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Child Rescue System in Borewell

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ABSTRACT—

To prevent accidents and save the lives of children who accidently fallen into borewells. Borewells are typically narrow and deep cylindrical holes that are drilled into the ground to extract the groundwater. In rural areas children often play near borewells, and sometimes, they accidently fall into the borewell, which have become a major concern in many parts of the world. The proposed system is designed to rescue the child in such situation. The system consists of a camera attached to a rope that is lowered into the borewell to locate the child. The camera provides a live video feed to the rescuers above ground, allowing them to locate the child and assess their condition. Once the child has been located, a second rope with a harness is lowered into the borewell to retrieve the child safely.

Keywords— *Child rescue, Borewell, Remote operation*

I. Introduction

A child rescue system in borewells is an important safety measure to prevent incidents of children falling into borewells and getting trapped. Borewell accidents have become a major concern in many parts of the world, particularly in rural areas where open borewells are prevalent. These accidents can be especially dangerous for young children who may accidently fall into these wells while playing or exploring. Unfortunately rescue efforts in such situations can be difficult and time consuming, often leading to tragic outcomes.

Generally, borewells are deep, narrow holes drilled into the ground for the purpose of accessing groundwater. These borewells can be up to hundreds of feet deep, and if a child falls in, it can be difficult to rescue them.

To address this problem, the “Child Rescue System in Borewell’’ project has been developed. The project aims to develop a system that can rescue children who fall into borewells and provide timely assistant to prevent any harm to the child. The system uses a combination of robotics and remote operation to retrieve the child from the borewell. The system consists of a robotic arm that is remotely operated by trained personnel using a computer or mobile interface to reach the bottom of the borewell and retrieve the child. The system also includes a camera that can capture images and videos of the child to assess their condition and provide crucial information to the rescue team.

A. Background

In India, borewell are commonly used to extract groundwater for drinking and irrigation purposes, especially in rural areas where others sources of water are scarce. However, borewells can be dangerous for children who may accidentally fall into them while playing nearby, such accidents have led to several tragic incidents in the past, where children have lost their lives due to lack of proper safety measures.

In response to this issue, the Government of India has mandated the implementation of a child rescue system in all borewell projects since 2010. The system involves the installation of set of sensors, cameras, and alarms at the top of the borewell, which can detect the presence of a child and alert the authorities in case of an accident. The rescue team can them use specialized equipment to retrieve the child from the borewell.

The child rescue system has proven to be an effective safety measure, reducing the number of borewell accidents and saving the lives of children who fall into them. However, the implementation of the system is still a challenge in many areas due to lack of awareness, inadequate resources and inadequate

monitoring. Therefore, it is crucial to promote the importance of child rescue systems in borewell projects and ensure their proper implementation to prevent such tragic incidents from occurring in the future.

II. LITERATURE REVIEW

The literature survey is considered as a part of the work. Its interference the queries related the improvement of work already done and clearly outline the development of the research projects. In this section, the history of the earlier work done in this area and their issues are discussed. It contains a record of all the research going in this area.

In study [1], Nitin Agarwal, Hitesh Singhal describes the rescue operations without human intervention. The Systems legs can be changed to fit the pipelines dimensions. This proposal is built on a rescue system, where a CCTV camera and a light source are employed to save lives. This project uses low power LEDs, and a human controls the system.

In study [2], Kavianand describes the designing a system for rescue child from inside borewell. This system has the ability to move within the borewell. PIR sensors are used in this Smart Rescue System to detect just people, regardless of the environment. The Raspberry Pi, which is more expensive than an Arm microcontroller, is employed in this setup. More accessories are needed.

In study [3], K Saran, S. Vignesh, Marlon Jones Louis have done servo motors to hold the child and safety balloons beneath the child to provide further protection to the child have been employed in a human-controlled computerized machine to rescue the youngster. The project process development includes everything from hand-drawn sketches to computer generated artwork.

In study [4], B. Bharathi, B. Suhitha Samuel have implemented project of prototype that uses a PIC 16F877A microcontroller and wirelessly controlled system that uses Zigbee technology and dc motor-based gripper operation for systemic arm to rescue a child.

In study [5], Preedipat Sattayasoonthorn and Jackrit Sudhakar described a battery management system for a rescue system. This document summarises battery management for a rescue system and provides recommendations for future developers. Power usage, battery selection, battery charging and discharging, and battery maintenance are all covered in this paper. However, because this system uses more hardware and has a complex design, it is expensive.

III. METHODOLOGY

The child rescue system in borewells can vary depending on the specific equipment and techniques being used. However, there are some general steps that are typically followed in a borewell rescue operation.

1.Initial assessment: The first step is to assess the situation and gather information about the borewell, such as its depth, diameter, and condition. This information will help to determine the most appropriate rescue technique to use.

2.Preparing the rescue site: The area around the borewell is cleared of obstacles, and safety precautions are taken to ensure the safety of the rescue team and any bystanders.

3.Locating the trapped child: A specialized camera or other equipment maybe used to locate the trapped child and determine their condition.

