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IMPLEMENTATION OF CHILD RESCUE SYSTEM FROM BOREWELL

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Abstract: In situations where children fall into borewells, rapid and efficient rescue operations are crucial. This project aims to develop a child rescue system using an ESP8266 controller and a DC motor- based carriage setup. The system incorporates temperature, pressure, and CO2 sensors to monitor environmental conditions within the borewell during rescue operations. Additionally, an IR sensor is employed to detect the presence of the child, halting the motor when activated. The gathered sensor data is displayed locally on an LCD screen and transmitted to an IoT-based platform, such as the Blynk app, for remote monitoring. This integrated approach enhances both local and remote monitoring capabilities, aiding in timely and effective rescue efforts.

Keywords: ESP8266, Temperature, pressure, gas sensors, LCD, IoT Blynk, Arduino

1.

Introduction

For Mankind survival water is the most important thing. Generally water scarcity is a major problem faced by Human society currently. So people are drilling bore wells in grounded area. After drying bore wells people left open those bore wells. So these left opened bore wells are becoming more dangerous for children and animals living in surroundings. We have seen many incidents like children were falling into borewells and putting their lives in danger. Recently a six-year-old boy, who fell into an open borewell in Madhya Pradesh's Rewa district was pulled out dead on the other day, bringing a gloomy end to a multi-agency rescue operation that lasted for over 40 hours. Falling into borewells poses a significant risk to children, often resulting in tragic outcomes if rescue operations are not promptly initiated and efficiently executed. Traditional rescue methods may suffer from delays and inefficiencies, necessitating the development of innovative solutions that leverage technology to enhance rescue capabilities. This project aims to address this challenge by designing a child rescue system equipped with sensors and IoT connectivity for comprehensive monitoring and remote management.

Existing model

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In the existing model called as Parallel Pit method. Now a day's robots are designed to help the human operators in the rescue mission. Rescue team normally follows the parallel pit process to save the child. The parallel pit method is done as, first the team will find the depth of the child in the bore well by using a rope. Then earth moving vehicles are used to dig the parallel pit next to the bore hole. This particular step may take time. During this process the child may suffer due to lack of oxygen and the lack of visualization may turn the situation worst to the rescue team.

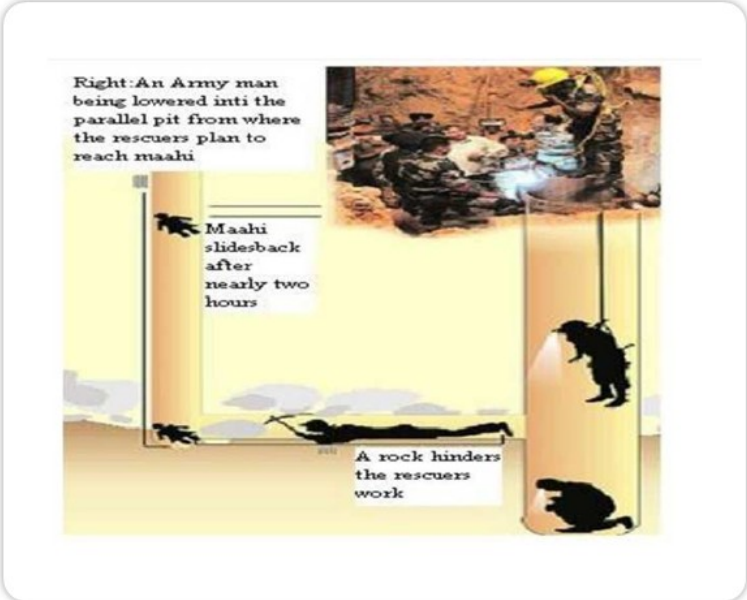

Figure 1: Parallel Pit Method

The parallel pit method is a time taking process it can take up to 70 hours or even more time for rescuing the child, but we could not guarantee the life of the child trapped in the borewell as so far it takes more time. For this parallel pit method we need big space to dug an another hole and it is risky and a difficult process. Big machines and very high expensive equipment is needed to rescue a child from borewell. High manpower is also required this rescue process and very draggy process.

