Open Borewell Rescue Robot

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Abstract— Nowadays borewell accidents are becoming most common problem. Many children are losing their lives because of the negligence of our society. Even though precaution is the best way to avoid such accidents, the society is not taking such measures; finally children will be the victim. So society is in need of an efficient rescue system to pull the child from borehole. In this paper, the open borewell robot is proposed to have a controlling unit and a monitoring unit. The controlling unit controls and enables the movement of the robot into the bore hole with the pulley action of the motor. The monitoring unit continuously monitors the movement of the robot and the child’s condition trapped in the bore hole with the help of a camera. The high end camera module used here will have a lighting system which supports the process of rescue as the robot moves into the bore hole. The other features of the robots which support the maximum safety of the child include oxygen concentration unit and airbag. The entire unit is designed to operate in dual mode both using power supply and battery mode.

Keywords— MyRIO, Metallic plates, CCTV, Servo motor, Oxygen Concentration unit, Safety air balloon.

I. INTRODUCTION

Open Borewell Rescue Robot is designed to provide at most safety to the child trapped in the bore hole during the rescue operation by providing continuous monitoring support. The computerized control unit controls the camera and acquires the images that have been captured with the help of wireless camera via the transmitter and receiver set up. PC for controlling the motion of the robot, servomotors used for rotating the metallic plates after finding out the gap, MyRio will control the entire system. This ground control unit will also comprise of air compressor unit which is used to supply air to the safety air bag in order to provide a platform for the child. This air bag in turn supported by metallic plates which ensures maximum safety. The video signals received are analyzed by the user and in turn sends the suitable commands to the robot. These command signals are then passed on to the controller, for further actions to take place. The metallic plate can be rotated, clamped and rod is inserted inside the gap found. Finally the air is blown into the airbag depending on controlling actions that are being performed by the controller. It is ensured that the child is provided with the oxygen supply. Servomotors are required to achieve the robot movements and ensure that the child has been held safely by the robot. Once this is ensured the entire arrangement is pulled up using pulley arrangement.

II. LITERATURE SURVEY

Occurrences of kids falling into open borewells have been standing out as truly newsworthy many circumstances however almost none have been done to guarantee their security by the experts. At the point when the kid has fallen inside the borewell, the Government utilizes the conventional technique for saving the kid by burrowing opening parallel to the borewell where the kid has been struck as shown in Fig 1. This conventional strategy has many impediments like it will destroy acres of land, expends additional time and requires high cost.
2.1. Robotic arm method
This technique was utilized by a Tamil Nadu handyman by name Manikantan. Yet, this technique neglects to give expected wellbeing to the kid where just the mechanical arms may not give adequate security to lifting up the child.

2.2. Rescue Robot
This is a 3 wheel robot equipped for moving vertically upwards and downwards inside the borewell by means of motors. The motion is controlled by laptop via zigbee module. The objectives of this device includes wireless controlling of Robot through personal computer using zigbee technology, live audio and video reception and implementation of pick and place concept of the robot. The drawback with this robot is, this is still in conceptual stage and many features like camera, motors to lift weight have not been included. There is not much importance given to the child’s safety. Oxygen supply unit is not included.

2.3. Advanced Borewell Rescue Robot
The Robot designed is a light weight machine that goes down into the borewell pipe and holds the caught child. This machine assembly will be supported by a cable wire and this will be controlled and supported by a gear assembly and a stand and pulley arrangement. In this, they have used very hard material for arms so it may hurt he child while holding it. Even the arrangement of the system is very bulky to send it into the bore hole.

III. DESIGN AND METHODOLOGY
The open bore well robot is proposed to have a controlling unit and a monitoring unit. The controlling unit controls and enables the movement of the robot into the bore hole with the pulley action of the motor. The monitoring unit continuously monitors the movement of the robot and the child’s condition trapped in the bore hole with the help of a camera. The high end camera module used here will have a lighting system which supports the process of rescue as the robot moves into the bore hole. The other features of the robots which support the maximum safety of the child include oxygen concentration unit and airbag. The entire unit is designed to operate in dual mode both using power supply and battery mode.

The design of the robot basically consists of three metallic discs. The upper metallic disc has slightly more diameter about 14 inches greater when compared to the other two discs forming a lid at the opening of the borewell. Usually the borewell diameter varies from 8 to 12 inches. The first and the second discs are interconnected via the rope. The second metallic disc has a diameter of 8 inches and the third disc of 6 inches. The robot is designed in a conical shape ensuring that while moving
inside the well it will not collide with the edges of the well which may hamper the rescue operations. The second metallic disc is fixed and is connected to the third via the metallic rod of 6 inches length. The third disc is provided with the provision of rotation and to the slot provided to the second disc; a thin metallic rod of 30 inches is fixed. This rod can have both horizontal and the vertical motion.

![Hardware Arrangement](image)

**Fig 2: Hardware Arrangement**

Along with the controlling module the device have a monitoring unit and some additional provisions for the protection of the kid. The fully computerized control unit controls the camera and acquires the images that have been captured with the help of wireless camera via the transmitter and receiver set up.

![Block diagram](image)

**Fig 3: Block diagram**

The block diagram in the Fig 3 shows the working operation of rescue Robot. Here the fully computerized controlled unit along with the camera provides accurate information about child’s position. This inference is the key step to the rescue process. Later the controlling actions are performed by the ground control unit. Ground control unit will be mainly comprises of PC for controlling the motion of the robot, servomotors used for rotating the metallic plates after finding out the gap, MyRio will control the entire system. This ground control unit will also comprise of air compressor unit which is used to supply air to the safety air bag in order to provide a platform for the child. This air bag in turn supported by metallic plates which ensures maximum safety. The video signals received are analyzed by the user and in turn sends the suitable commands to the robot. These command signals are then passed on to the controller, for further actions to take place. The metallic plate can be rotated, clamped and rod is inserted inside the gap found. Finally the air is blown into
the airbag depending on controlling actions that are being performed by the controller. It is ensured that the child is provided with the oxygen supply. Servomotors are required to achieve the robot movements and ensure that the child has been held safely by the robot. Once this is ensured the entire arrangement is pulled up using pulley arrangement.

IV. CONCLUSION

By adapting this system, the life of the child can be saved with minimal time. This system also performs life saving action in addition to rescuing process. The main highlight of this project is the inclusion of safety airbag which avoids further falling down of baby during the rescue operation. The Robotic arm will fix the robot at desired position and it will not allow further rotational or longitudinal movement of the robot. The operation time is minimal and the oxygen concentrator will help in supplying required oxygen to the baby. These robots are life saving machines. It can save lives of many innocent children. So, it is very beneficial to use this robot.

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