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Smart Borewell Child Rescue System

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Abstract: *From ages, India has been an agricultural country.Most of the cases of child death due to open borewell system have been reported in recent past years. The traditional method used to save the childwas less effective. Traditionally when child use toget stuck in the open borewell the rescue operationused to save the child was more time-consuming. Itincluded the parallel hole dug near the borewell andthen horizontal path was made to reach the child. This method required 40-45 hrs to complete the rescue operation. So the society needs newtechnology which will be more effective and efficient. Therefore new technology consist of the rescuing system module. Rescue module consist ofrobotic arm which helps to drag up the child usingpick and place method..*

Keywords: PIC microcontroller, Robotic arm, DCmotor, Borewell, Bluetooth Module, etc

I. INTRODUCTION

India has been an agricultural nation for ages. The majority of kid death resulting from openborewell systems have been documented in the lastfew years. The child was not as successfully savedby the conventional way. In the past, children would frequently become stuck in the exposedborewell. It took extra time to do the rescue operation that saved the child. It involved digging a parallel hole next to the borewell and creating a horizontal passage to get to the child. This methodrequired more time and more man power to save the child .It takes nearly 40-45 hours to dig the parallel pit, due to that time in most cases child would have died.

So, we are developing a system which is portable and cost effective. The main objective of our project is to save the child without letting any harm to child. Our project consists of rescue systemmodule which includes robotic arm, PIC microcontroller, motor and different sensors. Robotic arm is used to grab up the child fallen into the borewell. Temperature and Oxygen sensors areused to detect the situation of the child.

Fig: Graphical representation of old rescue system

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II. LITERATURE SURVEY

In addition to books and websites, we evaluatedthe following research papers to help us reach our project's final goal: "Rescue System from Open Borewells." The majority of the publications dealtwith the technology that we employed in this project.

The process of creating a method to save a child from a bore well is described by Kavianand.G. It is possible for this system to move within the bore well. PIR sensors in this Smart Child Rescue System enable it to detect just humans, regardless of the surroundingenvironment. This solution uses a Raspberry Pi, which is more expensive than an Arm

The non-human rescue operations are described by Nish Mohith Kurukuti. The legsof the system can be adjusted based on the dimensions of the pipeline. The power supply,actuators, servo motor, and dc motor make upthe system. Using a camera module, the child's position is recorded from the bore welland tracked on a PC. Arduino was interfaced with by the ultrasonic sensor. Since the Arduino lacks an application processor and runs a microcontroller, it is unable to run any kind of operating system. An Ethernet port orvideo output are not available for Arduino.

Manish Raj explains that the diameter of the narrow borewell is difficult for any adult to navigate since it darkens inside and makes rescue efforts difficult. Pneumatic arms are usedby the systemic system to secure a harness to thechild so they can be picked up. To facilitate communication with the youngster, ateleconferencing system is also integrated into the system.

Two supplementary roles to the wider systemicstructures that are currently in place aredescribed by N. Bourbakis and I. Papadakis- Ktistakis. These roles primarily carry outdistinct rescue missions. Here, a research team made up of experts from Ohio State University (micro-antennas) and ATRC-WSU (micro- design, software) is developing the micro-system known as This as.micro-systemic structures in an attempt to support the search for and rescue of those buried beneath rubble. These tiny structures are going to engage.

Sridhar, K. P. Hema, C. R. S. Deepa detailed a wireless sensor fusion system that may effectively support the paramedical team and rescue operation in the mechanical gripper systemic arm. In order to gather vital information from the bore well, including temperature, CO, humidity, and other gaseous levels, many sensors are interfaced to the wireless sensor fusion system. This allows the system to monitor the child's status inside the bore well. A pic microcontroller, which operates at a slower pace than an arm, is employed in this setup.

According to Nitin Agarwal et al.'s project work, "Child Rescue System from Open Bore wells," their idea is a rescue system that can enter the same bore well and carry out specific tasks in order to save the child. There is a high power LED light source and a CCTV camera. Their project involves a number of process development steps, starting with computer design and hand-drawn sketches. Their system is equipped with contemporary machinery that uses lightweight servo motors. Their project is managed by humans.

In their project "Smart Bore Well Child Rescue System," Prakash S. et al. have detailed how tosave a child who has fallen into an open bore using a battery-powered device that runs on a 12-volt battery. This robot may be controlled remotely, and it will descend the bore well and carry out the task. Their mission was to create a robot that could hoist a child using a balloon. Using wireless ZigBee technology and a wireless camera, the robot is controlled via a PC.

In their project "Child Rescue System in Borewell," Anupriya Ashtekar, Pooja Chinagundi, Apoorva Khanagoud, Sanmati Bedakihale, and Kusuma Dasappanavar To findthe child, the method comprises of a camera linked to a rope lowered into the borewell. Thecamera gives the above-ground rescuers a live video feed that lets them find the child and determine how well they're doing. A second rope equipped with a harness is lowered into the borewell to safely remove the youngster once ithas been located. It accomplishes rescue missions far faster than people. It can carry out formal pipeline inspections in areas inaccessibleto humans.