I. Related Review

Prevention and Retrieval of Children from Borewell using ArduinoAuthor: Akhil Nair U; Babu R; Balakrishnan.M; Dhanaraja Sekar S; K.Lakshmi Year: 2022- In recent years, due to parents' negligence, child drowning deaths are a common occurrence. Thus, we must solve the problem of child drowning accidents. This article discusses and analyses the present situation of child drowning. The sensor is

positioned on the pinnacle of the borewell hollow. The kids are stopped from falling beneath the horizontal closure, which mechanically closes at an intensity of approximately 5 ft when the device acknowledges the kid. Additionally, this venture also entails the usage of a robot that has arm-like systems to deliver the kid from the hollow.

IoT-based Child Rescue System from Borewell Author:M. Ramkumar;Jana K; Jeevan Babu M S; Bharathi G Year:2022-In the past years, the reported rates of children falling inside the bore-well have increased considerably. Where in most cases rescue operations take place by digging the pits parallel to an existing one consuming both time and manpower, others leave the children in forfeiting their lives. The current salvage frameworks are time taking and are not in the least exact as include manual assistance where there are numerous odds of human mistake. To defeat this issue, in this task an equipment module is planned to utilize a raspberry pi as a handling module and a camera module. The facial feeling from the kid is perceived by utilizing passionate calculation to check if the youngster is in trouble.

Conceptual model for improving maneuverability in borewell rescue devices Author: Adithya Kameswara Rao; Harikrishna K; Jayendran R; Meenatchi L S; Sudarsana Jayandan J; Niranjan Kumar P; Saimothish R Year: 2021- This paper deals with mechanisms for improved maneuvering into borewells for rescue operations. The constraints observed in existing borewell devices, such as the size of the borewell, the orientation of the child and the ease of maneuverability were analyzed. The work consists of mechanisms for anchoring, module's translation and rotation, gripper actuation and control. The improved borewell rescue device contains modules that can maneuver through the confined space, stabilize the sway, and aid the gripper to reach the child safely

II. Objectives of the proposed model

- Develop a DC motor-based carriage system for descending into borewells and retrieving trapped children.
- Integrate temperature, pressure, and CO2 sensors to monitor environmental conditions within the borewell.
- Implement an IR sensor for detecting the presence of the child and halting the motor accordingly.
- Display real-time sensor data on an LCD screen for local monitoring.
- Transmit sensor data to an IoT platform, such as Blynk, for remote monitoring and management.

Block Diagram

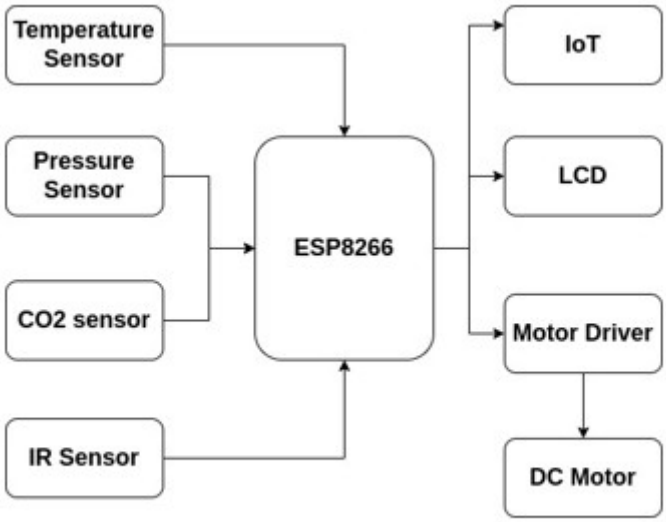

Figure 2: Block Diagram of proposed model

III. Methodology

Hardware Setup

ESP8266 controller for overall system control and IoT connectivity.

DC motor-based carriage system for descending into the borewell.

Temperature, pressure, and CO2 sensors for environmental monitoring.

IR sensor for detecting the presence of the child.

LCD screen for local display of sensor data.

Software Implementation

Programming ESP8266 for system control, sensor data acquisition, and communication.

Configuring Blynk app for remote monitoring and management.

Developing logic for IR sensor-based motor control.

