Smart Borewell Child Rescue System

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Abstract:
At present, children fall into the Bore well due to the careless nature of the people in society. The currently available systems to save the child are less effective and costly too. Thus society requires a new technique that is more efficient and effective. In most cases reported so far, a parallel hole is dug and then a horizontal path is made to reach the child. It is not only a time consuming process but also risky in various ways. The bore well rescue system is capable of moving inside the same bore well where the child has been trapped and performs various actions to save the child. This project proposes a portable real-time smart child rescue system. The equipment module in this task will make use of an ESP32S as a camera is used to continuously monitor the child's condition to analyze a child's facial expressions to determine whether or not. If they are in danger Music is played to keep the children quiet. A web application is used to control and monitor the entire system. Therefore the project offers a successful innovative solution for safeguarding the youngster.

Keywords: **ESP32S, Motors, Camera, Relay, DH11, Ultrasonic Sensor, IOT, Child rescue.**

I. INTRODUCTION

Many children died in these abandoned bore wells Children's carelessness and playful behavior lead to this type of accident most often occurs. India is the most popular country in the world with one-sixth of the world's Population.According to UN estimates; India overtook China in having the largest population in the world with a population of **1,425,775,850** at the end of **April 2023** and about 4% of the world's water resources. One of the proposed solutions to solve the country's water woes is the Indian rivers interlinking project. India now has around 33 million borewells, making us the largest user of groundwater in the world. After producing water borewell often remains uncovered, it possible for children to accidentally fall into them is the only cause behind the present sad in India. Many children died in these borewells children's carelessness and playful behaviour this type of accidents most often occurs. The recommended depth for a water borehole is between 60 and 200 meters. The diameter of a borehole is typically anywhere between 110 and 150 millimeters, but this might vary depending on the kind of machine that was used to drill the borehole. The borewell depth of around **700 feet**. In this case the rescue of children from deep borewells is challenging and requires more time to rescue a child from the borewell and to check any kind of irregularities in pipe. There is no way to rescue children from some bore well accidents. Sometimes, bore wells are left uncovered, posing risks. Rescue operations can be perilous for the team. Any delay can diminish the chances of saving the child. If the bore hole vicinity has rocks below a certain depth, the chances of rescue decrease. Success rates hinge on factors such as machinery transport time, human resources, and the response time of government bodies. Newspaper articles and Google search of borewell accidents in the last 10 years resulted in a total of 34 borewell incidents since 2006. The actual number of incidents may be more since many incidents go unreported. Table -1 shows the list of borewell cases report between 2006 and 2014.

SI No	STATE	No of Borewell Accidents (2006 -2014 Aug)
1	Maharashtra	2
2	Gujarat	6
3	Karnataka	3
4	Assam	1
5	Tamil Nadu	6
6	Rajasthan	4
7	Haryana	6
8	Mathya Pradesh	2
9	Utthara Pradesh	2
10	Andhra Pradesh	2
	Total	34

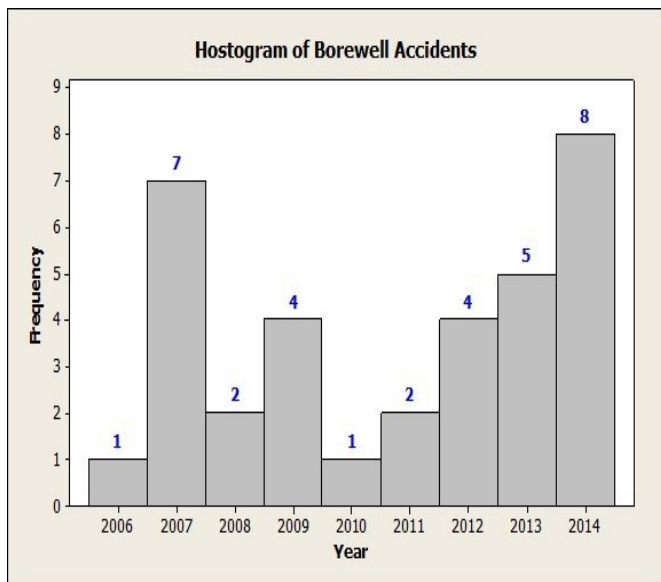FIG 1. Borewell Accidents up to 2014 in India

FIG 2. Historical representation

The successive technique, which involves manual work, is indeed labor-intensive and time-consuming. Lifting a child out of a narrow bore well presents several challenges, particularly regarding the safety and well-being of the child. Here are some considerations and potential solutions are Limited Space, Reduced Oxygen Supply, Trauma and Psychological Impact, Collaborative Efforts.Moreover, it carries inherent risks. However, with the advancement of high-speed technology and the increasing capacity of computers, there arises a realistic opportunity to implement new robot controls. To develop a portable, accurate and cost-effective model to rescue the children from borewell accident is the main objective of this project.

