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BOREWELL RESCUE ROBOT

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Abstract – *An innovative concept proposed in this paper is to handle bore well rescue operation. Children often falls down in bore hole which is left uncovered and get trapped. It is difficult as well as risky to rescue trapped child from bore hole. Hence we propose a system of designing robots for the rescue of a child in a bore hole. We aid the child by continuous monitoring and supply of necessary items to survive using technical methods. Bores which yielded water and subsequently got depleted are left uncovered and small children without noticing get trapped inside. To aid in such a life threatening situation we hereby propose 'bore well rescue robot'.*

Key Words: **Bore well rescue robot, Atmega 8**

1. INTRODUCTION

In order to meet the ever increasing demand for water bore wells are dug. But these are usually left uncovered and children often fall down. Normal rescue operation strategy involves digging a parallel pit to achieve the child and adjacent holes are made to walls of bore well. But these are time consuming and may cost life. A multifunctional, reprogrammable and intelligent manipulator designed to perform a task is a 'robot'. Using a robotic structure it is possible to rescue a child within a short time.

1.1 OVERVIEW

Robot for bore well rescue offers solution to this situation. It is fast, economical and safe. It has the facility to monitor trapped child, supply oxygen and provide a supporting platform to lift up the child. This system will attach a harness to child using robotic arms for picking up. It includes an ultrasonic sensor to calculate the distance to the child. A temperature sensor is used to measure temperature. An APR module is attached to robot for communicating with the child. The robotic arm has motor attached to it for picking and placing.

The proposed system will easily rescue the child within short time without major injury. Visualizing the child is made possible with infrared waterproof cameras and a high resolution TV monitor. This is a light weight machine that will go down into the bore well pipe and save the child's life systematically by performing the required action.

2.EXISTING SYSTEM

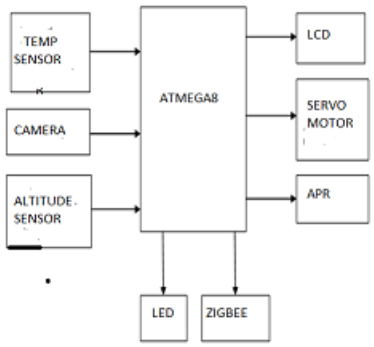
The main objective of this project is to make it possible for a child fall inside bore well to rescue without any injury. This goal is achieved by controlling a robot to take of the child inside the bore well which is controlled by the person from outside. In existing system, a big hole is dug beside the bore well up to the depth where the child is stuck. A small delay in this resources accumulation may reduce the chances of saving child alive. If the area beside the bore hole contains rocks below certain depth, in such cases the chance of saving child alive is very low. Lack of oxygen inside the bore well and lack of light sources causes the major difficulty during the rescue operation. There is no such special equipment for rescuing the child trapped inside the bore well. There is no proper technique to rescue victims of such accidents. When the local arrangements do not work, army is called in. In most cases reported so far, a parallel hole is dug up and then a horizontal path is made to reach to the subject's body. It is not only a time taking process, but also risky in various ways. 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 trapped bore that we can dig. Whatever may be the case the success ratio depends on lots of factors like availability of time taken for transportation of machinery to the situation, human resources and mainly the response time of various government organizations. In India according to the NCRB report of 2011 there are 5 average deaths per day in the license bore wells. At present there is no proper solution for this problem; in this paper the model of a

robot arm which can be used for rescue operation is explained.

3 PROPOSED SYSTEM

This work is aimed towards the construction and designing of a robotic system to work in borehole rescue operations and to detect faults inside the pipeline. The robot has arms at its front to pick and place the objects.

3.1 TRANSMITTER BLOCK DIAGRAM



TEMPERATURE SENSOR:

Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. **LM35** is a precision IC temperature sensor with its output proportional to the temperature (in ºC). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor. It also possess low self heating and does not cause more than 0.1 ºC temperature rise in still air. The operating temperature range is from -55°C to 150°C.

CAMERA:

Closed-circuit television (CCTV), also known as video surveillance, is the use of video cameras to transmit a signal to a specific place, on a limited set of monitors. It differs from broadcast television in that the signal is not openly transmitted, though it may employ point to point (P2P), point to multipoint, or mesh wireless links. In industrial plants, CCTV equipment may be used to observe parts of a process from a central control room.

ALTITUDE SENSOR:

HC SRO4 is a low cost, high accuracy altitude sensor. Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:

- Using IO trigger for at least 10us high level signal,
- The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.
- If the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.

Test distance = (high level time × velocity of sound (340M/S) / 2

LED

A LED is a two-lead semiconductor light source. It is a p–n junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron-holes within the device, releasing energy in the form of photons. LEDs are just tiny light bulbs that fit easily into an electrical circuit. But unlike ordinary incandescent bulbs,. The lifespan of an LED surpasses the short life of an incandescent bulb by thousands of hours.

SERVOMOTOR

Servo motor is used to operate the arms of the robot. The servo motor is actually an assembly of four things: a normal DC motor, a gear reduction unit, a position-sensing device (usually a potentiometer—a volume control knob), and a control circuit. The function of the servo is to receive a control signal that represents a *desired output position of the servo shaft,* and apply power to its DC motor until its shaft turns to that position. It uses the position-sensing device to determine the rotational position of the shaft, so it knows which way the motor must turn to move the shaft to the commanded position. The shaft typically does not rotate freely round and round like a DC motor, but rather can only turn 200 degrees or so back and forth.

The servo has a 3 wire connection: power, ground, and control. The power source must be constantly applied the servo has its own drive electronics that draw current from the power lead to drive the motor.