A. Rajesh*4, K. Vinay*3, D. Bhanu Prakash*2, and V. Sumana Sri Reddy*1 "An Arduino- Powered Smart Child Rescue System from OpenBorewell "Explain This research suggests an effective method that aids in freeing a victim who has become stuck in farewell. This device comprises of a DC motor assembly that slides a plate mechanism to prevent children from falling into the borewell. It is automatically controlled by a motor driver. When a child falls into the borewell, the PIR/IR sensors detect it, and the motor-driven plate automatically closes theborewell to prevent the child from slipping below. Additionally, it uses the GSM interfaced to the system to automatically send the same information, together with the location details, via SMS to the relevant departments or authorities.

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Professor Gangadhar1 Mr. Deepak3, Ms. HeenaParveen4, and Ms. Akshatha H2 They do not need to dig a hole parallel to the bore well, as described in their alternate scenario for the "Smart and Safe Child Rescue System" project. They are therefore including IR sensors to makethis idea better. When these sensors detect the presence of a youngster, an LCD display will show the message and a buzzer will sound. The notification will be forwarded to the local policestation and person when the child falls inside the bore well. As a result, saving the child can be done quickly and without any problems.

III. PROPOSED METHOD

Block Diagram:

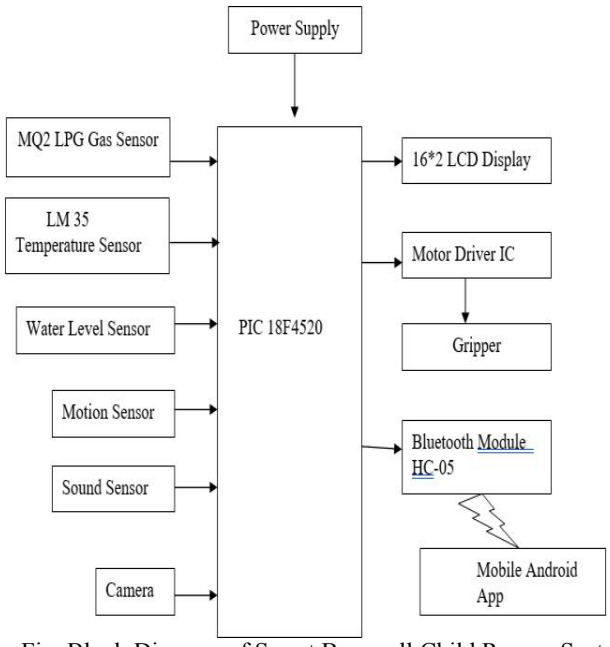

Fig. Block Diagram of Smart Borewell Child Rescue System.

Step-by-step operation of the Smart Borewell Child Rescue System project is,

First Alert Reception: A child has fallen into a borewell, and the system has received an alertabout it. This alarm may have come through the Android app.

Site Assessment: Before deploying the system, emergency personnel assess the location. Sensors for motion, temperature, sound, and gas analyze the surrounding environment and possible threats. The presence of hazardous gases is detected by thegas sensors. When something is detected, an alarmis set off, and rescue efforts are halted to protect the rescuers. The water level in the borewell is monitored by the water level sensor. The borewell is filled with water and dangerous to enter if the water level is higher than a specified threshold.

Create Command Center: A command center iscreated, maybe equipped with an LCD screen to visualize data in real time. Bluetooth facilitates communication with the system, enabling remote control and monitoring. Equipment Deployment: To locate the youngster visually, cameras are lowered into the borewell. Mechanisms for grippers are ready for any extraction work that may come up.

Rescue Phase: the robotic arm is deployed if it isdetermined that the environment is safe. The PIC controller uses the sensor inputs to determine howto move the arm. To grab the child, it delicately lowers the gripper into the borewell. The gripper is made to be both safe and delicate so as not to hurt the infant. The arm raises the child out of theborewell once they are firmly grasped.

Safety Features: To guarantee the child's safety aswell as the rescuers', the technology includes a failsafe. Any sensor that picks up on dangerous situations instantly stops the rescue effort andsends out an alert.

All things considered, the smart borewell childrescue system employs robotics, sensors, and communication modules to effectively and securely rescue child from borewells.

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IV. COMPONENT DESCRIPTION

PIC 18F4520 controller:

Fig: PIC 18F4520 Microcontroller

The core processing unit of the system is the PIC controller. The system is managed by a camera anda number of sensors that offer input. The control device is used to remotely monitor and operate thechild rescue system.

The PIC features a data register map with a 12-bit address bus 000-FFF and a data memory of up to 4k bytes. Split up into banks of 256 bytes each, there are a total of F banks. Regardless of the bankchosen, half of bank 0 and half of bank 15 combineto generate a virtual (or access) bank that can be accessed using 8-bits.Within the PIC18, there is a separate program data bus and address bus that allow access to the 16-bit program memory. The system's program and static data are stored in program memory.

