Abandoned Borewell Child Fall Rescue System

Mrs. Aarthi Elaveini, Assistant Professor, Department of ECE, SRM Institute of Science and Technology- Ramapuram
S Dhivya, B Tech student, Department of ECE, SRM Institute of Science and Technology- Ramapuram
S Preethi, B Tech student, Department of ECE, SRM Institute of Science and Technology- Ramapuram
Rishitha Angaluri, B Tech student, Department of ECE, SRM Institute of Science and Technology- Ramapuram
Reshma Ramesh, B Tech student, Department of ECE, SRM Institute of Science and Technology- Ramapuram

Abstract Due to various factors our ground water table has gone down and hence borewells are being dug deeper. These borewell tend to be very narrow and deep, due to this there have been various cases in which small children accidently fall inside the borewell and get trapped. When a child gets trapped inside the borewell, the above the borewell will be unaware of the situation down there and the rescue mission might take a long time. To prevent all this from happening here we propose to detect the child fall and automatically deploy robotic arms to grab the child before the child gets stuck deep inside.

Keywords: borewell, borewell rescue system, robotic arms, child fall detection

I. INTRODUCTION

Borewell are the connections made by humans to reach ground water table. The depth of these borewell depend on the availability of water under the ground. Due to water scarcity now a days borewell are dug deeper. They are generally 4 ½" to 12", as they are narrow children often don't notice it and fall inside the dark and deep borewell. As they are narrow getting inside the borewell to rescue the child is not possible. Previously over 20 incidents occurred in different parts of India. Few of them were rescued using methods developed by the army personals such as digging a parallel pit to the borewell and then reaching the child. Unfortunately, many of them lost their lives inside the borewell, as they are stuck inside a dark place with very less oxygen to breathe and also due to the lack of food and water. These borewell sometimes tend to be dangerous as they might have some toxic gas inside them. The most recent incident that covered up whole media was a two-year-old Sujith Wilson's case. He was stuck inside a borewell for more than 72 hours. As it was a hilly terrain the rescue mission had taken lots of time to reach the child. After a long struggle, the child succumbed to death. This show casted light upon the very same incident that had been taking place year after year and it's seriousness. This showed how important it is to close the unused borewell.

Inexplicably, past few years saw repeat incidents of innocent children becoming victims of thhese uncovered borewells. In September 2013, a six-year old girl child met her fate after falling into a borewell in Pulavanpadi village in Tiruvannamalai District. Another news just after the previous one, A three-year-old girl, R Madhumita, got stuck at about 30 feet of a 500-feet borewell at her father's farm at Pallagaseri village near Villupuram in April 2014.She fell into the borewell which was covered with many polythene sacks, when she stepped on it accidentally while playing. After a 19-hour long struggle, she was rescued alive by multiple teams working tirelessly, but unfortunately she died in a hospital. In the same year, a four-year-old boy Harshan accidently fell inside a borewell that was left open in a farm, also located in Tirunelveli district. Rescuers used newly developed technologies for more than five hours and brought the child out alive. Just a day after the successful rescue, an 18-month old baby fell inside an unused borewell at Tiruvannamalai. Many of these innocent kids have been the victim to this never ending problem.

Fig 1 Child stuck inside a borewell.
Image courtesy: India Today

Several such mishaps have occurred in other parts of the country as well, including neighboring Karnataka, Telengana, Punjab, Rajasthan, Madhya Pradesh, Guraon .

As an act prevent any more of this to take place, supreme government framed a set of guidelines. Yet, still these incidents take place. This system hopes to bring about a change, by preventing the child from falling inside these open borewells.

II. EXISTING SYSTEM

As child falling into the borewell has been happening for past 15 years, several rescue and prevention methods had been designed. As a part of rescue system parallel pits were dug to borewell to reach the child, second is a rescue robot. This rescue robot has a harness connected to it uses the vest like structure to carry the child out of the borewell.
As a prevention method, a blockage at 5 feet or 10 feet this will stop the child from getting deeper into the borewell.

