Real Time Implementation of an Advance Child Rescue System for Open Bore well

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Abstract: *The past few years' water scarcity is the major problem in our society. The level of the water has become down, so many bore well has been dug and it is left uncovered properly which has become the death pits of many children and has taken the lives of many children. The time taken to rescue a child from an bore well takes about more than 72 hours .Due to an lack of an proper oxygen and humidity, the lives of an many child couldn't be saved. Recent survey says that about 10 of them 3 were rescued after a long process. This has become challenging nowadays. The main aim of this technique is to rescue to an child safe within an short period. The paper presents a simple and effective method to rescue the child from the bore well. The traditional way to rescue the child is to dig a parallel pit t adjacent to the bore well. This method is difficult, lengthy and also risky to rescue the trapped child. In the proposed method mechanical system moves inside the bore well channel and moves its gripper arm in accordance with the user commands given. The hardware is interfaced to the Android app and microcontroller setup is used to control the mechanical set up.*

Keywords: Bore well Accident, Child Rescue, Sensors, Controller, Wireless Control via Android App

I. INTRODUCTION

There is no proper technique to rescue victims of such bore well accidents. The existing technique[4] which involves digging the parallel hole to rescue the child next to the bore well in which the child has trapped actually. Moreover, it involves a lot of energy and expensive resources which are not easily available everywhere and in this process, we always need big space around the trapped bore that we can dig a parallel bore. These ad-hoc approaches involve heavy risks, including the possibility of injuries to the body of the subject during the rescue operation. Also, the body may trap further in the debris and the crisis deepens even more means death. In most cases, we rely on some make shift arrangements. This does not assure us of any long term solution. In such methods some kind of hooks are employed to hold the sufferers clothes and body. This may cause wounds on the body of the subject. The successive technique involves manual work. It is not only a time taking process, but also risky in various ways. The advent of new high-speed technology and the growing computer Capacity provided realistic opportunity for new robot controls. Recently many accidents occurred in India. Forty five deaths of children have been reported in the country since September 2009[2], from that we have only nineteen with the proof of a newspaper(refer table no 2.1) After studying all the cases, we found a solution to do, which results a robotic machine which can go through the trapped bore well without any support

Many developments has been introduced in an science and technology, which brings an lot of improvement in science and it leads to an development of an country, on the other side the major problem faced by an all is an water scarcity. The level of water become down, so many holes has been dugged and left uncovered properly. Recently in a Punjab the accident has occurred due to the carelessness and improper coverage of a hole, 3 years old child has been fell into a bore well, and after a long time child has been rescued. The time taken for an rescue process may takes about more than 3 days .The main cause for an death is that an rescue process it takes more time ,and an oxygen that is present inside an hole is insufficient, and presence of many toxic gases inside an bore well leads to an death pits of many children. Recently, in Tamilnadu an 2 years old child surjith has been fell into a bore well which is left uncovered properly, he has been fallen due to the play full activities and the carelessness of the parents. They try to rescue a child from a hole

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by manual process but they couldn't adopt the technology. No more equipment were available still now for rescue process .so they use of an big machines for an rescue process .The time taken to bring these equipments takes More than one day. They tries to rescue a child manually, the level of a child has gone down. So they use of a new Technology, by paralleling digging a horizontal hole and by rescuing the child. While drilling a parallel hole and vibrations causes ground quakes and disturbs the child. The hole is fully covered with sand which leads to a death of a child inside a hole.

II. LITERATURE SURVEY

A. Major problem faced by the human society was water scarcity which is analyzed by Bharathi and Suchitha. Due to drought and depletion of underground water, more bore wells are drilled on the surface of the earth. In many areas, the bore wells are drilled and left open without any proper covering. These bore wells became death pits and started taking many lives especially small children. Now a days falling of children in bore wells are increasing due to carelessness and playful activities of the children. The hole dug for the bore wells are deep around 700 feet. In these cases, the rescue of child from such deepest bore well is quite challenging.

B. Bharathi describes the design of a robot for rescuing the child from bore well. This robot is capable of moving inside the bore well, according to the human comment by PC and also pick and place based on the arm design. This robot is operated through PC with the help of wireless Zigbee technology and wireless camera which gives both the audio and video signals on the TV. The high power LED in the robot acts as a light source in the pipe where the light intensity is low. It is a low cost human controlled robot used to monitor and gives an insight view of rescuing the child safely.

