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ARDUINO BASED CHILD RESCUE SYSTEM FROM BOREWELLS

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ABSTRACT

In recent days, ndia has witnessed distressing incidents where children have fallen into uncovered bore wells, becoming trapped inside. Rescuing a child from a bore wells, becoming trapped inside. Rescuing a child from a bore well is a highly risky and challenging process, often more complex than other types of accidents. Current rescue systems are both costly and inefficient, typically taking more than a day to save the child. This proposed solution involves using a clipper controlled remotely to pick up and safely retrieve the child from the bore well. The clipper is manually lowered into the well using a rope attached to it. Unlike traditional methods, this approach eliminates the need to dig a parallel hole for the rescue. Additionally, a camera is affixed to the clipper, allowing real-time monitoring of the child's condition and position inside the well.

I.INTRODUCTION

In today's world, water scarcity is a growing concern, and uncovered bore wells pose an additional danger, particularly for small children who may accidentally fall into them while playing. These accidents often occur due to a lack of attention, leading to children getting trapped in bore wells. Current rescue methods often result in failure, and many victims are either not rescued in time or suffer injuries.

To address this, we are developing a lightweight robotic system called the "Child Rescue System in Open Bore-Well" to systematically extract trapped individuals without the need to dig a parallel hole. This robot, equipped with a cable and gear assembly for support, can be easily inserted into the bore well and controlled remotely. The system uses advanced robotic control techniques and avoids many of the complications associated with traditional rescue methods.

Unlike existing methods, which are time-consuming and costly, this robotic solution is designed to save lives more quickly, efficiently, and safely. The robot's functionality makes it well-suited for confined spaces, and its ability to maneuver inside bore wells offers a practical solution to a problem that has historically been difficult and dangerous to resolve. By significantly reducing the time required for rescue, this system provides a safer alternative and improves the chances of saving the trapped child.

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II.LITERATURE SURVEY

For finalizing objective of our project work we have reviewed following research papers majorly being related with the technology which we have used in our project work "Child Rescue System from Open Borewells", apart from books and websites.

1.Sumit Pandey. This project focuses on rescuing infants who have fallen into bore wells, a serious issue given the numerous reports of child fatalities. As water levels diminish, bore wells are drilled to greater depths, increasing the risk of accidents. Traditionally, rescuing a child involves digging a parallel pit, a process that can take over a day and often lacks effective results.

The key feature of this project is its ability to rescue the child before they descend too deep. The system uses Infra-Red (IR) signals for communication. An IR sensor, placed just two inches below the borewell surface, detects any obstruction. If the signal is interrupted, indicating the presence of an object or person, a buzzer triggers an alert to a mobile phone. Additionally, a stake positioned a few feet below the surface automatically closes off the borewell to prevent further descent. This approach addresses accidents commonly occurring in agricultural borewells, aiming to improve the chances of a successful rescue.

1. Prof. Chandra Kumar H S, discuss the tragic incidents where children fall in to uncovered, abandoned bore wells, which have become death traps for many. These uncovered bore wells, which have claimed several innocent lives, and rescuing trapped children from such situations is a highly complex process, often requiring large machinery and significant manpower. This paper introduces a new design aimed at preventing such accidents and rescuing child who fall into bore wells. The system features a sensor placed at the top of the bore well, which detects if a child has fallen in. Upon detection, an automatic horizontal closure positioned at a depth of about 3 feet is trigged to close, preventing the child from falling further.

2. M R Chaitra, explains the challenges of rescuing children who fall into uncovered, abandoned bore wells, a problem that has become increasingly common. Traditional rescue operations typically involve digging a parallel pit near the bore well, which is not only difficult but also risky and time-consuming. To address this, a robotic system is proposed that utilizes pneumatic arms to attach a harness to the child, allowing for safe retrieval. The system also includes a teleconferencing feature to enable communication with the trapped child.

The mechanical system is designed to navigate the bore well based on user commands sent to the Arduino controller, which manages the movement. The hardware is connected to a PC to control the DC motor and ensure the robot can safely extract the

child in less time than conventional methods. Key components of this system include an IP camera, Bluetooth technology, and a Microcontroller 8051 (Newton), all working together to facilitate the rescue process.

5.A Sumalatha, highlights the growing issue of abandoned bore wells turning into death traps, with many children tragically falling into these wells and losing their lives. Originally intended to save lives, bore wells have unfortunately become hazards, with rescue operations often requiring large machinery and significant manpower. These operations are usually complex, time-consuming, and difficult to carry out.