The control signal is pulse width modulated (PWM), but here the duration of the positive-going pulse determines the position of the servo shaft. For instance, a 1.520 millisecond pulse is the center position for a Futaba S148 servo. A longer pulse makes the servo turn to a clockwise-from-center position, and a shorter pulse makes the servo turn to a counter-clockwise-from-center

position. The servo control pulse is repeated every 20 milliseconds.

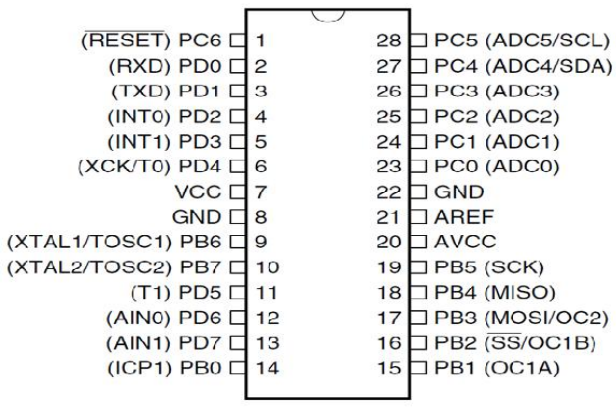
APR

Being able to capture sound, store it and play it over and over again at regular intervals while at the same time, saving the digital data to storages it will be helpful for a child inside the bore well to hear the sound of their parents and come out of fear. For the record, our Digital Audio Recorder will capture a single (mono) analog audio channel with a sample rate of 22.05kHz, 8-bit sample depth and store it as a Windows WAV file with up to 4GB file size on a micro SD flash card. Now before you yawn in excitement at those specs, remember, we're doing this with a 16MHz processor, just 2KB of RAM and 32KB of programming space.

MICROCONTROLLER:

ATMEGA8

ATmega8 is a low-power CMOS 8-bit microcontroller based on the AVR RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega8 achieves throughputs approaching 1 MIPS per MHz, allowing the system designer to optimize power consumption versus processing speed. ATmega8 microcontroller has 23 programmable input/output (I/O) pins which can be used for interfacing with external world. It is possible to configure them as input or output by setting a particular register value through programming. This IC comes in 3 different packages, but we are using the popular 28-Pin PDIP package (Atmega8-16PU). Note that Atmega8 is available in 2 versions; ATmega8 and Atmega8L. Atmega8L is a low frequency version which works up to 8MHz frequency. All of these I/O pins have secondary functions, which are shown in parenthesis on the pin out diagram shown here. Each of these registers are 8 bits wide, with each bit corresponding to a single pin (an exception is bit 7 of the Port C register -PC6- most often used as the RESET pin, not an I/O).



PINOUT OF ATMEGA8

3.2 RECEIVER BLOCK DIAGRAM

ZIGBEE

There are a multitude of standards like Bluetooth and Wi-Fi that address mid to high data rates for voice, PC LANs, video, etc. However, up till now there hasn't been a wireless network standard that meets the unique needs of sensors and control devices. The Zig Bee Alliance is not pushing a technology; rather it is providing a standardized base set of solutions for sensor and control systems ZigBee technology is a bidirectional wireless communication technology of short distance, low complexity, low cost, low power consumption, and low data rate, mainly used in automatic control. It mainly works on 2.4GHz ISM band with 20~250kbit/s data rate, 100m ~1.5km maximum transmission range, and a typical 100m distance .

APPLICATIONS:

As bore well child saver: - The main application of the machine is in the rescue operation of the child from the bore well.

As Pipe cleaning machine: - This machine can be used in pipe cleaning. It can drive through long pipes and with a rotary brush as an end effecter fitted at front will serve the cleaning operation of dirty pipes. As the inside surface of the pipes may be wet and slippery the high quality wheels are capable to grip on the wet surface.

As Pipe inspection machine:- In pipe manufacturing industries the final product is required to go through inspection process for quality control and prevent any leakage in pipes or any oil, gas pipe lines are to be surely free from any kind of leakage and damage as it may cause huge destruction if any kind of accidents takes place. This inspection machine loaded with special inspection instruments like sensors, x-ray are capable to inspect pipes, thus can detect any kind of defect which may be the reason for a serious accidents.

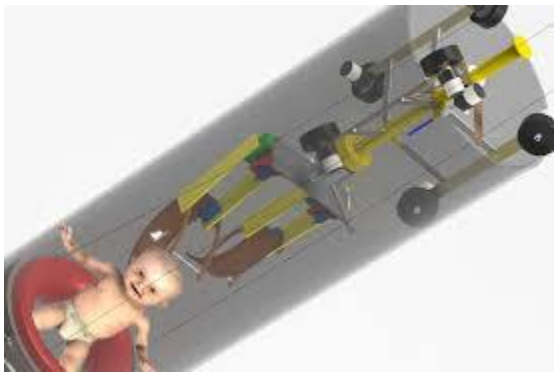
Miscellaneous Application: This type of robot capable of climb vertical pipes or drive through horizontal or inclined pipes may be used in the following areas.

- In manufacturing industries.

- In space programs.
- In radio active or highly hazardous environment.
- In under water operation

4 RESULT AND DISCUSSION

We hereby propose a design model as bore well rescue robot which is able to rescue a child trapped inside bore well.It can measure temperature as well as the altitude. The proposed model design is supposed to look like the following:



5 CONCLUSION

A lot of lives have been lost due to falling in the bore well because it involves digging a pit beside a bore well which is a time consuming process. The proposed system is to overcome all these difficulties. This project is used to reduce human efforts for rescuing operations from bore well. It performs rescue operations in very less time as compared to traditional methods. Thus, it has been designed keeping the entire obstacle in mind that may arise during the operation. We like to conclude with the help of my research project I am able to rescue without any damage

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