C. Palwinder Kaur describes the rescue operation without human intervention. Here the wheeled leg mechanism is designed to go inside the pipe and the legs are circumferentially and systematically spaced out apart. The robot can adjust its legs according to the pipeline dimensions. The robot has consisting of power supply, switch pad and gear motor. The child position is captured from the bore well with USB camera and monitored on PC. The LM35 temperature sensor and 16*2 LCD are interfaced with pic 16F877A microcontroller to sense and displays on LCD. Manish Raj describes as the diameter of the bore well is narrow for any adult person and light goes dark inside it, the rescue task in that situation is challenging. The robotic system which will attach a harness to the child using pneumatic arms for picking up. A teleconferencing system is also attached to the robot for communicating with the child.

D. John Jose Pattery describes the facility that monitors the trapped child, supplies the oxygen and provides a supporting platform to lift up the child. The first motor placed at top turns a gear mechanism which in turn pushes 3 blocks arranged at 120 degree from each other towards the side of the bore well. The bottom shaft is turned by 130 degrees with the help of second motor, thus helping to locate the gap through which the lifting rod is adjusted by third motor. When the diameter is adjusted, the forth motor helps the lifting rod to screw its way through the gap towards the bottom of the child. Once lifting the rid reaches a safe position under, an air compressor is operated to pump air to the bladder attached to the end of lifting rod through an air tube that runs downwards inside the lifting rod. The bladder provides a safe seating to the child. Them the first motor is reversely operated so as to unclamp the system. Simultaneously it is lifted out of the well using a chain or rope.

III. METHOD OF DISEASE DETECTION

The entire system is manually controlled by the user. The functional block diagram of Borewell Rescue System is as shown in figure:

All the parts of the system are controlled manually outside the borewell using 2 DPDT Switches (1 for rotating DC motor clockwise and anticlockwise, 2 for the opening and closing of the claws). System is taken inside the borewell using pulley and rope mechanism to reach up to the child by visualizing through camera A/V output. Child live position is captured through camera and communication is done with the child with the help of mic and an operational amplifier 7805. The harness of the system used in two arms is very soft so that it do not hurt the child while gripping. The system is rotated using DC motor according to the child position the child is gripped from suitable position and then the system is taken out from the borewell by pulling the rope. Hence, the child can be safely taken out from the borewell using this mechanism.

The Smart and Safe child Rescue System consists of Temperature sensor (LM35), Gas sensor (mq4), Oxygen tube, Web camera and the clipper. The sensors are under the control of Atmel microcontroller and are attached with the clipper. The clipper is controlled by the DC motor. The hands of the clipper are tied up with the rope of 90cm and is inserted inside the hole manually. A Web camera (5MP) is fixed in the arm facing the ground through which we can view in PC and can come to know the status of the child inside the well. Since it is not a night vision camera an LED fixed with it. Once it is inserted the temperature sensor senses the temperature of the environment and shows the result in the LCD and then within a second the gas sensor detects the gas and displays the result in LCD.
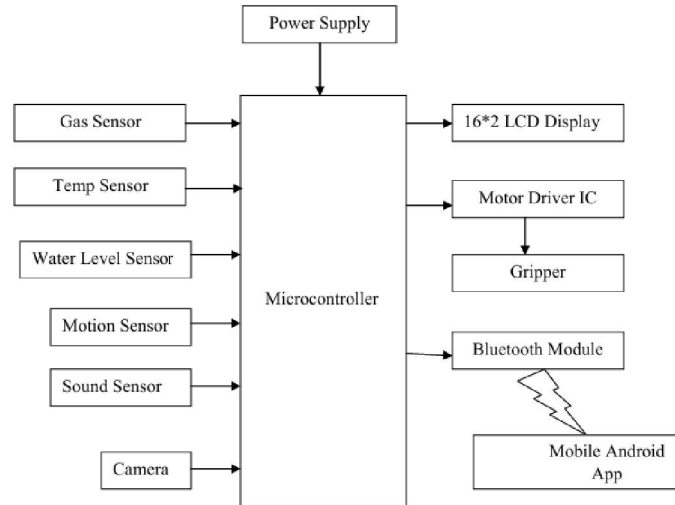
Fig. 1. Block Diagram

A. PIC18f4520 Microcontroller

The Data Memory up to 4k bytesn Data register map - with 12-bit address bus 000-FFF

