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Literature Survey on A Bore Well Rescue Bot

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Abstract: Over the past few years, there have been several accidents of children falling into abandoned bore wells in India.

Abandoned bore wells have turned into death pits for kids. This problem is found all over India. Rescue teams spend hours and sometimes days in futile attempts to save these kids. A lot of money is being spent in these missions. In most cases they are unable to save the kids. Such events have happened umpteen numbers of times in the past, and every time either the government of the bureaucracy are being blamed. The rescue process of saving the child from bore well is a long and complicated procedure & to approach the victim parallelly takes about 20-60 hours. This complicated process makes 70% of the rescue operations to fail. Very few of the victims have been saved in such accidents. This paper briefs different techniques used to save kids fallen into the abounded bore wells and also briefly discuss the drawbacks in these methods.

In this paper we propose a technique to deals extreme Safe handling of the victim with cent percent recusal & further eradicating the kid from falling in bore well. Our Bot designed constitutes a best Ergonomic Design and performs safest rescue operation.

Keywords: Egronomic, Anchorage, Rack & Pinion Geared mechanism, Teleconferencing.

I. Introduction

Water scarcity is the major problem faced by the human society. Due to drought and depletion of underground water more bore wells are dugged on the surface of the earth. Due to water scarcity more bore wells are being sunk. In many areas the bore wells are dugged and left open without any Proper covering. This abandoned bore wells have become death traps and started taking many innocent lives of small children. Now a days falling of children in bore wells are increasing due to the carelessness and playful activities of the children. The holes dugged for the bore wells are deep and around 700 feet. In these cases the rescue of children from such deepest bore wells is quite challenging. Many times the rescue system for children fallen in the bore wells may risk the child life.

As the famous saying of famous scientist Benjamin Franklin "**An Ounce of Prevention is worth a Pound of Cure**". In order to overcome these hurdles a new system of preventing children from falling into bore wells is designed.

II. Literature Survey

In [1] Virtual prototype realization and simulation for small – caliber deep well rescue robot [2011]

In order to analyze the feasibility of rescue robot, a virtual prototype of the robot was designed by using Solid works, which ensures to find the potential deficiencies during the course of robot design before the final robot design and assembling is done. The virtual prototype can show the whole process of rescue activities. Originally when the robot is put into the well and is moved accordingly to analyze the rescue position furthermore the anchorage set has fixed the robot and the stretching arm has stretched out till to the underside of the victim and the supporting bracket is applied to perform rescue operation.
Draw backs: Fixed model & Risky

In [2] A novel design of robotic system for rescue in bore well accidents. [2016]

The robot is sent into the bore-well where the robot is adjusted to the size of the bore-well with the help of the rack and pinion geared mechanism. This is achieved with the help of data received from the ultrasonic sensors. This is achieved with the help of data received from the ultrasonic sensors. After firmly attaching robot to the walls of the bore well, the robot traverses down the bore-well. If the bore-well is having tapered diameter The ultrasonic sensors in front of the wheels will sense the distance and automatically adjust the wheels beneath it with the help of the rack and pinion mechanism present in the center block.

Drawback: Rescue time up to 40 hours, Risky and requires more man power

In [3] Smart child rescue from bore well[2016]

This Smart Child Rescue System consists of PIR sensors which help to sense only human beings irrespective of the external conditions. These sensors will be placed at the top of the bore well pipeline which helps to sense the human being if he/she falls in the pipeline. These signals from the sensor will be sent to the Raspberry-pi controller. This raspberry-pi controller analyses this and immediately closes the automatic horizontal closure which is fixed at around 10 feet depth in the bore well pipeline. The top surface of the horizontal closure is well softened for safe landing of children.
Drawback: Rescue time is up to 20-40 hours with more space consumption, Risky.

In [4] Bore well child fall safe guarding robot[2018]

In order to safeguard the child who has fallen into bore well, a model is designed using the temperature and gas sensor to sense the temperature and gas leakage in the particular area. Liquid crystal Display is used to display the position of the child. Here we are using the Infrared transmitter and receiver is used to sense the distance of the rope. Keypad is used to give inputs to the microcontroller, by pressing the operations to do It is erasable type of memory which is programmed and stored in internal memory.
Drawback : Requires High Rescue time up to 48 hours, Child safety at risk.