II. EXISTING SYSTEM

Rescue a child trapped from a well is a very dangerous and difficult operation compared to other accidents. It takes more than a day to save a child. There are so many remedies, but most fails. 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. Existing rescue systems are both ineffective and expensive. Typically, rescue involves digging a parallel hole and creating a horizontal path is made to reach the child, which is not only time-consuming but also poses various risks.

III. REVIEW OF THE RELATED LITERATURE

Our project work aimed to review research papers predominantly related to the technology utilized in our project, specifically focusing on "Rescue Systems from Open Borewells". Alongside books and websites, these research papers offered crucial insights and knowledge necessary for the development and implementation of our project.

❖ Kavianand .G [1] describes the designing a system for rescue a child from inside bore well. This system is capable of moving inside the bore well. This Smart Child Rescue System consists of PIR sensors which help to sense only humans irrespective of the external conditions. In this system Raspberry pi is used which is costly than Arm microcontroller. It requires more peripherals.

❖ M R Chaitra Monika P Sanjana M Shobha Sindhe S R Manjula G "IOT Based Artificial Intelligence Women Protection Device" using A robotic framework for rescue robotics in borewell environments has been proposed here." [2]

❖ Kosti, Ronak, Jose M. Alvarez, Adria Recasens, and Agata Lapedriza "the relevance of using contextual information to recognize emotions and, in conjunction with the EMOTIC dataset, motivate further research in this direction."[3]

❖ VS, Thrisha, and Vikas Reddy S "to rescue the child is by using the clipper mechanism which is very safe and the child can be endangered within a rapid period of time without having the possibilities of the obtaining any issues in rescuing the child."[4]

❖ Gopinath, S., T. Devika, L. Manivannan, and N. Suthanthira Vanitha "It consists of ZigBee transmitter, ARM 8 processor, robot arm and the sensors perform their role in these operations and highly advanced ICs with the help of growing technology."[5]

❖ Tadavarthy, Satyaprasad, Tarun Chowdary, Naga Sushma Yalamanchali, and Yammanuru Jahnavi Reddy "Integrating features of all the hardware components used have been developed in it."[6]

❖ Palaniswamy, Sridhar, and D. Y. Arfath "Fabricated a system to achieve a live rescue using special graspers."[7]

❖ Pandian, Surya Saravana, and Karthikeyan Sundarsamy "The proposed system operation was better than conventional bore well rescue operations and has several components to do different works which will make the arm more invincible and easier in operation."[8]

❖ Therefore all our existing methods only save the child in different ways after they all fall into the borehole. Therefore, this type of system is risky, and it takes more time [9]

❖ AB, Mary Beni Reshma, Nasrien Rejee WH, S. Revathy, and J. Jabez "An implementation of IoT based recommendation system for heart disease where the emergency messages are sent via SMS to mobile phone."[10]

IV. PROPOSED SYSTEM

In this paper deals with design and implementation of Smart Borewell child rescue system from open borewell using the ESP32S. This should be work as a control module which consists of camera module, motor driver, DC motor, Sensors, Relay and control switches also. Before implementation the first step will be able to identify the child before falling into the borewell. Using Ultrasonic sensor, we measure distance of tapped child from borewell. After the child falls into the borewell, the next step is to locate the child him or her. Initially, we will collect datasets such as facial emotions capturing image using the camera module. It will determine and monitor status of the child whether or not. If the child is danger a tele-conferencing system will also be add to communicating with the child to keep the children quiet. Then the temperature of the child is determined by using temperature sensor DH11 type threshold value is 50 degrees Celsius and verify the child is alive or not. The mobile application displays the status condition of the child by continues monitoring. This paper mainly deals with the design of robotic arm is controlled by the motor driver. One Dc motor fixed in the top of rescue system will control the rope movement like up and down motion. The picking part of the belt is attached with the robotic arm with gear assembly. Another motor fixed inside the arm used to open and close the robotic arm. Additionally robotic gripper will attach rescue system holds the child tightly and takes them out safely. Chest harness for lifting a child from a bore well simplifies the process while ensuring safety and effectiveness. Primarily revolving around Efficiency and Safety, Ease of Lifting, Precision and Control. Overall, the use of a robotic arm in this scenario streamlines the rescue process, reduces the risk of injury to both the child and the rescuers, and improves the chances of a successful outcome. Further we can supply Oxygen. Also, we can gain a better understanding of the borehole. This will enable us to perceive the child's location and position as well as detect any faults in the pipeline. The entire system is manually controlled by the user.
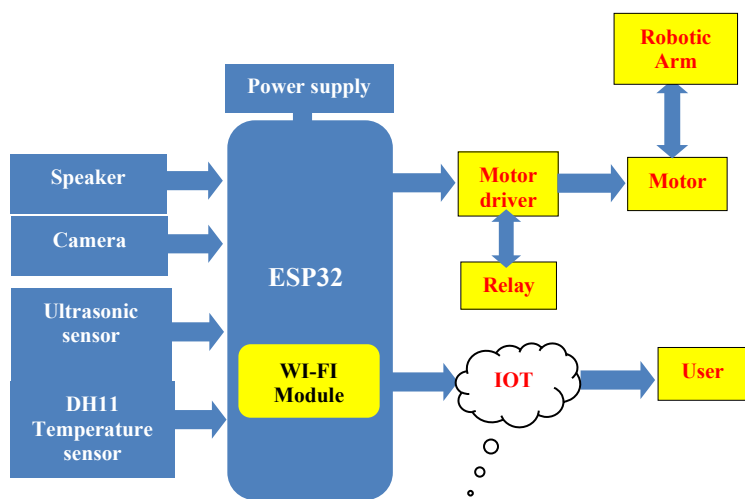
FIG 3. Block diagram of the system