4.Creating a rescue shaft: Depending on the situation, a parallel shaft maybe drilled next to the borewell to provide a means of access to the trapped child. This is typically dine using a specialized drilling equipment.

5.Extracting the child: The trapped child is carefully extracted using a specially designed rescue capsule or other equipment. The child may need to be stabilized or treated for any injuries before being transported to a medical facility.

6.Follow-up care: Once the child has been rescued, they may need ongoing medical care and support and help them recover from their ordeal.

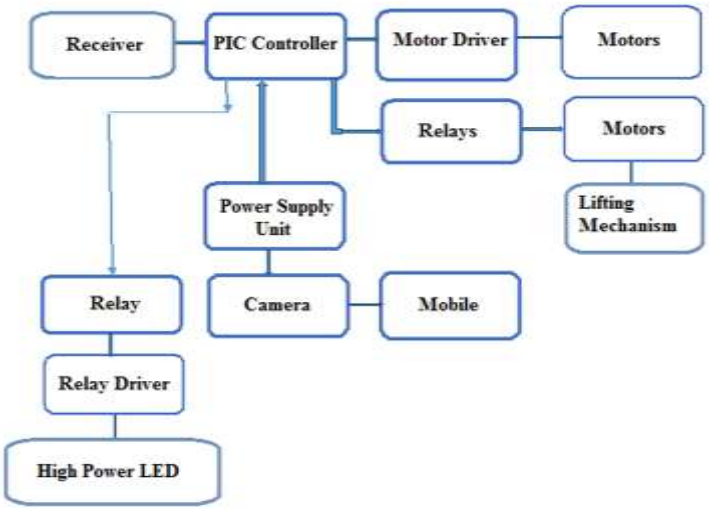

Fig: Block diagram of child rescue system in borewell.

Children who unintentionally fall into borewells can be saved with the Child Rescue System in Borewell project. A robotic arm, gripper system, DC motor, relay, PIC controller Atmega 328, indicators, diodes, LEDs, capacitors, resistors, control unit, power supply, focus light, regulator, borewell pipe, embedded C programming, camera with Wi-Fi, and rope are some of the technologies used by the system.

The robotic arm of the apparatus is intended to descend to the borewell's bottom and retrieve the infant. It is driven by a DC motor that is managed by an Atmega 328 PIC microcontroller. Using a computer interface, the controller receives commands from a remote operator, who can then direct the movements of the arm. To hold the youngster, the gripper mechanism is utilised.

COMPONENTS DESCRIPTION:

Robotic arm and gripper system: The child is lifted out of the borewell by being grabbed by the robotic arm and gripper system. The gripper system is used to grasp and hold the child by the robotic arm, which is a mechanical arm driven by a DC motor.

DC motor: The robotic arm's movement is managed by the DC motor.

Relay driver IC and relay: To drive the relay, which directs the DC motor, one uses the relay driver IC.

PIC controller Atmega 328: The PIC controller serves as the system's central processing unit. Various sensors and cameras provide input, and it manages the entire system.

The child rescue system uses indicators, diodes, LEDs, capacitors, and registers to provide feedback and regulate various functions.

Remote monitoring and control of the kid rescue system are done via the control unit.

Power supply and regulator: The power supply and regulator maintain a consistent voltage while supplying the system with power.

Borewell pipe: The child rescue system is inserted into the borewell using a borewell pipe.

Focus light: To illuminate the borewell and enable the camera to record video of the child, use the focus light.

Embedded C programme: This programme integrates and controls all the parts of the kid rescue system.

Wi-Fi-enabled camera: The camera records video of the youngster and sends it wirelessly to the control panel.

Rope: The child rescue equipment is lowered and raised using the rope into and out of the borewell.

The child rescue equipment is lowered into the borewell using the rope when a child falls into it. The borewell is illuminated by the focus light, and the camera records a video of the child's location. The robotic arm and gripper system are moved by the PIC controller Atmega 328, which uses an embedded C programme to process data from the camera. The youngster is lifted out of the borewell by a robotic arm and gripper device, and the control unit remotely observes the entire procedure.

IV. RESULT

The developed manipulator was put to the test over a pipe that was 8 to 10 inches wide and 3 to 4 feet tall. The manipulator robot had been modified to fit these proportions. Small items weighing 200 to 300 grammes were placed into the pipe. The operator used a switch pad to move the robot within the vertical pipe. The target that was being seen on the PC was then recognized.

V. CONCLUSION

Due to the time-consuming process of digging a pit next to a bore well, several people have died in the past ten years as a result of falling into them. All of these challenges are addressed by the suggested system. With the help of this project, bore well rescue operations will require fewer people. It completes rescue tasks much more quickly than humans do. It is capable of performing pipeline inspections that are out of human reach. in formal format.

VI. FUTURE SCOPE

The following features can be added or changed to further improve the project:

1. An extra function of an air bag can be employed to hold the youngster underneath, preventing further depth falls.

2. An oxygen supplier and sensor can be installed.

3. To detect the concentration of hazardous gases inside the pipe, a smoke sensor can be attached.

4. You can make it waterproof.

5. It can be expanded to include bomb diffusion, GPS location setting, and digital compass self-navigation.

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