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Computer Controlled LifeSaving Machine

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ABSTRACT:

This project deals how to save a child that is struck in a bore well. In recent days we get some news like a child have struck up in a bore well and it takes more than a day to save it. Here in this project, a child fallen in a 7” bore well is to be saved using a computer controlled motor with a camera to monitor the position of the child and the action of the kit. The child can be saved within a short period of time without any type of difficulties. Also the machine is accurate and there will not be any damage to the child by the machine.

KEYWORDS: *CCTV,DC,LED,I/O*

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I. INTRODUCTION

A computer controlled motor system to save a child trapped in a bore well[1]. Recently, many accident reports of children (and even adults) falling in open bore-wells have appeared in the print and the electronic media. Very few of the victims have been saved in such accidents. In some of these cases the dead body of the subject could not be collected easily. Even if rescued late, most victims were reportedly injured.

To overcome such problems of these rescue operations, we have an alternative (feasible) proposal. We are developing a robot machine that can take out the trapped body in systematic way[2]. It will also perform various life-saving operations for the sufferers such as oxygen supply. A video camera to observe the actual situation closely and continuous interaction with the sufferer could also be attached.

It will be a light weight machine that will go down into the bore well pipe and hold the trapped body systematically. This machine assembly will be supported by a cable wire and this will be controlled and supported by a gear assembly, a stand and all necessary accessories[3].

In this alternative scenario, there will be no requirement of digging any hole parallel to the bore well. The remotely controlled robot will go down the bore well and perform the action[4]. A lot of other hassles will also be avoided by this alternative technique.

II. LITERATURE REVIEW

Children often fall down in the bore well which have been left uncovered and get trapped. The rescue of these trapped children is not only difficult but also risky. A small delay in the rescue can cost the child his or her life. To lift the child out the narrow confines of the bore wells is also not very easy. The child who has suffered the trauma of the fall and is confined to a small area where, with a passage of time the supply of oxygen is also reduces. Robot for bore well rescue offers a solution to these kinds of situations. It is fast, economical and safe. Moreover, it has the facility to monitor the trapped child, supply oxygen and provide a supporting platform to lift up the child. The prototype consists of 4 separate mechanisms driven by motors. The motor placed at the top turns a gear mechanism which, in turn, pushes 3 blocks arranged at 120 degrees from each other towards the side of the bore well.

This clamps the whole system firmly to the bore well wall. The 2nd motor placed below the plate turns the bottom shaft by 360 degrees, thereby helping to locate the gap through which the lifting rod passes. This is done with the help of a wireless camera attached to the lifting rod. Once the gap has been located, the 3rd motor adjusts the radial distance of the lifting rod. When the diameter is adjusted, the 4th motor helps the lifting rod to screw its way through the gap towards the bottom of

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the child. Once the lifting rod reaches a safe position under the child, an air compressor is operated to pump air to the bladder attached to the end of the lifting rod through an air tube that runs downwards inside the lifting rod. The bladder provides a safe seating to the child. When the child is secure, the lifting rod is contracted to its maximum position. The 1st motor is then reversely operated so as to unclamp the system. Simultaneously it is lifted out of the well using a chain or rope.

There is no proper technique to rescue victims of such accidents. When the make shift /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. These ad-hoc approaches involve heavy risks including the possibility of injuries to the body of subject during the rescue operations. Also, the body may trap further in the debris and the crisis deepens even more.In most cases, we really on some makeshift 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. A single accident creates a big hue and cry spreading a sense of panic among the masses. It draws a lot of undue attention and criticism of the civil administration. Heavy expenses have also reportedly incurred in most cases.

It is pertinent to mention that a proper technical solution for such emergency crisis is the need of the hour. More so in times of technical advancements and continuous research, technocrats should take the responsibility. To find an easy way out. It is an issue of national as well as social concern and an early step in the direction of developing an instrument for the rescue of victims of such cases is desirable. So far there is no proper solution available for giving relief in such accidents. Generally, a hole parallel to the bore-well is dug up then a horizontal path is created to reach to the subject's body. But it takes too much time to save the life of the sufferer. Moreover, it involves a lot of energy, and expensive resources which are not easily available everywhere. It also involves possibilities of damaging the body of sufferer during the rescue operation loom large.In some cases makeshift arrangements are made to pull out the body of sufferer. In such methods some kind of hooks are used and sufferers' clothes or body organs get caught hold of. This may cause wounds on the affected body.To overcome such problems of these rescue operations, we have an alternative (feasible) proposal. We can develop a robot machine that can take out the trapped body in systematic way. It will also perform various life-saving operations for the sufferers such as oxygen supply. A video camera to observe the actual situation closely and continuous interaction with the sufferer could also be attached. It will be a light weight machine that will go down into the bore well pipe and hold the trapped body systematically. This machine assembly will be supported by a cable wire and this will be controlled and supported by a gear assembly, a stand and all necessary accessories. In this alternative scenario, there will be no requirement of digging any hole parallel to the bore-well. The remotely controlled robot will go down the bore well and perform the action. A lot of other hassles will also be avoided by this alternative technique. In order to attempt above objective we have prepared a working prototype already. Forty five deaths of children have been reported in the country since September 2001.From that we have only nineteen with the proof of news paper. Their deaths are caused due to uncovered dry bore wells. When the casing pipes costing hardly Rs.2000-3000 are removed, even a 6" bore became wider and trap an unwary child. In the recent history of the country, only one child Sandhya of Bellary on April 11, 2002 and Prince from Haryana, was rescued alive from bore well.

