by using the Zigbee technology This Zigbee module provides a control of sensor and control system. It is a bi directional wireless technology of short distance. Microcontroller is a device used to control the whole device. This robot is operated by servo motor. In this robot camera, LED lights are provided to visualize the situation.

John Jose Pattery et al (2017) described the facility of reusing a trapped child. This system consists of motors, gear mechanism, lifting rod, and air pump. First, motor is placed with gear mechanism and arranged at 120 degree from each other. The second motor is placed below the plate, and it turns the bottom shaft by 360 degrees. The third motor is used to adjust the lifting rod. The fourth motor helps to lift the rod screw its way through the gap towards the bottom of the child. The end of the lifting rod is fixed with air bladder. It is operated through air pump.

The total system is lifted out of the well using rope. Manish Raj et al (2017) described the rescuing robot using pneumatic system. This method consists of pneumatic and telecommunication systems. In this robotic system, the pneumatic arm is placed in the bottom of the system. The telecommunication system would also be attached to the robot for communicating with the child.

Saran et al (2014) designed a human-controlled computerized robot. This robot is used to rescue the child from bore well. It consists of servo motor, and safety balloon. The servo motor is used to hold the child. The safety balloon is used to hold the child and provides an additional safety to the child.

Satyaprasad Tadavarthy et al (2014) designed the rescuing robot consisting of 3 wheels with rubber grip and robotic arms. The wheels are connected with motor having spring suspension mechanism. The rescuing robot enters into the bore hole, and then the wheels will exactly fit to the walls of the hole which make the robot to move inside down without any sliding. This type of robot is used to pick up the baby from the borehole.

3. EXISTING SYSTEM

In existing system shown in fig.2 Rescue a child trapped from a well is a very dangerous and difficult operation compared to other accidents. With existing methods, it takes more than a day to save a child. There are so many remedies, but most fail. Over the past few days, parallel holes have been dug to rescue fallen victims, a long process. Recently, handheld robots have been developed to save children, but they also have some drawbacks. It cannot hold the complete body while lifting up.

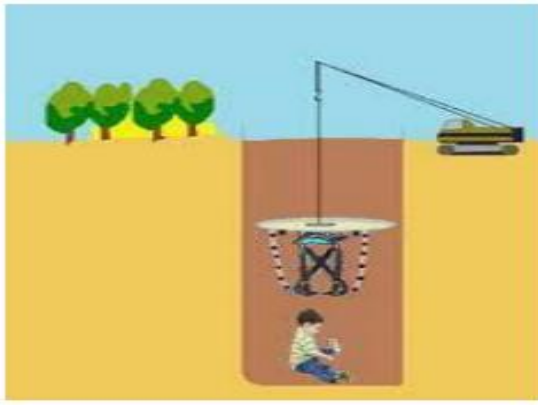


Fig.2: Diagram of Existing System

4. PROPOSED SYSTEM

In the proposed method this paper presents the implementation of a safe child rescue system from a bore well using Arduino microcontroller, ultrasonic sensor, Bluetooth, motor driver, DC motor, motor driver, and robotic arm. The system is designed to detect the presence of a child in a bore well using an ultrasonic sensor and send a signal to the Arduino microcontroller. The Arduino then activates the DC motor through the motor driver to rotate the robotic arm. The robotic arm, equipped with a hook, descends into the bore well and lifts the child to safety. The system can also be controlled remotely via Bluetooth using a smartphone. The implementation of this system offers an effective and efficient solution for rescuing children from bore wells, reducing the risk of injury or death caused by such accidents.

A. Block Diagram

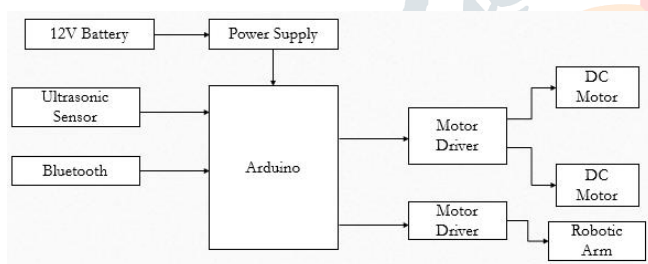


Fig.3: Block Diagram

The safe child rescue system from a bore well using Arduino consists of several components: the Arduino microcontroller, ultrasonic sensor, Bluetooth, motor driver, DC motor, motor driver, and robotic arm. The following is the step-by-step operation of the system:

Detection of a child in the bore well: The ultrasonic sensor is placed at the top of the bore well, which detects the presence of a child in the well. The sensor sends a signal to the Arduino microcontroller if it detects the presence of an object within a certain distance range.

Activation of the DC motor: Upon receiving the signal from the ultrasonic sensor, the Arduino microcontroller activates the DC motor through the motor driver. The DC motor rotates the robotic arm.

Descent of the robotic arm: The robotic arm, which is equipped with a hook, descends into the bore well. The hook latches onto the child.

Lifting of the child: The DC motor continues to rotate, lifting the robotic arm and the child to safety. **Remote control:** The system can also be controlled remotely via Bluetooth using a smart phone. The user can send commands

to the Arduino microcontroller to activate the DC motor and control the robotic arm.

B. Hardware Used

1. Arduino Uno

Arduino Uno shown in figure is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller shown in fig.2.



Fig.4: Arduino Micro Controller

2. Ultrasonic Sensor

Ultrasonic transducer is a device which converts some other energy into ultrasonic vibrations. It is made up of an active element, a backing and wear plate. The piezoelectric or single crystal material can be used as an active element which converts the electrical energy into ultrasonic energy. The ultrasonic waves are sound waves whose frequencies are higher than those of waves which are audible to human ear. It sends electrical signals to the object and once when it strikes the object then it reverts to the transducer. In the proposed system it is mainly used for the social distancing in the supermarkets or malls..