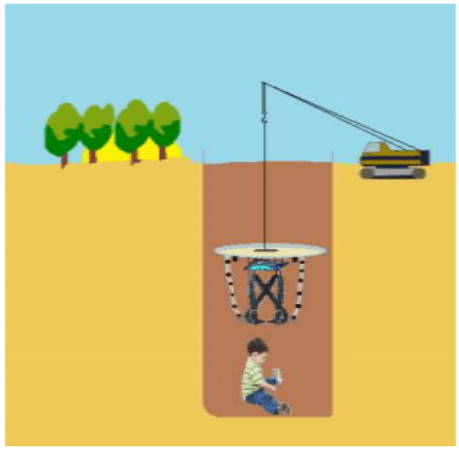

Fig 2 Robot used for rescuing child inside the borewell

.

II. PROPOSED SYSTEM

There are currently two systems in force to effectuate to rescue a child trapped in a borewell. One method is by digging a tunnel parallel to the borewell and the other one is deploying a robot to rescue the child. Both of them have their own drawbacks. In the parallel tunnel system, the digging needs to be done every carefully as of not to harm the child by causing any mud slides in the borewell. This also might take many days which might lead to any mishaps. The latter system which is the robotic system; this might not know the exact condition inside the borewell and the position in which the child is stuck hence pulling out the child without any analysis might be dangerous.

To overcome the above-mentioned problems, here we incorporated the system with the borewell. This system will detect the free fall of the child and immediately activate the robotic arms which will rescue the child before it goes too deep inside the borewell.

III. Block Diagram

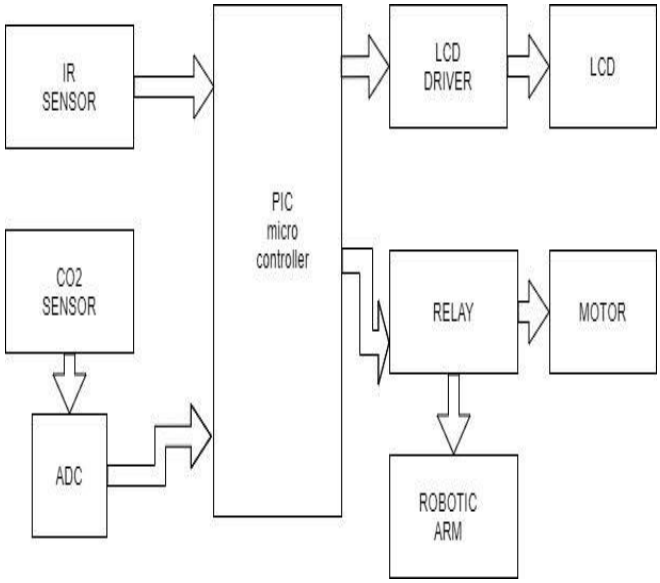

FIG 3: Block Diagram of the system

1) SYSTEM ARCHITECTURE:

A. IR SENSOR:
IR LED emits infrared radiation; this radiation reaches the surface in front of it and reflects back to the IR receiver. The amount of reflected radiation depends on the reflectivity of the surface in front of it. This light varies the voltage and thus it is used to detect motion of any object. In this project IR sensor is used to detect the motion of anything passing across it. When a child falls accidently, he/she will activate the sensor. This output from sensor will go to the micro controller for further process.

FIG 4: IR Sensor

B. TWO RELAY BOARD:

Relay is electromechanical device actuated by electric current. These operate with low power input yet conduct high currents. These are used here as the power signal from the microcontroller needs to be improved and also as to conduct various high current operating element such as the DC motor and the robotic arms.

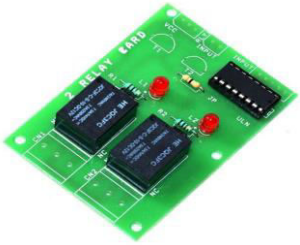

Fig 5: Two Relay board

C. PIC MICRO CONTROLLER:

This board is built with PIC16F877A as a microcontroller unit. The input supply to the board can be fed from both ac and dc. A serial communication is achieved by an UART protocol. The output can be monitored in LCD as well as pc. This micro controller is used to interface between hardware and software. This is programed to work based on the sensor output then directs the rescue device.

