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Child Rescue System Against Open Borewells

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KEYWORDS

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Arduino Uno
Robotic arm gripper
ESP32Cam
MQ2 sensor
DHT11 sensor
SMS commands
SIM800L module

ABSTRACT

In this project aim to prevent incidents of infants falling into open bore wells. This is an important issue as it poses a significant threat to the safety and lives of young children in rural areas. In India, for instance, it is estimated that hundreds of children fall into bore wells each year, and many lose their lives due to the lack of proper rescue measures. To address this issue, the project proposes a child rescue system that uses advanced technologies such as Arduino Uno, Robotic Arm Gripper, ESP32 Cam, MQ2 sensor, DHT11 sensor, and SIM800L module. The system is designed to be a low-cost and efficient solution that can be easily implemented in rural areas .The Arduino Uno is the main microcontroller that controls the overall system. The Robotic Arm Gripper is used to hold the baby and move it out of the bore well. The ESP32 Cam is used to see the baby via camera output, which is transmitted to a remote location for monitoring. The MQ2 sensor is used to detect gas values, while the DHT11 sensor is used to measure temperature and humidity values. All these values are monitored and transmitted to the remote location via the SIM800L module .To operate the system, users can send SMS commands to the SIM800L module, which controls the overall system. For instance, users can send commands to move the robotic arm, turn on/off the camera, and check the gas and temperature/humidity values . In conclusion, the child rescue system proposed in this project is an innovative solution that can prevent infant fatalities due to bore well accidents. The use of advanced equipment like Arduino Uno makes this system an efficient, low-cost, and easy-to-use solution. This system can be implemented in rural areas, where incidents of bore well accidents are prevalent, and can save the lives of many young children.

1 Introduction

The project "Child rescue system against open bore wells" is a technological solution aimed at preventing and rescuing infants and children from accidents that occur due to falling into open borewells. This project uses various hardware components like Arduino Uno, ESP32 cam, robotic arm gripper, and SIM800L GSM module to monitor and rescue infants who fall into open bore wells. Water scarcity is the major problem faced by human society currently. Recently many accidents of children falling in the open bore well have appeared. Very few children have been saved in such accidents. Many were died due to lack of oxygen and lack of time period they had taken to save the child. Even if rescued late, most victims were reportedly injured. This abandoned bore wells have become death pits and started taking many lives especially small children. The incident of losing lives trapped in bore well was highlighted in 2006 where a 5year old child named Prince was rescued by Indian Army experts after a tough combat which lasted up to 49hrs.Report says starting from 2009-2016 more than 36 children fell into the bore well consequently. So saving a child from the bore well became a difficulty and a risky process. A small delay in the rescue process can lose his/her life. Even though the necessary oxygen, increasing temperature and humidity in such depth will be another risk for child life. In order to solve this kind of situation the rescue system is designed to save the child inside the bore well and the design is named as “CHILD RESCUE SYSTEM AGAINST OPEN BOREWELLS” which is sent inside manually and holds back the trapped child systematically.

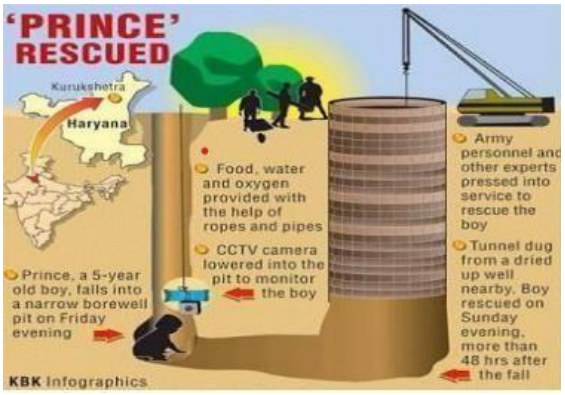
2 Literature Review

In India, open bore wells are one of the major reasons for child deaths. According to a report by the National Crime Records Bureau (NCRB), 368 children died due to falling into open bore wells in the past decade (2010-2019) in India. This shows the severity of the problem and highlights the need for a technological solution to prevent such incidents. Various researchers have worked on developing solutions to prevent such incidents. One such solution is the "Child rescue system from open bore wells using Arduino Uno and ESP32 cam, robotic arm gripper". The project uses a camera mounted on the robotic arm gripper to monitor the infant who has fallen into the bore well. The camera captures live video footage of the infant, which is transmitted to the user's mobile phone through the ESP32 cam. This helps the user monitor the infant's condition and plan the rescue operation accordingly. The robotic arm gripper is controlled by the Arduino Uno and the SIM800L GSM module. The user can send commands through SMS to the GSM module, which then sends the command to the Arduino Uno. The Arduino Uno then controls the robotic arm gripper to pick up the infant from the bore well. This makes the rescue operation easier and faster, as the user can control the robotic arm gripper remotely. Several studies have been conducted on the feasibility and effectiveness of using Arduino-based systems for rescue operations. For instance, the study conducted by Anusha et al. (2020) aimed at developing a rescue system using Arduino and GSM module for 7 disaster management. The study concluded that the system was effective in remotely controlling the rescue operations. Another study conducted by Aruna et al. (2019) aimed at developing a smart

rescue system using Arduino and GSM module for accidents that occur in mines. The study concluded that the system was effective in improving the rescue operations and reducing the time taken for rescue.

3 Existing System

The existing system used for rescuing children from bore wells involves a team of rescue personnel using ropes and pulleys to lower themselves into the bore well and retrieve the child. This system is time-consuming and can take several hours, if not days, to complete. Moreover, the rescue personnel face various challenges during the operation, like the risk of suffocation due to a lack of oxygen in the bore well, difficulty in maneuvering through narrow spaces, and so on.



