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DESIGN AND FABRICATION OF MINISIZE BOREWELL RESCUE ROBOT

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ABSTRACT

In the past few years, there have been several accidents of children falling into abandoned bore wells in India. Abandoned bore wells that have turned into death pits for children. The problem is all over India. Rescue teams spend hours a n d sometimes days in futile attempts to save these little kids. A lot of money is also spent in these missions. In most cases they are unable to save the kids. Such events have happened umpteen times in the past, and every time either the government or the bureaucracy is blamed. The rescue process to save the child from bore well is a long and complicated process now. The rescue team tries to approach the victim from a parallel well that take about 20-60 hours to dig. This complicated process makes 70% of the rescue operations fail. The design of handling system is made in such a way that the baby/victim never gets hurt and this rescue system is sent through the same well where the victim is felt inside to bring back the victim safe through an autonomous control of drives. Our design constitutes a best Ergonomic Design and performs safest rescue operation.

Key words; Pneumatic cylinder, Gripper, Battery.

1. INTRODUCTION

Today's major problem faced by human is water scarcity, which leads to a large number of bore wells being sunk. These bore wells in turn have started to take many innocent lives. Bores which generate water and subsequently got depleted are left uncovered. Small children without noticing the hole dug for the bore well slip in and get trapped. There is no befitting technique to rescue victims of such accidents. When the make shift local arrangements do not work. Moreover, it involves a lot of energy and expensive resources which are not easily available everywhere and, in this process; we 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 victim's body during the rescue operations. Also, the body may trap further in the debris and the crisis deepens even more means death. In most cases, we trust on some makeshift arrangements. This does not assure us of any long-term solution. In such methods some kinds 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 obtained in most cases. It is pertinent to mention that a proper technical solution for such emergency crisis is the needed. More so in times of technical advancements and continuous research, technician should take the responsibility to find an easy way out. After studying all the cases we found a serious issue to do, to make a machine which can go through the trapped bore well without any support and hold the trapped body in least minimum time. With this machine, there is no chance of damaging victim's body and other minor damages, and we called that machine as "Bore Well Child Rescue System".

2. LITERATURE REVIEW

M. V. RAVI, NEHAL THAKUR, B. N. RACHANA 2020: Methods to keep child alive in a bore should take in to consideration the lack of oxygen, increased temperature and humidity, which produces hyperthermia. These problems are addressed with fresh air delivery or without delivery of oxygen. The remotely controlled robot will go down the borewell and perform the action. The rescue system is operated through PC using wireless camera and Bluetooth technology.

RAJARATNAM D.R.P, LAKSHMI RAJ TILAK R 2018 The Bore Well Rescue Robot is capable of moving inside the well and performs operations according to the user commands. The proposed model is designed to provide the child with two level of safety achieved by using robotic holding at the top and safety airbag at the bottom. The robot is operated by the human manually and monitor in computer. According to the observations made continuously using CCTV camera.

GIRDHARAN M 2016 I It takes nearly 30 hours to dig the parallel pit, by that time the child would have died. There is possibility of injuries to the child inside the well. The mechanical system moves inside the uncontrolled bore well. Camera connected to pc to check the position of the child. Entire System is hooked with rope. This kind of system can release trapped baby from the bore well securely within lesser time.

MRS. V SARITHA, P. AISHWARYA 2022 Rescue of trapped child from bore well is very risky and difficult process when compared to the other accidents. It takes more than a day to save the child. Here, the child who is stuck inside the hole is to be saved by the clipper which pick and place the child with the help of remote controller. The clipper is left inside manually by the rope tied up at its hands. It also consists of camera which is affixed to the clipper which is used for monitoring the child. By this camera we get the visuals of the child and their condition.

JAYA SUDHA M, SARAVANAN 2019. At present, the rescuing task is accomplished by the method for burrowing a parallel pit close to the bore well with the same depth of the child and makes a passage that interfaces with the two wells. It takes about 30 hours to burrow the new well. The protection system is with the guide of setting an air sack at the base of the passage and recovers the child at the base of the passage and recovers the child at any rate of gripper disappointment.

MOINUDDIN SHAIK, BHARGAVA REDDY KAKU NURI 2021 – In this project, a new method has been introduced for a practical, safe, time saving rescue with less manpower. Here the system utilizes the associated work of wireless technology with mechanical setup for the rescue. Various technically efficient gadgets are combined in the setup. To ensure the medical safety of the victim the system has been aided with oxygen supply and water sprinkler along with many sensors to detect temperature, heart beat and presence of gas.

SHIVAM BAJPAI, ABHINAV SINGH 2019 S. The rescue team tries to approach the victim from a parallel well that take about 20-60 hours to dig. This complicated process makes 70% of the rescue operations fail. The design of handling system is made in such a way that the baby/victim never gets hurt and the robot itself provides some pretreatment to make the baby survive.

LAWRENCE DANIELA VINO LEE R 2017. To assist in such rescue operations, we tend to propose a robotic system capable of moving underneath the bore well supported with user commands equipped with a robotic arm, high power LED, high-resolution camera, and sensors like ultrasonic, temperature and gas sensor. The device system is interfaced with the at mega 328 controllers. Robotic arm is designed uniquely where it operates with 4-point gripping system in which each pair is controlled separately in order to increase the precision of the grip.