Six year old boy Deivaraj on June 8,2014 was rescued from the bore well, but later died in the hospital due to injuries during the rescue operation and lack of medical aid .Usual method followed by rescue team is first to find the depth of the child in the bore well by using a rope. After finding the depth, a parallel pit is digged using earthmoving vehicles. This method of rescuing has following difficulties,

- It takes up to 30 hours to dig the parallel pit, by that time the child would have died.
- Lack of oxygen inside the bore well.
- Lack of visualization causes the major difficulty during the rescue operation.
- There is no such special equipment for rescuing the child trapped inside the bore well.

III. DESCRIPTION OF THE PROJECT

In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

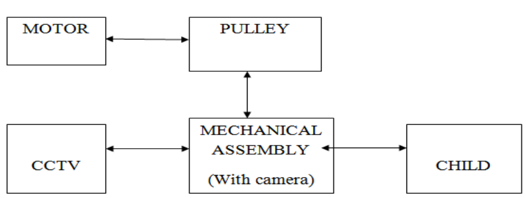


Figure 1 Proposed Block Diagram

Let's start by looking at a simple 2-pole DC electric motor (here red represents a magnet or winding with a "North" polarization, while green represents a magnet or winding with a "South" polarization).

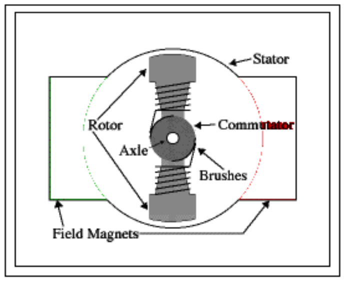


Figure 2TwoPole DC Electric Motor

The geometry of the brushes, commutator contacts, and rotor windings are such that when power is applied, the polarities of the energized winding and the stator magnet(s) are misaligned, and the rotor will rotate until it is almost aligned with the stator's field magnets. As the rotor reaches alignment, the brushes move to the next commutator contacts, and energize the next winding.

In real life, though, DC motors will always have more than two poles (three is a very common number). In particular, this avoids "dead spots" in the commutator. You can imagine how with our example two-pole motor, if the rotor is exactly at the middle of its rotation (perfectly aligned with the field magnets), it will get "stuck" there. Meanwhile, with a two-pole motor, there is a moment where the commutator shorts out the power supply. This would be bad for the power supply, waste energy, and damage motor components as well. Yet another disadvantage of such a simple motor is that it would exhibit a high amount of torque "ripple" (the amount of torque it could produce is cyclic with the position of the rotor).

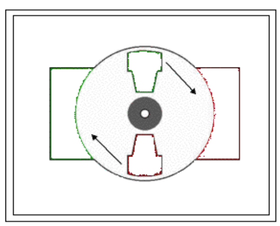


Figure 3Operation of 2-Pole DC Electric Motor

So since most small DC motors are of a three-pole design, let's tinker with the workings of one via an interactive animation (JavaScript required):

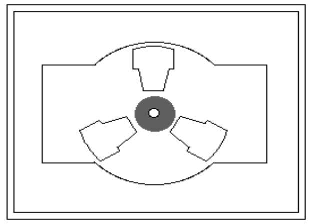


Figure 4Three Pole Design

A few things from this -- namely, one pole is fully energized at a time (but two others are "partially" energized). As each brush transitions from one commutator contact to the next, one coil's field will rapidly collapse, as the next coil's field will rapidly charge up (this occurs within a few microsecond). We'll see more about the effects of this later, but in the meantime you can see that this is a direct result of the coil windings' series wiring: There's probably no better way to see how an average DC motor is put together, than by just opening one up. Unfortunately this is tedious work, as well as requiring the destruction of a perfectly good motor. This is a basic 3-pole DC motor, with 2 brushes and three commutator contacts.