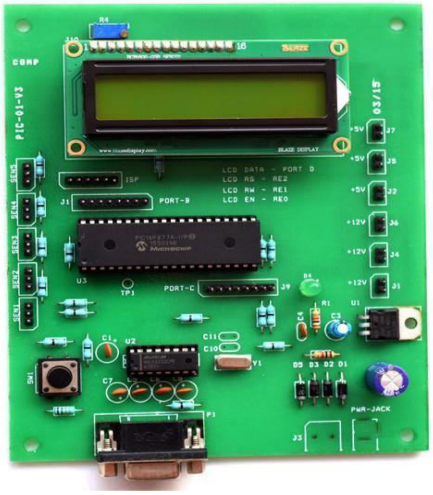

FIG 6: PIC ASSEMBLED PCB+UART+LCD

D. ROBOTIC ARMS:

As the rescue device robotic arms are used. These are run using a DC motor. As the borewell is too narrow and since the width might vary, here in the system an adjustable type robotic arms are used. These will help in adjusting themselves for the required dimension.

IV. METHODOLOGY

The steps involved in abandoned borewell child rescue system is:

1) An IR sensor is used to sense the movement or the free fall of the child

2) The output of the IR sensor is sent to the PIC microcontroller

3) This microcontroller processes and computes the details and then displays the data.

4)The robotic arms are activated; these are automatically programed to pull the child out of the borewell.

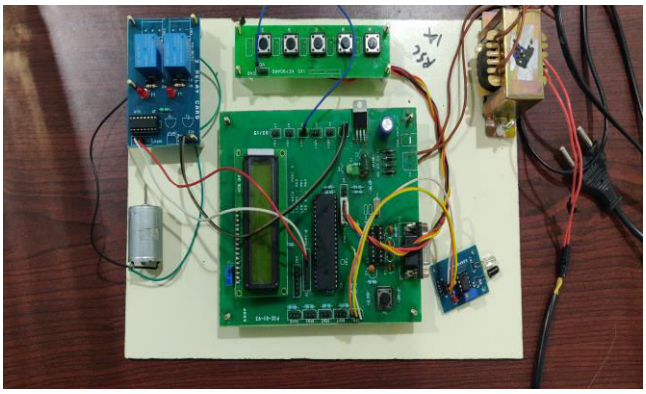

FIG 7: Hardware Module

V. CONCLUSION

Over the years, several lives were lost by falling into the borewells. The rescue process involved the usage of high-power machinery and also consumed several man hours. The proposed system intends to lessen both the usage of machinery and the time that is consumed in rescuing the victim.

VI. FUTURE SCOPE

The proposed can be further improved by adding or modifying the following features:

1) Blockage can be created every 5 to 10 feet to stop the child from falling further deep in the borewell

2) Designing a robotic arm that can be controlled using human gestures and that can mimic human arm movements

3) Automatic borewell closing system can be developed; if any human activity is present borewell close automatically.

VII. REFERENCE

[1] B. Bharathi, B. Suchitha Samuel "Design and Construction of Rescue Robot and Pipeline Inspection Using Zigbee" International Journal Of Scientific, Engineering and Research (IJSER) Volume 1 Issue 1, September 2013.

[2] Kavianand G , Gowri Ganesh K, Karthikeyan P "Smart Child Rescue System from Borewell(SCRS)" The Institute of Electrical and Electronics Engineers (**IEEE**) , 2016

[3] Manish Raj, Arpit Bansa, A MakhaI, P.Chakrabort and G.C.Nandi "An Approach Towards Rescue Robotics In Bore Well Environment" The Institute of Electrical and Electronics Engineers (**IEEE**) , April 2014

[4] K. P. Sridhar, C. R. Hema, S. Deepa "Design of a Wireless Sensor Fusion System to Analyze Conditions Inside Bore Wells" Springer Science+Business Media New York, April 2016

[5] Aashvij Shenai, Dawnee Soman, Abhijeet Antin, Pallvai R "Development of In-Pipe Robot for Assisting Borewell Rescue Operations" The Institute of Electrical and Electronics Engineers (**IEEE**) , 2018

[6] Palwinder Kaur, Ravinder Kaur, Gurpreet Singh "PIPELINE INSPECTION AND BOREWELL RESCUE ROBOT" IJRET: International Journal of Research in Engineering and Technology, April 2014

[7]CO2 sensor – data sheet from google.com

[8] Details on the past incidents – India today