V. HARDWARE DETAILS

A. Node MCU ESP32

This is the NodeMCU development board based on ESP32, features WiFi+Bluetooth connectivity, onboard CP2102 and keys. There are two power pins: the VIN pin and the 3V3 pin. The VIN pin can be used to directly power the ESP32 and its peripherals, if you have a regulated 5V power supply. The 3V3 pin is the output from the on-board voltage regulator; you can get up to 600mA from it. GND is the ground pin.
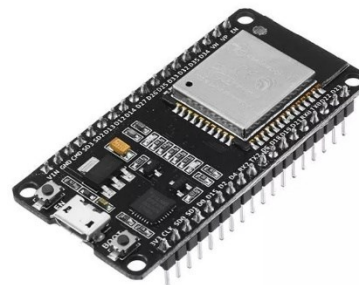
B. Motor driver

Motor driver is used to control motion of a motor and its direction by feeding current accordingly. Output of a motor driver is in digital form so it uses PWM (Pulse Width Modulation) to control speed of a motor. Motor Driver are basically current amplifiers followed by input signals.
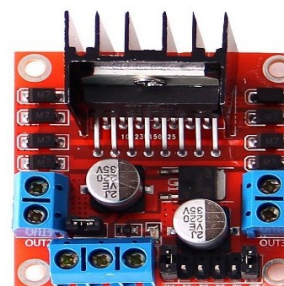
C. Dc Motor

The electric motor activity relies upon the straightforward electromagnetism. A Current passing on conductor makes an attractive field when it is in the external attractive field, it will experience a power relating to the current in the conductor and to the nature of outside attractive field. In the magnet the opposite boundary (north and south) will draw in and such furthest point (north and north, south and south) putdown. The interior arrangement of the DC motor is planned to load the attractive correspondence between a current-0 passing on conductor and an outside attractive field to make rotational movement.

D. Ultrasonic sensor

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound.
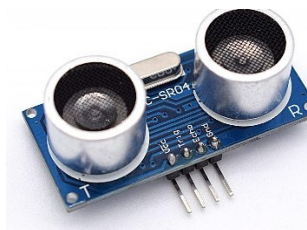

E. Temperature sensor

A temperature sensor is a device that detects and measures hotness and coolness and converts it into an electrical signal. There are many different types of temperature sensors. The DHT11 is a basic, ultra-low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air and spits out a digital signal on the data pin.
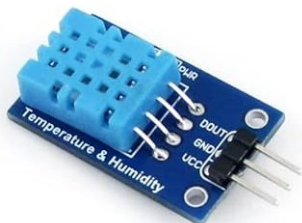
F. Night vision Camara

As the drag well condition is a dull domain the robot will have lights which will give enough lighting conditions to the activity of the robot. The entire situation will be feed as live through the correspondence module which will distribute pictures and furthermore recordings from the camera of the robot. 1080P Day & Night Vision USB Camera Module, 2MP Automatic IR-Cut Switching All-Day Image USB2.0 Webcam with IR LED; FOV (D/H/V) on 1/2.7" Cam,
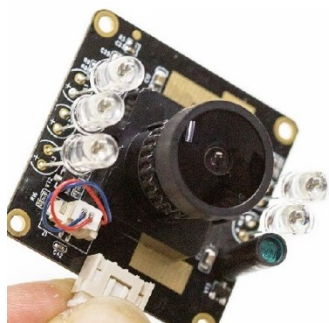
G. Arduino Software (IDE)

The Arduino Software (IDE) - contain a text editor for scripting code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It bonds to the Arduino and Genuino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension.in. The editor has features for cutting/pasting and for searching/replacing text. T

H. Blynk

Blynk is an IoT platform for iOS or Android smartphones that is used to control Arduino, Raspberry Pi and NodeMCU via the Internet. Configuration of mobile UI during prototyping and production stages.

VI. CONCLUTION

Human life is precious. Our proposed system is very useful to society in saving the lives of children from falling into borewell. In the past 15 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. The Robotic arm will pick the belt and fix it to the child appropriately. It additionally incorporates web camera for video surveillance. These robots are lifesaving machine by using, ESP32S Motors, Arms, Gears and IOT technology this project can be will be implementing successfully. As we like to conclude with the help our project, we hope it able to rescue without any damage.

VII. FUTURE SCOPE

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. This project has an efficient scope in the future, where this idea can be converted to computerized and intelligence-based production in a cheap way.

VIII. REFERENCE

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