4 Proposed System

The proposed system for the "Child rescue system from open bore wells using Arduino Uno and ESP32 cam" aims to prevent and rescue infants who fall into open bore wells. The system consists of various hardware components like Arduino Uno, ESP32 cam, robotic arm gripper, and SIM800L GSM module, which work together to monitor and rescue the infant

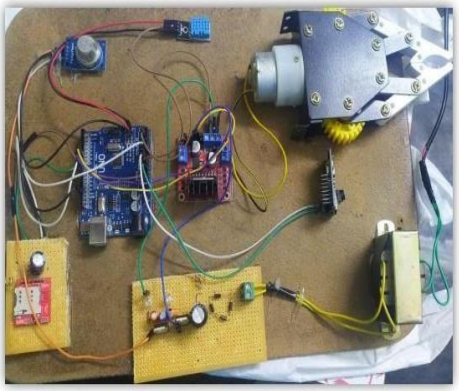
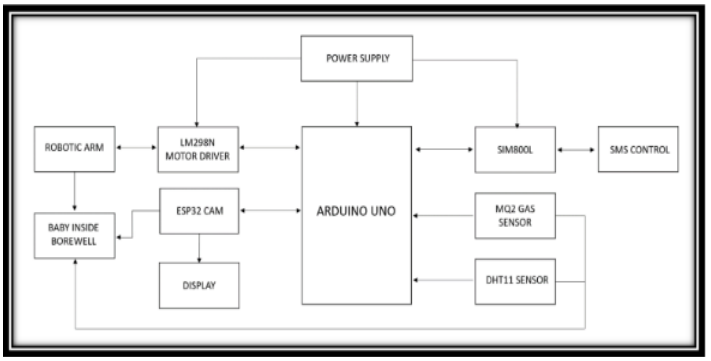


Fig 3.3 Proposed system



5 System architecture

The proposed system for the "Child rescue system from open bore wells using Arduino Uno and ESP32 cam" includes the following components:

• Arduino Uno: The Arduino Uno is the main component of the system. It acts as the brain of the system and controls all the other components. The Arduino Uno receives commands from the SIM800L GSM module and controls the robotic arm gripper accordingly.

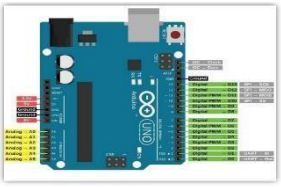


Fig 4.8 Arduino UNO R3

• ESP32 cam: The ESP32 cam is a small camera module that is mounted on the robotic arm gripper. It captures live video footage of the infant who has fallen into the bore well and transmits it to the user's mobile phone through Wi-Fi.

Fig 4.11 ESP 32 CAM

• Robotic arm gripper: The robotic arm gripper is the component that picks up the infant from the bore well. It is controlled by the Arduino Uno and can be moved in different directions to reach the infant.

Fig 4.12 Robotic Gripper Arm

• SIM800L: The SIM800L GSM module is the component that enables the user to control the robotic arm gripper remotely. The user can send commands through SMS to the GSM module,

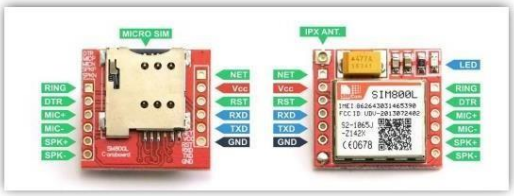


Fig 4.9 SIM800L GSM Module

which then sends the command to the Arduino Uno.

• MQ2 Gas Sensor: The MQ2 gas sensor is a popular gas sensor module used to detect various gases, including smoke, propane, methane, alcohol, and other harmful gases.

Fig 4.13 MQ2 Gas Sensor

It is a small module with a sensitive element, which consists of a sensing material and an electrode.

• LM298N Motor Drive: The LM298N is a dual H-bridge motor driver IC designed to control small to mediumsized DC motors. It can control up to two DC motors with a maximum rated current of 2A per channel and a peak current of 3A per channel.

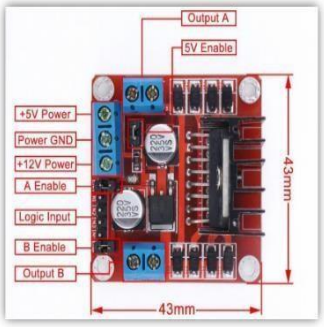
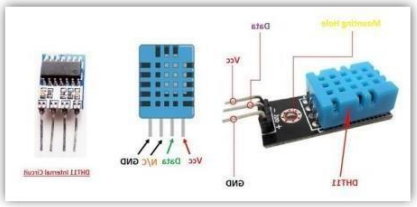


Fig 4.10 LM298N Motor Driver

The LM298N provides bi-directional control, allowing the motor to be driven in both forward and reverse directions, making it suitable for a variety of applications that require motor control.

• DHT11 Sensor The DHT11 sensor is a low-cost, digital temperature and humidity sensor that is commonly used in various projects and applications. It consists of a capacitive humidity sensor and a thermistor to measure the temperature.



• Jumper Wires : Jumper wires are electrical wires used to make connections between two or more points on a breadboard or other electronic circuit. They are often used in electronics projects for prototyping, testing, and troubleshooting circuits.

Fig 4.15 Jumper Wires

6 Advantages

- Quick response time
- Cost-effective
- Remote monitoring
- Easy to use
- Increased safety

7 Conclusion

The proposed system is a feasible and effective solution for preventing and rescuing infants who fall into open bore wells. The system consists of various hardware components like Arduino Uno, ESP32 cam, robotic arm gripper, and SIM800L GSM module, which work together to monitor and rescue the infant. The system operation is simple and can be controlled remotely, which makes it an effective solution for such rescue operation

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