In [5] Development of In-pipe Robot for assisting Bore well Rescue operations [2018]

The controller here is a Raspberry Pi 3. The robot's motion is actuated by DC motors with speeds of 150 rpm, which are driven by suitable drivers. The robot has three motors. 120° apart from each other. A power bank is used to power everything except the motors a separate DC supply is used for the motors. The robot has a variety of sensors to gather extensive information about the pipe in question. The controller runs a graphical user interface (GUI) for the user to communicate with it. The GUI has been developed on the Python platform. It is inherently divided into four parts i.e., live feed, data analysis, image processing and motor control.
Drawback: chances of losing connectivity, child safety should be prime concern, High Rescue time, charging of power banks.

In [6] Rescue systematic in bore well Environment.

This paper describes the diameter of the narrow bore well for any adult because light goes dark inside it, the rescue task is challenging. This systematic system attaches a harness to the child using pneumatic arms for picking up the victim. A teleconferencing system is also attached to the system for communicating with the victim.
Drawback: Rescue operation risky, loss of connectivity, No light.

In [8] Pipeline Inspection and Bore well Rescue system

An autonomous system having self moving & self sustaining capacity was designed. Wheeled leg mechanism was employed & sent inside the pipe. The legs of the system are circumferentially & spaced out 120 apart. LM- 35Temperature sensor & 16X2 LCD was interfaced with PIC 16F877A microcontroller to sense the temperature inside the bore well and to display the same respectively.
Drawback: Cost effective, Fixed model, Risky.

In [9] Bore well Rescue System

A human controlled computerized machine was developed to rescue the victim using servo motors to hold the child. This project includes series of process from development of hand drawn sketches to computer generated design. The mechanical model is sent in to bore well consisting of 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 bore well.
Drawback: Mechanical model occupies more space & is cost effective, Fixed model, High rescue time.

In [10] Design & Construction of Rescue system

A wireless controlled system using Zigbee technology & dc motor based gripper operation for systematic arm was developed. This prototype uses PIC 16F877A microcontroller in the operation of rescuing the child. The system is operated through PC using wireless zigbee technology & wireless camera for viewing both audio and video.
Drawback: Connectivity, chances of camera getting damaged.

III. Proposed Work

The idea for this proposed system is conceived by witnessing the rapid bore well accidents prevailed in India during 2010-19 to prevent the children fall into unclosed bore well & rescue the victim by avoiding the technical and financial risks involved in rescue operation and to perform the rescue operation in the extreme conditions. The basic concept of this project is to bring the victim to ground within short span of time. This could be achieved by the advanced ergonomic design involved in the robot. It seeks to harmonize the functionality of tasks with the requirements. Ergonomic design focuses on the compatibility of the objects and environments with the humans using them. For completion of present design & to reach prototype stage, the following steps are followed as shown in the flow charts -Design needs, Objective, Problem Definition, Concept Design, Preliminary Design Detailed Design, Design Communication and Final design.

The main aim of the project is to make safe and sophisticated rescue bots. After making the concept ready, further design and modeling is carried out. Design criteria to design rescue bots for saving the kids trapped in bore wells, following three criteria are considered:

I) supplying oxygen to the victim trapped inside the borewell
II) picking him/her up safely from the bore well without failure or dropping of the robotic arm in between.
III) Taking out the victim safely as early as possible. Considering the above criteria rescue bot is being designed. The reason that these rescue robots are not into market or common use is that they fail to serve one or all of the above. Hence every aspect of design is being taken care to make sure that our design satisfies above mentioned criteria to the best extent. The bot is expected to be fabricated in a way that the trained operator opens the stand and fixes over the bore well and gives the input regarding depth and diameter of the bore well. The bot self-operating system starts with the given input regarding depth well. The IR sensor placed along with camera on the bottom will detect the distance of the victim from the ground. Fresh air is provided through a special pipe arranged from the rescue robot. With the detection of the victim all the conditions of the victim is calculated & the best way to rescue is detected & is being rescued with the safety balloon procedure.

The extended aim of the project is to ensure the child from falling in to the bore well by creating smart cap system. This enables safety measures around the bore well & eradicates the victim from falling with advanced technical & service based support system.

IV. Conclusion

Human life is very precious and our proposed system **Bore well child server** is a significant attempt to save the life of the victim of bore well accidents. Besides this, an unique capability of climbing through vertical and inclined pipes makes wide scope of application for 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 that may occur during rescuing operation. This structure is made strong enough to sustain all possible loads though it is made flexible at the same time to adjust wider range of bore diameter and any change in the diameter of bore. In rescuing operation time is a vital factor which alone can determine the success or failure of the whole operation. Thus, it has been designed keeping the entire consequences in mind that may arise during the operation. We like to conclude with the help of our research project that we will be able to rescue the child safely.

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