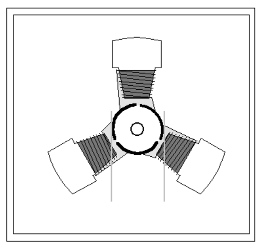


Figure 5 Three Pole Design with 2 Brushes

As a result, the armature is hollow, and the permanent magnet can be mounted inside the rotor coil. Coreless DC motors have much lower armature inductance than iron-core motors of comparable size, extending brush and commutator life. The coreless design also allows manufacturers to build smaller motors; meanwhile, due to the lack of iron in their rotors, coreless motors are somewhat prone to overheating. As a result, this design is generally used just in small, low-power motors. Beamers will most often see coreless DC motors in the form of pager motors.Again, disassembling a coreless motor can be instructive -- in this case, my hapless victim was a cheap pager vibrator motor. The guts of this disassembled motor are available (on 10 lines / cm graph paper). This is (or more accurately, was) a 3-pole coreless DC motor.A camera is a device used to capture images, either as still photographs or as sequences of moving images (movies or videos). The term comes from the Latin camera obscura for "dark chamber" for an early mechanism of projecting images where an entire room functioned as a real-time imaging system; the modern camera evolved from the camera obscura.

IV. DESIGN AND DRAWING

Table 1 DC Motor Specifications

SL.NO	SPECIFICATION	RANGE
1	Speed	30 rpm
2	Voltage	12 volt
3	Power	18 watts
4	Current	1.5 amps

MOTOR TORQUE:

Torque = (P X 60) / (2 X 3.14 X N)

Torque = (18X 60) / (2 X 3.14 X 30)

Torque = 5.72 Nm

Torque = 5.72 x 10^3 Nmm

SHAFT DIAMETER:

Torque = 3.14 x fs x d ^{3} / 16

5.72 x 10^3 = 3.14 x 42 x d ^{3} / 16

D = 8.85 mm

The nearest standard size is D= 9 mm.

V. OPERATION OF THE MODULE

The computer controlled motor system has a main motor, which has two pulleys in a single shaft, which is used to send the machine into the bore well. The rope from the pulley is connected to the supporting frame. The secondary motor is fixed to the supporting frame, which is used to power the arms using lead screw. The camera fixed in the supporting frame displays the position of the child and the distance is viewed by the operator and is controlled manually. When the arms get surrounded by the child, the main motor is stopped. Then the secondary motor is activated and the lead screw contracts the arm to hold the child. The arm contains sophisticated cushion. So that no stress will be on the child. The CCTV is a device used to monitoring the child movement inside the bore well.

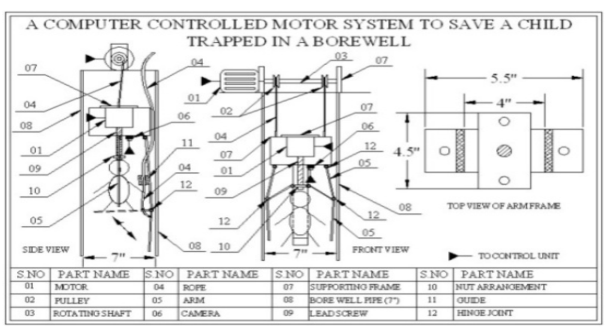
Figure 6 Screenshot of CCTV Camera

The video is captured by the camera. Instead of CCTV the computer monitor can be used as a monitoring device. The LED is connected with camera for lighting purpose. Oxygen tube is used for respiration to the child. A lead screw also known as a power screw or translation screw.It is a screw designed to translate radial motion into linear motion. Lead screws are typically used well greased, but, with an appropriate nut, it may be run dry with somewhat higher friction.There is often a choice of nuts, and manufacturers will specify screw and nut combinations as a set.

Figure 7 Screen Shot of Hardware Setup

A microcontroller is a complete microprocessor system built on a single IC. Microcontrollers were developed to meet a need for microprocessors to be put into low cost products. Micro controller is a standalone unit, which can perform functions on its own without any requirement for additional hardware like i/o ports and external memory. Microcontroller is a general purpose device, which integrates a number of the components of a microprocessor system on to single chip. It has inbuilt CPU, memory and peripherals to make it as a mini computer.

Micro suggests that the device is small, and controller tells you that the device' might be used to control objects, processes, or events. Another term to describe a microcontroller is embedded controller, because the microcontroller and its support circuits are often built into, or embedded in, the devices they control.



S.NO	PART NAME	S.NO	PART NAME	S.NO	PART NAME	S.NO	PART NAME
01	MOTOR	04	ROPE	07	SUPPORTING FRAME	10	NUT ARRANGEMENT
02	PULLEY	05	ARM	08	BORE WELL PIPE (7")	11	GUIDE
03	ROTATING SHAFT	06	CAMERA	09	LEAD SCREW	12	HINGE JOINT

Figure 8 Schematic Diagram of the Hardware Setup

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