Fig.5 Ultrasonic Sensor

3. DC Motor

DC MOTOR DC motors are widely used, inexpensive, small and powerful for their size. They are most easy to control. One DC motor requires only two signals for its operation. They are non-polarized, means you can reverse the voltage without any damage to motor. DC motors have +ve and - ve leads. Connecting them to a DC voltage source moves motor in one direction (clockwise) and by reversing the polarity, the DC motor will move in opposite direction (counter clockwise). The maximum speed of DC motor is specified in rpm (rotation per minute). It has two rpms: no load and loaded. The rpm is reduces when moving a load or decreases when load increases. Shown in figure 4.



Fig.6: DC Motor

4. Power Supply

Power Supply shown in figure 6. The system is powered by a battery source of 9 V that is connected to the input pin of voltage regulator (L7805) to get a proper output voltage at the output pin of voltage regulator equal to 5 V or to step down the voltage from 9 V to 5 V, which is required for Arduino microcontroller, one RFID readers and RFID Cards.



Fig.6: Power Supply

5. 12 V Battery

Twelve-volt batteries shown in fig.7 are commonly used in RV, boat, and other automobile systems. From a technical perspective, a battery uses one or more cells to allow a chemical reaction creating the flow of electrons in a circuit. Batteries do not create energy or power on their own.



Fig.7: 12 V Battery

6. Motor Driver

Motor driver takes the low-current signal from the controller circuit and amps it up into a high-current signal, to correctly drive the motor. It basically controls a high-current signal using a low-current signal. There are different types of motor drivers available in the market, in the form of ICs. The driver device shown in fig.8.



Fig.8: Motor Driver

7. Bluetooth

Bluetooth shown in fig.9: is a standard used in links of radio of short scope, destined to replace wired connections between electronic devices like cellular telephones, Personal Digital Assistants (PDA), computers, and many other devices.

Bluetooth technology can be used at home, in the office, in the car, etc. This technology allows to the users instantaneous connections of voice and information between several devices in real time. The way of transmission used assures protection against interferences and safety in the sending of information.



Fig.9: Bluetooth Module

C. Software Used:

1. ARDUINO IDE

Arduino IDE Arduino IDE is open source software that makes to write the code in easy manner and helps to upload it into the Arduino board and the uploaded code contains the program that describes the working of the process. The main advantage is the software can be used in any Arduino board. The Arduino can control and interact with a wide variety of sensors like temperature, accelerometer and heart beat sensor.

5. EXPERIMENTAL RESULTS

The experimental Setup shown in below figure 10. The system is designed to detect the presence of a child in a bore well using an ultrasonic sensor and send a signal to the Arduino microcontroller. The Arduino then activates the DC motor through the motor driver to rotate the robotic arm.

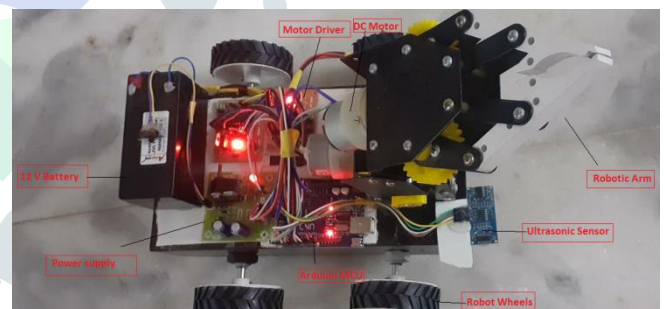


Fig.10 Hardware kit

In the proposed system, it consists of ultrasonic sensor and robotic arm. These two modules plays important role in the proposed system. The ultrasonic sensor helps to measure the distance of child. That is how much deep the child is. This will help the rescue team by understand the distance of child. The arm module will pick the child from bore well. This robotic arm will help to save the child. Arduino UNO is the main controlling part of this proposed borewell rescue system. Apart from Ardino UNO, ultrasonic sensor and robotic arm dc motor and dc motor drive helps in the movements of robotic arm and Bluetooth helps in controlling robotic arm using android phone.

On turning ON the power supply, the full operation is using the Bluetooth that is serial communication. If we want to detect the child distance from the starting point of well or as the robotic arm approaching, we can send a variable (say "t") serially to measure the distance from child. We can move the

robotic arm upwards, downwards, close and open the robotic arm.

6. 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. In the current design of bore well child saver machine has been made to suit every possible situation may occur in rescuing operation. The project is mainly designed to save many lives of children who fall inside the bore well. In the past 10 years, lots of lives had been lost by falling in to the bore well because digging a pit beside the borewell is very tedious and time consuming process. By using bigger motors, arms and advanced technology this project can be implemented successfully. This can be concluded that the proposed system can retain the lives of many children who fall into the bore well in future in short time. The project work "Smart Borewell Child Rescue System Through Wireless Monitoring" is designed and developed successfully. For the demonstration purpose, a prototype module is constructed; and the results are found to be satisfactory. Since it is a prototype module, a simple module is constructed, which can be used save lives of the children falling into the borewell in quick time.

Future Scope

In future The current design of the system can be further improved by adding more features to it. For example, the system can be made more efficient by using more powerful motors or by increasing the range of the ultrasonic sensor. The system can be used not only for rescuing children from bore wells but also for other applications such as detecting and rescuing animals that may fall into wells or pits.

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