Integration and Testing:

Integrating hardware components and verifying communication protocols.

Testing system functionality under various environmental conditions.

Conducting simulated rescue operations to evaluate system performance.

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Hardware and Software Requirements

Hardware

ESP8266 controller.

DC motor-based carriage setup.

Temperature, pressure, and CO2 sensors.

IR sensor.

LCD screen.

ESP8266 controller

The ESP8266 is a versatile and low cost Wi-Fi microcontroller with highly integrated chip designed to provide full internet connectivity and microcontroller capability. It is integrated into development boards like NodeMCU. It comes with the 32-bit microprocessor and operated at 3.3v. We should write the required program in the Ardiuno software and we are dumping the code into this controller module.

Figure 3: ESP8266 controller

SENSORS

In this project we have used various sensors for monitoring the temperature, pressure, gases.

Gas Sensors: Gas sensors are essential for detecting dangerous gases such as carbon dioxide (CO2) and methane (CH4) that may accumulate in the borewell. These gases can cause serious health risks to both the trapped child and leads to unconsciousness of child. By using this we can continuously monitor gas levels, the rescue team can take appropriate measures to ventilate the borewell or provide respiratory protection as needed for the safety of the child.

Temperature sensors: Temperature sensors are used to monitor the ambient temperature inside the borewell. In rescue operations, extreme temperatures can affect the well-being of the trapped child. For example, if the borewell is exposed to direct sunlight, temperatures can rise quickly, leading to heat stress or dehydration. Conversely, in colder environments, hypothermia becomes a concern. By monitoring temperature levels, rescue teams can take steps to regulate the environment within the borewell or provide necessary interventions to maintain the child's body temperature within safe limits.

Pressure sensors: Pressure sensors are

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employed to monitor changes in pressure within the borewell, which can indicate various conditions such as water level fluctuations or structural instability. In the context of a rescue operation, pressure sensors can help assess the integrity of the borewell and identify any risks of collapse or flooding. Additionally, pressure sensors can aid in determining the depth at which the child is trapped and guide the rescue team in planning the extraction process.

Top of Form

IR Sensors: IR sensors can be used for various purposes in a rescue system. By using this sensor we can detect the presence of the trapped child within the borewell by sensing body heat or movement. This IR sensor produce Infrared ways to detect object and gives feedback to the module.

LCD Displays

Data from various sensors, including gas, temperature, pressure, and IR sensors, can be visualized on the LCD screen in the form of graphs, charts, or numerical values. This allows rescue personnel to monitor environmental conditions and make informed decisions based on real time data

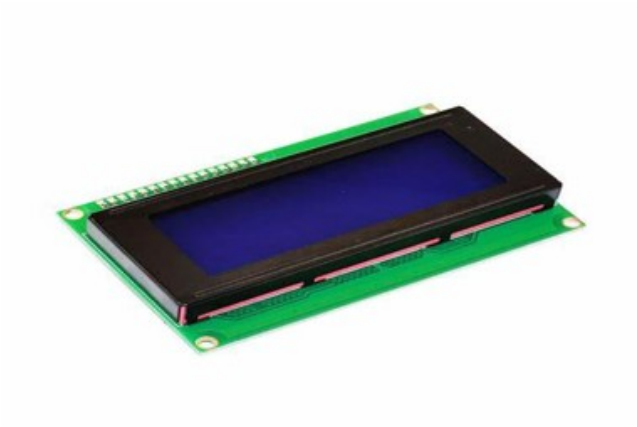

Figure 4: LCD Display

Software: -

-Arduino IDE or similar programming environment.

- Blynk app for IoT connectivity.

