**Objective:**

When a child has fallen into a bore well , it is difficult for normal rescue operation to safeguard the child. The use of advanced technology and more precise controls can play a vital role in the rescue operation of the child. The main aim of this robot is to rescue the child from the bore well hole with minimal amount of injuries. Our bot is designed for minimal hole diameter and there is no restriction with the depth it can reach. The necessary safety measures for rescuing the child will be implemented during the procedure. Our robot is capable of moving inside the hole and it performs according to the users command. This arrangement ensures that the child does not slip further deep during the rescue operation. This entire robot model is totally controlled manually by human and suitable camera and sensors are also placed to watch and sense the process.

**Introduction:**

In our country and mostly in rural areas due to the scarcity of water more bore well hole are dug. However in villages and farming area there is a constant need of water. So the water from rivers and lakes are not suffice every time. People's need for water can also be achieved by groundwater. So in our country there are more bore well dug. Not every bore well gives a good way of taking water, some hole should be dug more deeply into the ground to get water. However many bore wells do not yield and are abandoned. Vegetation take over that place and these bore wells are forgetten.

These are done for the purpose of getting water but some children are unaware and play around these area and they don't recognize these as their death trap. Unfortunately 92% of the victim age is below 10. As the statistics suggests , from 2006 more than 30 deaths have occurred in our country. The bore well diameter is too small for adult and children could easily fell down. The darkness and lack of oxygen in the bore well takes the life of the child slowly. Some bore wells are 300 ft deep(or more). The child might not always fall to the bottom but get stuck in the mud in between. Depends upon the soil condition, the slippage of the child and could maximum collapse if its a marshy condition. These condition are also required to safeguard the child safely. The rescue operation must be quite precise and carefully done to rescue the child.

There are plenty of bore well accidents in our country and recently in Tamilnadu. We wouldn’t have ever forgotten about the tragic Sujith Wilson's death occurred in a village near Trichy after playing near an abandoned bore well and he accidently fell down in it. It happened on 25 October 2019 at around 5.45 pm. The rescue operation commenced on a full swing for 80 hours. But unfortunately , Sujith died after a hard struggle in that deathly atmosphere. Around 2:00 am 30 October 2019 officials confirmed the death of the boy.

Rescue operation can be carried out in many ways. Sometimes if the child is closer to the surface the rescuer gets in and pulls them out. However if the child has fell into greater depths, initially a camera is sent into the hole and check the condition of the child. The common idea is to dug a parallel hole away from the bore well hole and to send a rescuer in the parallel to rescue the child. But due to the geological issues this rescue plan often doesn't succeed. Even it is more difficult for the best technology to succeed ,because any disturbance to the hole can block the access point to safe the child.

**Literature Survey:**

A major problem faced by the human society was water scarcity which is analyzed by Bharathi and Suchitha. Due to drought and depletion of underground water, more bore wells are drilled on the surface of the earth. In many areas, the bore wells are drilled and left open without any proper covering. These bore wells became death pits and started taking many lives especially small children. Now a days falling of children in bore wells are increasing due to carelessness and playful activities of the children. The hole dug for the bore wells are deep around 800 feet. The maximum depth is in Bengaluru of about 1700 feet. In these cases, the rescue of child from such deepest bore well is quite challenging.

B. Bharathi et.all [1]describes the design of a robot for rescuing the child from bore well. This robot is capable of moving to the inside the bore well, according to the commands given to PC and also pick and place based on the arm design. This robot is operated through PC with the help of wireless Zigbee technology and wireless camera which gives both the audio and video signals on the TV monitor. The high power LED in the robot acts as a light source in the pipe since the light intensity is low. The main drawback is that the arm structure can’t give adequate security to the child while lifting.

John Jose Pattery [2] describes the facility that monitors the child in the borewell, supplies the oxygen and provides a supporting platform to lift up the child. The first motor placed at top turns a gear mechanism which in turn pushes 3 blocks arranged at 120 degree from each other towards the side of the bore well. The bottom shaft is turned by 130 degrees with the help of second motor, thus helping to locate the gap through which the lifting rod is adjusted by third motor. When the diameter is adjusted, the forth motor helps the lifting rod to screw its way through the gap towards the bottom of the child. Once lifting the rid reaches a safe position under, an air compressor is operated to pump air to the bladder attached to the end of lifting rod through an air tube that runs downwards inside the lifting rod. The bladder provides a safe seating to the child. Them the first motor is reversely operated so as to unclamp the system. Simultaneously it is lifted out of the well using a chain or rope.

Giridharan .M described about designing a robot consists of three engines to save a child on the drag well. The primary engine is used for movement which is up and down by using screw bar. Second engine is utilized for grabbing reason with the surface of lead screw arrangement. Another engine is used to rescue the child through rack and pinion arrangement. Based on the location of the child, the whole arrangement can be pivoted. Then the child is lifted from the bore well.

Arthika.S described about the mechanism of safeguarding child from the bore well. The temperature sensor is used to detect the temperature and similarly gas sensor is used to detect the gas spillage in the specific region. ARM compression and expansion method is used for roper up and down movement. The robotic arm is using relay operation for picking and placing the child. This method provides safeguarding activities in less time. The major drawback is lifting of child is very difficult by using gripping arm.

**Applications:**

1. The depth of the bot it can reach, can be increased by increasing the length of the rope.
2. It is more safer than the L-rod technique and other normal rescuing procedure.
3. Ensures that the child does not slip further deep into the borewell during the rescue operation.
4. Monitoring the Gas levels in the borewell which acts as a feedback enabling the user to increase/decrease the O2 level for the child to breathe in and remove the harmful gases out.

**References:**

[1]. B. Bharathi, B. Suchitha Samuel “Design and construction of Rescue robot and pipeline Inspection using Zigbee”, International Journal.

[2]. John Jos Pottery ”robot for bore well rescue” Amal Jothi college of engineering vol 10, Jun 2009.

[3]. Nithin, G., Et Al. "Design And Simulation Of Bore Well Rescue Robot- Advanced." Arpn Journal Of Engineering And Applied Sciences 9.5 (2014): 3101-3104

[4]. Rajesh, Singuru, Gamini Suresh, And R. Chandra Mohan. "Design And Development Of Multi-Purpose Prosthetic Bore Well System-An Invincible Arm." Materials Today: Proceedings 4.8 (2017): 8983-8992.

[5]. Shah Vrunda, R., Chirag S. Dalal, And Rajeev Dubey. "Automate Machine For Rescue Operation For Child." International Journal Of Research In Engineering And Technology (2015).