Temperature Sensor:

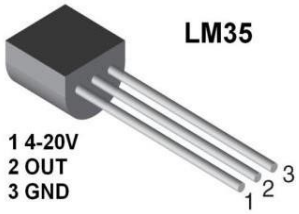

Fig: LM35 Temperature Sensor

Here we are using the LM35 temperature sensor. The output voltage of the analog, linear LM35temperature sensor changes linearly as temperature changes. National Semiconductors makes the three terminal linear temperature sensor, model number LM35. It is capable of measuring temperaturesbetween -55 and +150 degrees Celsius. For every degree Celsius that the temperature rises, the LM35's voltage output increases by 10mV. The standby current of an LM35 is less than 60uA, andit can run on a 5V supply.

Gas Sensor:

Fig: MQ2 Gas Sensor

For the detection of gas leaks in homes and businesses, the Grove-Gas Sensor (MQ2) module is beneficial. It works well for detecting alcohol, smoke, propane, H2, LPG, CH4, and CO. Its quickresponse time and great sensitivity allow measurements to be conducted as quickly as possible. A potentiometer can be used to change the sensor's sensitivity.

Water Level Sensor:

The water level sensor keeps track of the water level in the borewell. A float switch is a tool for determining the liquid level in a borewell. A pump,an indicator, an alarm, or any other device may beactivated by the switch. A float switch's function isto open or stop a circuit in response to changes in aliquid's level. The majority of float switches are "normally

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closed," which means that when the float is at its lowest point and rests on its bottom clip orstop, the two wires flowing from the top of the switch complete a circuit.

Fig: 52 mm pp liquid Water Level Sensor

Motion sensor:

Fig: PIR Motion Sensor

Motion is detected using a PIR sensor.The PIR sensor comprises two slots, each composed of a unique infrared-sensitive substance. Both slots detect the same quantity of infrared radiation (IR) from the walls, the room, and the outside environment when the sensor is in the idle state. Apositive differential change occurs between the twohalves of the PIR sensor when a warm body, such as a human or animal, first intercepts one side of the sensor. The opposite occurs when the heated body exits the sensing region, in which case the sensor produces a negative differential change. What is detected are these change pulses.

Robotic arm and gripper system: The robotic arm and gripper device grab the child and lift themout of the borewell. With the gripper system, the youngster is held in place by the robotic arm.Mechanical arm powered by a DC motor.

DC Motor: DC motor is used to manage themovement of the robotic arms.

LCD Display: LCDs are available in a variety ofsizes and shapes; the most popular is the 16- character, 2-line display without a backlight. It only needs 11 connections three control lines, eight bits of data, and a 5V DC supply and uses about 1mA of current.

V. CONCLUSION

Borewell child rescue system is significant way tosave the life of victim of borewell accident. The current design of rescue system has been made to suit every possible situation may occur in rescuing operation. The project is mainly designed to save many lives of children who fall inside the bore well. In the past few years, lots of lives had been lost by falling into the bore well because digging aaway from the borewell is quite risky and time consuming process. By using PIC microcontroller, gripper, many sensors, a robotic arm, etc. and advanced technology this project can be implemented successfully. This can be concluded that the proposed system can retain the lives of many children who fall into the bore well in futurein short time. The project work “Smart borewell child rescue system” is designed and developed successfully. For the demonstration purpose, a prototype module is constructed and the results arefound to be satisfactory. Since it is a prototype module, a simple module is constructed, which canbe used save lives of the into the borewell in quicktime.

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VI. RESULT

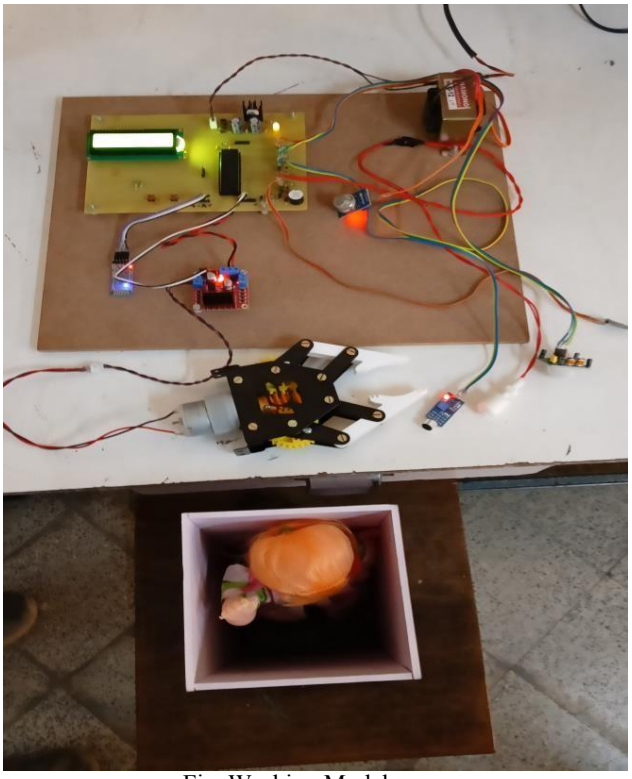

Fig. Working Model

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