This project proposes a simpler and more efficient approach for rescuing children trapped in borewells. Traditionally, the method involves digging a parallel pit beside the borewell, a process that is not only lengthy but also risky. In contrast, the proposed solution uses a mechanical system that moves inside the borewell and operates a gripper arm, controlled by user commands. The hardware is connected to a PC, and the mechanical setup is controlled through an Arduino system, streamlining the rescue process.

4.Jayasudha.M, Saravanan, Water scarcity is a major issue, prompting many to drill bore wells, especially in a country where most people rely on agriculture and irrigation. Unfortunately, children sometimes fall into uncovered bore wells, creating a dangerous situation.

Rescuing a child from a bore well is a challenging task. Currently, the typical method involves digging a parallel pit next to the bore well, matching the depth of the child, and creating a tunnel to connect the two wells. This process is labor-intensive and time-consuming.

To address this problem more effectively, a specially designed robot has been developed. This robot is equipped with a webcam to monitor the trapped child and rescue them efficiently. The system comprises two main modules: the rescue system and the protection system. The protection system includes an airbag placed at the bottom of the borewell, which helps safely recover the child using a gripper mechanism. This approach aims to expedite the rescue process and ensure the child's safety.

3.6. S. Gopinath, discusses the recovery process for children who have fallen into borewells. Due to drought and the depletion of groundwater, more borewells are being drilled, and when the groundwater dries up or becomes polluted, the casing pipes and motors are often removed without properly sealing the borewells. This creates dangerous conditions where children playing nearby may accidentally fall in, often leading to tragic outcomes.

The proposed system aims to safely rescue children from borewells without putting the victim in further danger. Sensors are integrated with an ARM8 processor, and a camera with an LED light is used to provide visuals of the child, assisting the control unit in operating the system. A vacuum cup is employed to adjust the child's position. The robot’s arm is

controlled by a stepper motor, and once the child is securely grasped, a BLDC motor is used to lift the child out of the bore well. Data transfer between the rescue team on the surface and the system in the bore well is managed by ZigBee technology. The simulation results, generated using Keil C software, are supported by hardware implementation, and the outcomes are displayed

III.EXISTING SYSTEM

Bore wells that successfully reach water do not pose a threat, as they are properly sealed with casing after motors are installed. However, bore wells that fail to reach water at maximum depths are often left uncovered and abandoned, referred to as dry or dead bore wells. These uncapped wells present a significant danger, particularly to children, and incidents of bore-well-related child deaths are increasing. Traditionally, the method used to rescue children who fall into these wells is manual, involving the digging of a large hole beside the bore well to the depth where the child is trapped. This process requires significant human resources, including military and paramedical personnel, as well as heavy machinery like JCBs and tractors. Any delay in gathering these resources can drastically reduce the chances of rescuing the child alive.

If the ground near the bore well contains rocks below a certain depth, and especially if the rocks are large, the situation becomes even more difficult, often requiring the entire rescue process to be restarted at a different location. In such cases, the likelihood of saving the child decreases further. The success of the rescue largely depends on several factors, including the availability of machinery, the time taken to transport equipment to the site, the availability of personnel, and, most importantly, the response time of government agencies. According to the 2011 NCRB report, India sees an average of five deaths per day due to abandoned bore wells.