S. GOPINATH, T. DEVIKA 2015 The sensor systems are interfaced with the ARM8 processor. A camera along with an LED light is used to visualize the victim as well as it helps to operate the system by control unit. The vacuum cup is used to adjust the child position. The arm movement of the robot is controlled by stepper motor. Once child is perfectly picked by robot, BLDC motor is used to lift up the child from borewell.

SRIRAM REDDY. K, SATYANARAYANA D 2021 -S This paper considers three different cases of weight of children like 12kg, 15kg and 18kg based on which the device was designed. This study designs the device with the help of night vision camera with torchlight, oxygen pipe with an oxygen cylinder, vacuum pipe and suction cup. The study conducts theoretical, experimental and ANSYS calculations to show the effectiveness of the proposed device.

3. WORKING P R I N C I P L E

The rescue system arrangement is placed near the bore well where the victim is felt inside and it is verified that the gripper is properly inserted into the bore well without any distractions. Initially the dc motor for powering the winch drum is turned on to rotate counter clock wise, thus the rope wounded on the drum get released with respect to the rotation experienced on the drum. The extension of rope causes the gripper which is tied with it to travel inside the bore well due to the gravitational force, thus the gripper arrangement reaches victim. By the gripper attached with infrared camera that camera used scene the target in dark light also. At that position the winch drum motor gets turned off, pneumatic cylinder with air bag is tend to extend by the activation of solenoid valve and makes the air bag to reach bottom portion of victim. To safe guard the lifting process air bag get expanded by compressed air supply and the motor to power the gripper is turned on to rotate clock wise thus the victim gets gripped by the gripper and once the victim gets held tightly the gripper motor is stopped and again the winch drum motor is activated in clock wise direction. This causes the rope to wound on the winch drum and makes the gripper with victim to move up. Once the victim had reached ground level the motor is turned off and the gripper motor is activated in anti-clock wise direction to release the victim. The gripper also takes over with vacuum cup holder to hold the target as climbable position too.

4. CONSTRUCTION

The gripper which grabs the victim is functioned with the help of lead screw arrangement. The lead screw is powered by means of dc motors which is directly linked with it and get connected to the fixture for providing the stabilized rotation. On its other end the two separate links are attached with it which is hinged to the fixture frame on its other end. One end of the gripper link is also hinged with this link; thus the motion of link affects the gripper link to perform its gripping operation. This entire gripper arrangement is hanged by the rope which is rolled over the winch drum. This winch drum is supported to the base frame with the help of bearing at its end for obtaining free rotation. The rotation of winch drum is powered by means of separate dc motor which is coupled on the base frame. The source for driving both the dc motors are provided by means of battery and for changing the direction of rotation experienced by the motor DPDT switches are used.

5. MAJOR COMPONENTS

Pneumatic cylinder
IR Camera
DC Motor
Spur Gear
Metal strip
Battery
Ball Bearing
Gripper
Screw Rod
Hose and connector
Shaft
ROPE
Metal frame
Compressor
PVC pipe
Directional control valve

6. PROBLEM IDENTIFICATION

Today's major problem faced by human society is water scarcity, which leads to a large number of bore wells being sunk. These bore wells in turn have started to take many innocent lives. Bores which yielded water and subsequently got depleted are left uncovered. Small children without noticing the hole dug for the bore will slip in and get trapped. There is no proper technique to rescue victims of such accidents. When the make shift local arrangements do not work. In most cases reported so far, a parallel hole is dug and then 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 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 kinds of hooks are employed to hold the sufferer's clothes and body. This may cause wounds on the body of the subject.

7.OBJECTIVES

After studying all the cases we found a serious issue to do, to make a robotic machine which can go through the trapped bore well without any support and grasp the trapped body at least minimum time with providing facilities of oxygen cylinder, safety balloon. With this machine, there is no chance of damaging human body and other minor damages, and we called that machine as "Mini Size Bore Well Child Saver Machine".

8. DESIGN

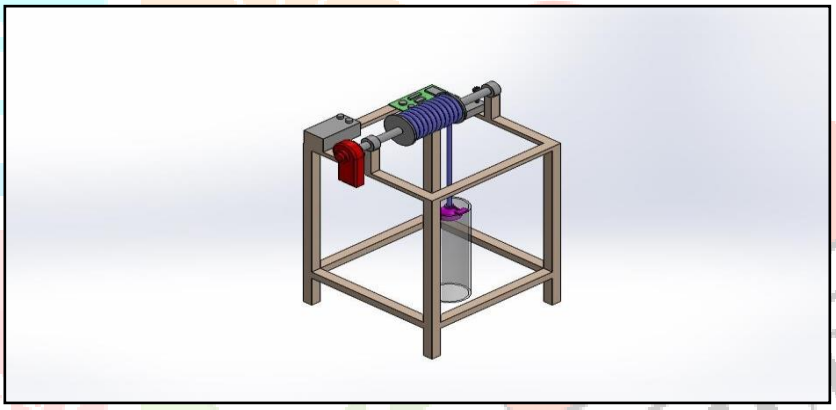

FIG. 1.DESIGN

9. CONCLUSION

Human life is a precious. Our smart bore well child recue system is a significant attempt to save the life of the victim of bore well accidents. Besides this, the unique capability of climbing through vertical and inclined pipes makes wide scope of application or this machine in manufacturing industries and other relevant fields. In the current design of bore well child saver machine has been made to suit every possible situation may occur in rescuing operation. We like to with help our project. we able to rescue without any damage.**10. REFERENCES**

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