- Divided into 256-byte banks
- There are total of F banks
- Half of bank 0 and half ofbank 15 form a virtual (oraccess) bank that is accessibleno matter which bank isselected – this selection isdone via 8-bits
- Program memory is 16-bits wide accessed through a separate program data bus and address bus inside the PIC18.
- Program memory stores the program and also static data in the system.
- On-chip program memory is either PROM or EEPROM
- The PROM version is called OTP (one-time programmable) (PIC18C) The EEPROM version is called Flash memory (PIC18F).
- Maximum size for program memory is 2M n Program memory addresses are 21-bit address starting at location 0x000000

Fig. 2. PIC 18f4520

B. DC Motor Gripper

- The Gripper module is state of the art robotic arm designed indigenously by Robomart. It can be used in various 'pick and place' kind of robots. It works on DC Motor (9 to 12V DC). Change in rotation direction of the DC Motor, generates Jaw Open & Close Action.
- The DC motor can be easily be controlled with the help of DPDT Switch (manual mode) or with the help of any microcontroller along with L293D Motor Driver module. Give an extra functionality to your robots by adding a fully functional Robot gripper to them.
- Gripper assembly Plates. 2x (Fiber Grippers). 1x (45 RPM DC Metal Geared Motor). 1x (Worm Gear). 2x (Spur Gear).
- Application: DIY projects requiring Robot Arm Gripper. Pick and Place Robot.
- Package Include 1 x ROBOT GRIPPER ARM

Fig. 3. DC Motor Gripper

C. HC05 Bluetooth module

- HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration.
- Bluetooth serial modules allow all serial enabled devices to communicate with each other using Bluetooth. As HC-05 Bluetooth module has 3.3V level for RX/TX and microcontroller can detect 3.3 V level, so, no need to shift transmit level of HC-05 module. But we need to shift the transmit voltage level from microcontroller to RX of HC-05 module.
- The data transfer rate of HC-05 module can vary up to 1Mbps is in the range of 10 meters
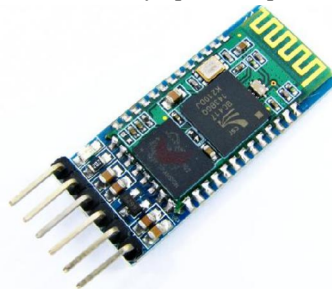

Fig. 4.HC05 Bluetooth Module

D. Gas Sensor

- MQ series sensors use a small heater inside with an electro chemical sensor in order to measure the different kind of gases combination Here, MQ4 gas sensor is used which senses the methane gas, natural gas and all hazardous gasses easily with the range sensitivity from 300 to 10000ppm. It is low cost sensor and can be easily plugged with the Arduino boards. The threshold value for MQ4 is 500ppm.
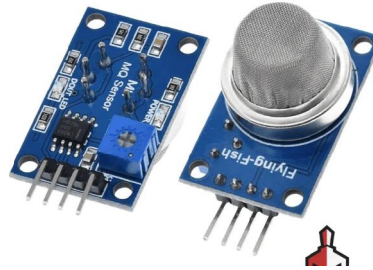
Fig 5: MQ GAS Sensor

E. PIR Motion Sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications.
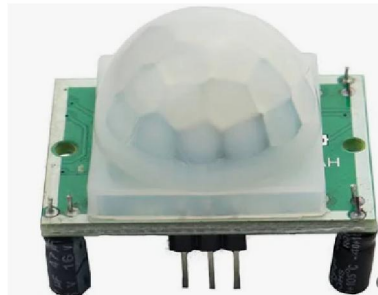

Fig. 6. PIR Motion Sensor

F. LCD Display

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.
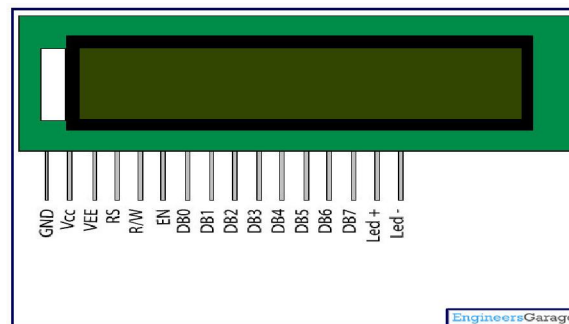

Fig. 7. LCD Display

IV. CONCLUSION

The proposed system is tested with a test object (stuff doll) and is observed the performance of the system is quite satisfactory in rescuing operation also completed in very less time compared to traditional methods. The prototype has been designed keeping the possible practical issues in mind. The structure can be made strong enough to sustain all possible loads. A high resolution camera is used in the system to identify the position of the baby The gripper

mechanism is operated using a android app from Bluetooth module in order to rotate the arm (to align in proper position) and to open and close the grippers on the arm.

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