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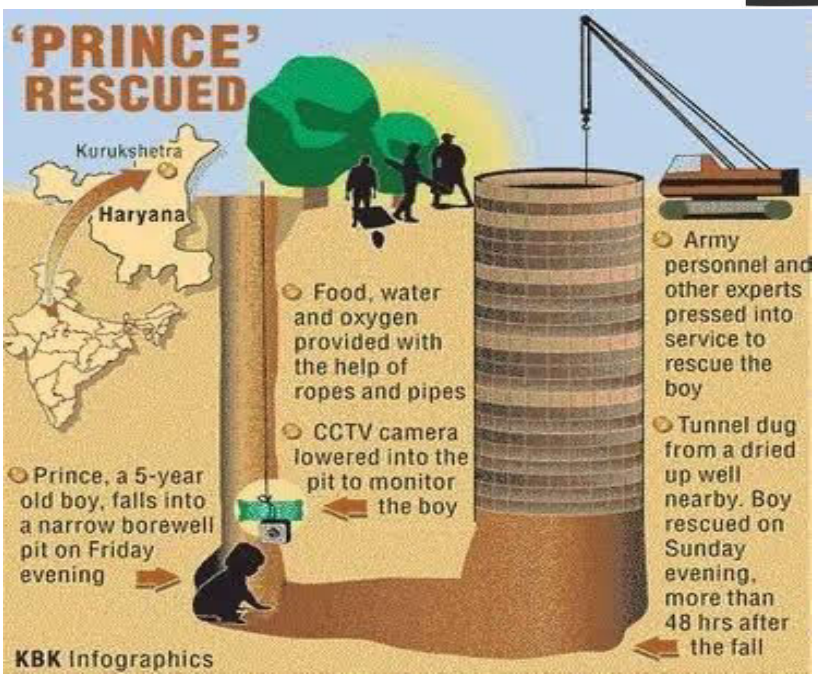
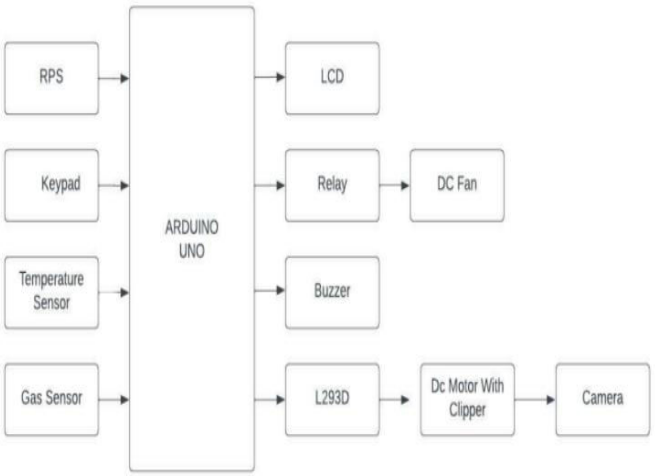


IV.PROPOSED SYSTEM

In this project, the child trapped inside the borewell is rescued using a clipper mechanism that carefully lifts the child, controlled remotely. The clipper is manually lowered into the borewell using a rope attached to it. Unlike traditional methods, this approach eliminates the need for digging a parallel hole next to the borewell. A camera is attached to the clipper, providing real-time visuals of the child's condition for monitoring purposes.

Despite the availability of various rescue techniques for saving children from open borewells, there remains a need for simpler and more efficient solutions. This project utilizes an Arduino-based child rescue system, which does not require the digging of a parallel pit. This approach significantly reduces the need for extensive manpower and heavy machinery. The system incorporates an advanced microcontroller and a highly precise hand-gripping mechanism to safely retrieve the child from the borewell



Block diagram

V.WORKING PRINCIPLE

The Arduino UNO is a microcontroller board based on the ATMEGA328P chip. It features 14 digital input/output pins, 6 of which can be used as PWM outputs, and 6 analog input pins. It also includes a 16 MHz ceramic resonator, a

USB connector for programming, a power jack, an ICSP header, and a reset button. The Arduino UNO operates with various input and output devices. In the diagram, the input devices are positioned on the left side.

The input devices include an RPS, keyboard, temperature sensor, and gas detector. The RPS (Regulated Power Supply) provides the necessary input power to operate the circuit. The temperature sensor detects changes in voltage across the diode terminals, indicating a rise in temperature as the voltage increases. The gas detector, specifically the MQ4 sensor, is used to detect smoke or gas, triggering a signal to activate a fire alarm or buzzer in the event of hazardous levels. Whenever it detects smoke also can be displayed on LCD, which ionizes the air and causes current to flow between the plates. When smoke enters the chamber, it disrupts the flow of ions, thus reducing flow of current and activates buzzer. The Arduino UNO is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller. Simply connect it to a computer with a USB cable or power, it with an AC-to-DC adapter or battery to get started.