- Libraries for sensor interfacing and communication

Blynk Software

Blynk is a platform that allows you to build IoT (Internet of Things) applications for controlling hardware remotely using your smartphone. It provides a drag-and-drop interface to create interfaces for your IoT projects without needing to write code from scratch. Blynk connects to an ESP32 microcontroller via the internet using the ESP32's built-in Wi-Fi capabilities. In your Arduino sketch, you configure the ESP32 to connect to your Wi-Fi network. You provide the SSID (network name) and password of your Wi-Fi network to the ESP32. This allows the ESP32 to connect to the local Wi-Fi network, enabling it to communicate with the

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Blynk server over the internet. You include the Blynk library in your Arduino sketch. This library provides functions and methods to establish communication between the ESP32 and the Blynk server. You specify the authentication token provided by the Blynk server in your Arduino sketch. This token is unique to your Blynk project and serves as a secure identifier, allowing the ESP32 to communicate with your specific Blynk project. In your sketch's setup function, you initialize the Blynk library and establish a connection to the Blynk server using the Blynk.begin() function. This function takes your authentication token as an argument .In your sketch, you define functions to handle Blynk events such as button presses, slider movements, and other interactions from the Blynk app. These functions are called whenever the corresponding events occur in the Blynk app. In the main loop of your sketch, you call the Blynk.run() function periodically. This function maintains the connection to the Blynk server and handles incoming and outgoing data between the ESP32 and the Blynk app.You write code in your sketch to interact with hardware connected to the ESP32, such as sensors, actuators, LEDs, etc. You can control these hardware components based on commands received from the Blynk app and send sensor data back to the Blynk app for display or analysis.

IV. Advantages of the proposed module

- Rapid detection and response to child fall incidents in borewells.
- Enhanced monitoring of environmental conditions within the borewell.
- Real-time data visualization for both local and remote stakeholders.
- Improved coordination and decision-making during rescue operations.
- Potential for integration with existing emergency response systems.

V. Results

In our proposed model we can monitor the borewell conditions like gases (methane, carbon dioxide) present in the borewell, we can measure the temperature conditions and pressure inside the borewell. We have used the ESP2866 WIFI module so we can connect to internet, in this IOT model we are using the Blynk application software for operating the sensors. We can see the measured results of the sensors in the LCD display connected to the Arduino. With results of this measured values we can detect the harmful gases present in the borewell which can cause unconsciousness to the child. The crucial purpose of this Blynk software that we can easily operate the entire sensor values. The IR sensor is used for tracking the path that the DC drive motor is used as pulling system for the child as long as the IR sensor cannot detect any object

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through the path the DC motor will works so we can reach the child.

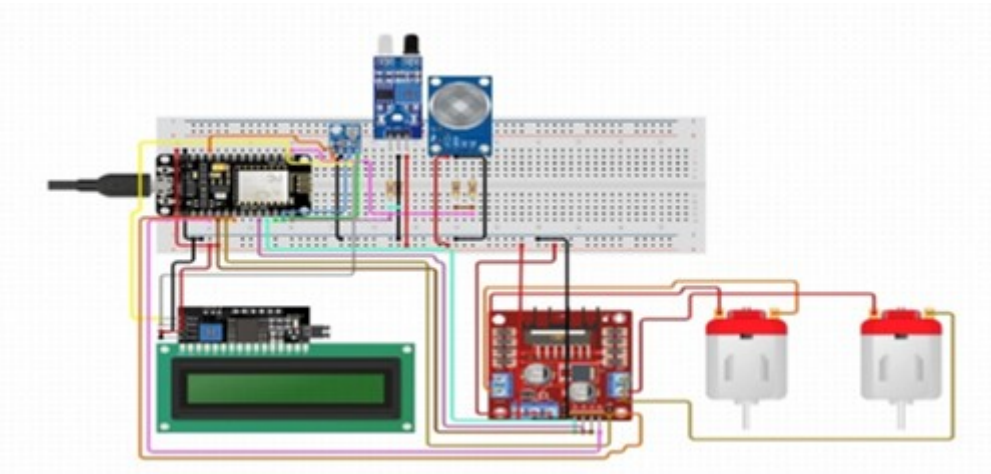

Figure 5: Schematic Diagram

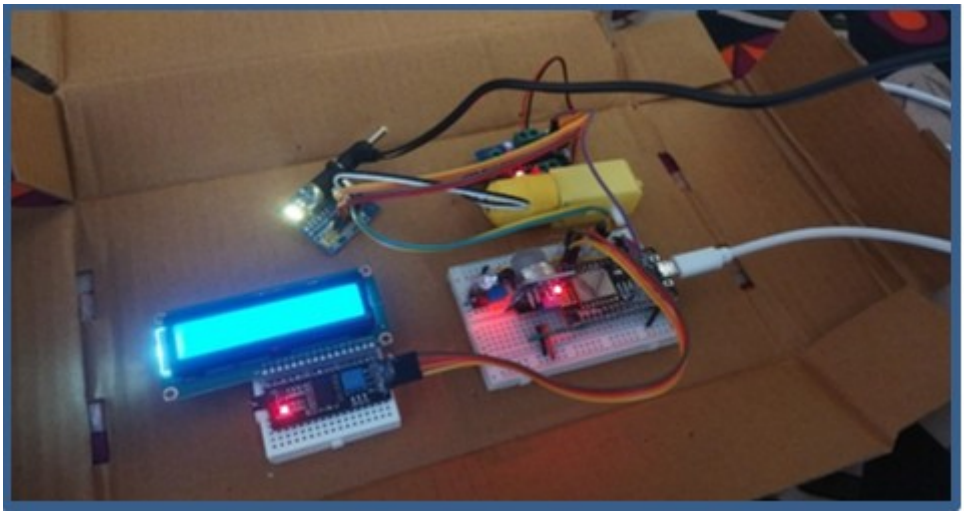

Figure 6: Hardware kit

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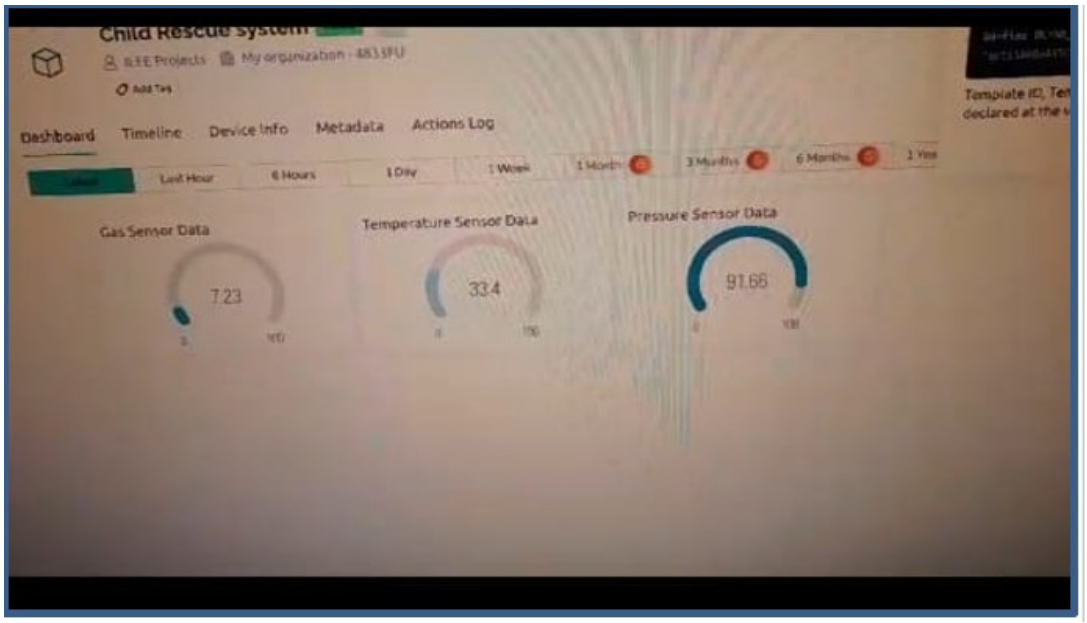

Figure 7: Measured values of sensors

VI. Conclusion

The proposed child rescue system offers a technologically advanced solution for addressing the challenges associated with borewell incidents involving children. By integrating sensors, IoT connectivity, and real-time monitoring capabilities, the system enhances the efficiency and effectiveness of rescue operations, ultimately contributing to improved outcomes and increased safety for children in vulnerable situations. Continued refinement and deployment of such systems hold the potential to significantly reduce the risks posed by borewell accidents and save precious lives.

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