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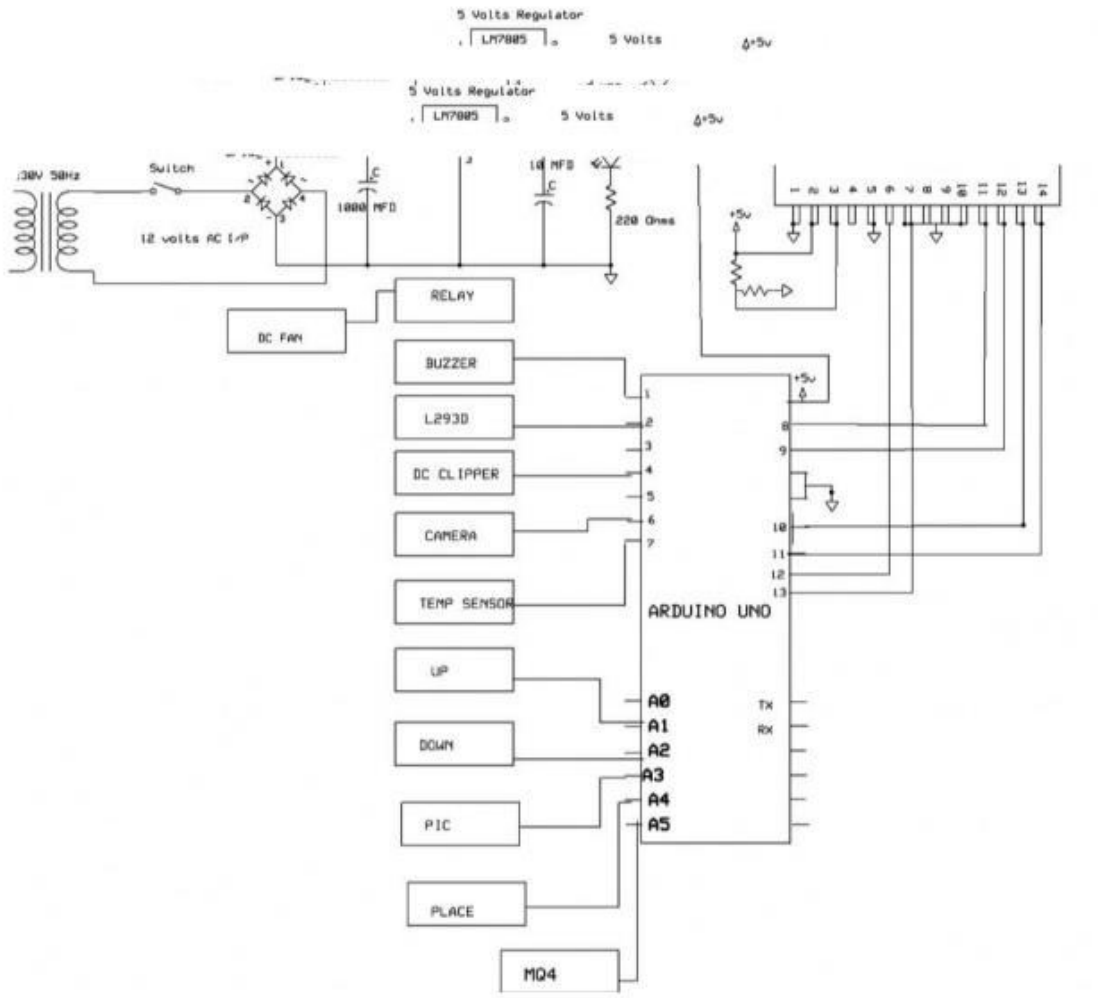

Fig 3.2 Schematic diagram

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The Arduino UNO differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. The dc input from (2 to 13) 2 pin is connected to the dc fan to top the heating of components. The pin 8 and 9 are connected to the input motor driver shield, which is used to control the speed of motors. the pins of EN1 and EN2 of motor driver shield are connected to the motor with clipper, which is given input from vss and vs(+5v).

The pins of 3 and 6 of motor driver shield are connects with the buzzer. The analog pins of Arduino.in these six we mostly use four pins to perform our necessary actions. The pin A1 is used to control the motor 1, it picks up the motor 2 with the pulley. The pin A2 is used to control the motor 2, it led to take down the motor 2 with the help of pulley.

VI.CONCLUSION

The "Smart and Safe Child Rescue System" is designed to protect children who fall into bore wells, aiming to save lives that might otherwise be lost. Over the past decade, numerous lives have been claimed by such accidents, largely due to the lengthy and time-consuming process of digging a pit beside the bore well. By utilizing advanced motors, robotic arms, and cutting-edge technology, this project offers a successful solution. It is anticipated that this system will significantly increase the chances of rescuing children in future incidents, thereby preserving many lives.

VII.FUTURE SCOPE

In the future, this project can be expanded for various applications by integrating additional components:

Gas Detection: By connecting a gas sensor to the robot, it can be deployed in hazardous environments to monitor gas concentrations. The sensor will detect any poisonous gases and send this information to the microcontroller. The microcontroller then communicates the data to a transceiver, which relays it to a PC for analysis.

Oxygen Supply: Future upgrades will include a gas sensor to detect lethal gases inside the bore well. Additionally, an oxygen sensor could be incorporated to provide oxygen to the trapped child, enhancing safety during the rescue operation.

Hand Gesture Control: To improve rescue efficiency, the potentiometer could be replaced with a hand gesture mechanism, allowing for more precise and faster control of the robot, thereby reducing the time needed for rescue operations.

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