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Borewell Rescue to Child Using IOT Techniques: A Survey

P.Thangaraj[1], Dr.S. Gavaskar[2]
Mphil Full-Time Scholar[1], Assistant Professor[2]
Department of Computer Applications, Bharathiar University, Coimbatore [1,2]
rajsan1516@gmail.com[1],Gavas_blue@yahoo.com[2]

Abstract- In India past one decade, there have been several borewell accidents where especially children accidently fall into open borewell holes. Many systems and mechanism were found to rescue the children from the hole. Resolving this idleness becomes critical as because of human interacts. The small delay in the rescue can affect the life of the children. The main objective of this survey is to find the various techniques and mechanism which is used in the rescue operation. From this survey we observed that the borewell data can be analyzed by using the sensors fusion and the robotic arm. The borewell using the sensor fusion will helps the rescue operation in short time period. The source of the paper is obtained from the various digital libraries. In this we analyzed the borewell accidents between the years 2006-2017. Based on criteria 12 articles is reviewed and brief by the various mechanisms where commercially. Behind the review 11 papers has been elucidate the system functionality and also solve the criteria based analysis. From this we wrap up that most of the rescue operation is thrive because of the sensor fusion, robotic arm, wireless technology and IOT Techniques.

Keywords- Borewell, Camera, Child rescue, LCD, GSM, Microcontroller, Robot arm, Sensor fusion

1. INTRODUCTION

As per geographically and by nature India is an agricultural country, so the agrarian depends on the water. The source of the water may comes from river, well, rainfall or groundwater. Now days due to less rainfall, over population, modernization the source of water is decreases and also river and well were drained. Major problem is cause by excessive drilling of borewell has led to exploitation of groundwater at high rates. As people moving to urbanization excessive water demand for irrigation and increases of population, bore well are constructed for water extraction. Scarcity of water becomes the global issue nowadays. So peoples are leads to borewell being ruined. Bores which yielded water consequently got exhausted are left uncovered. In past few years most of the Borewell are illegally drilled to extract the water and several children have fallen into these uncovered borewell this is the main issue as we faced nowadays.

Statistics says that the consecutive years starting from 2006 more than 30 deaths are occurred due to uncovered borewell. The most mournful fact is 92% of the victim is under the age of ten. We found this serious issue, we brought up with robotic mechanism which can go through the trapped hole without any help and also grasp the body within a short period of time. This robot has the facility of oxygen cylinders, safety balloons to save the humans life. Measuring temperature of the borewell is not sufficient to monitoring to avoid that we are using temperature sensor for successful rescue. The distance of the child from the dig is measured by the ultrasonic sensor.

The main objective of this paper is to find the robotic based mechanism to rescue the children within the short period of time. Second objective of this work is to find the various techniques, mechanisms, robotics, wireless sensor fusion techniques which economically suits to the layman users. Third objective of this work is to find the strength and weakness of the various technique used in the articles. Finally dashboard is done for future prediction and analysis. Based on this we give the awareness to the people to save the child life.

2 . METHODOLOGY

In this review we have conducted survey based methodology for bore well rescue operation for the child. The methodology consist of five phases such as,

- Selection Process
- Selection Terminology
- Article Resources
- Selection Criteria
- Quality Assessment Rules

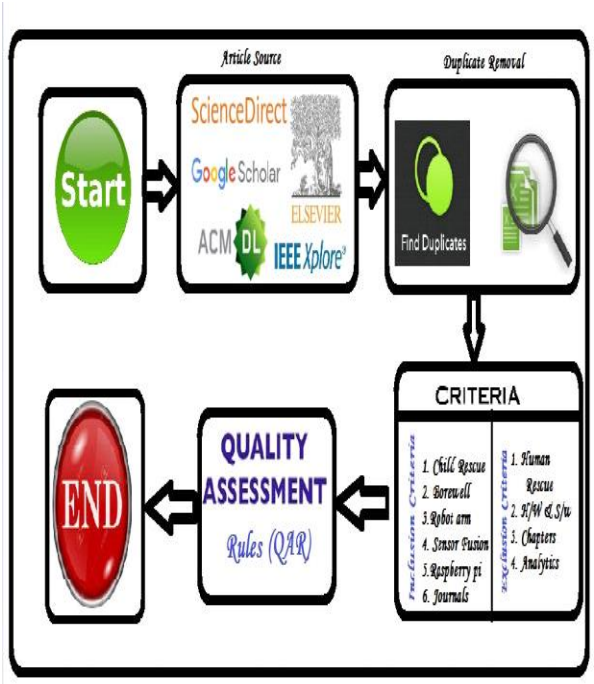

Fig 1: Methodology for Borewell Child Rescue Operation

2.1 *Selection Process*

Selection process is based on summarizing and reviewing the IOT techniques in Borewell to child rescue operation. The rescue operation of the child is the main objective of this survey. We defined criteria for selection process (RQ) given below:

RQ1: How to hold the baby and take him out from the hole?

The aim of the work is to hold the baby from the hole without injuring the baby. With the help of the robot arm and oxygen balloon we can protect the baby and seating safely. Oxygen balloon provides the oxygen to the child in the borewell hole and Robot arm handles the child from the hole.

RQ2: Which IOT technique has been used to protect the child from the borewell?

The aim of the question is to specify the IOT techniques that are implements to protect the child from the borewell. Based on internet of things robot can function automatically whenever needed. No need to wait for humans help.

RQ3: What type of Sensor is used, comparison between the sensors?

The objective of the question is to find suitable sensor for the operation and to provide relevant data for future analyze. It also compares the sensors with categorization of the sensor, cost of the sensor, data which is used for prediction.

RQ4: Comparison between any mechanism/software has been performed through the Robot?

This describes the supply of oxygen, water, cooling air, temperature, pressure, gasses for child rescue operation. It compares the mechanism which is good in optimization, low cost, sensing the data continuously, 24/7 monitoring.

RQ5: Distinguish the strength and weakness of the implementation of the borewell child rescue operation?

It compares the strength and weakness of the techniques which has the high performance. This question provides the answer to where the mechanism, hardware and software can be used. It also suggested to give the product level or application level protocol.

2.2 *Searching Terminology*

Searching terms are important to find the relevant articles. Searching terms based on domain, area, mechanism, keywords, etc. The searching terms for the survey is given below,

Based on research question

- We defined new terms similar to main terms; they are keywords, synonyms, spelling and link words.
- Frequently used technique has been listed out to find the best technique.
- Domain related keywords; used to retrieve form the publications.
- The different search terms are mentioned as below,
    - "Borewell" and "Child Rescue operation", or "Sensor Fusion",
    - "Robot arm", "LED monitor", "Oxygen pipe" and so on.

2.3 *Selection Criteria*

We select limited articles based on the criteria. The filtration process is conducted manually to resolve any differences. First duplication of the articles obtained by authors has been removed. Based on inclusion and exclusion criteria the selection criteria are performed.

Inclusion Criteria

- Use child rescue operation in Borewell
- Use hardware to child rescue
- use the sensor fusion and robot to protect the child

- Comparative study of various sensors has been used.
- Consider Article resides between the years of 2014-2017.
- Child rescue operation or wireless mechanism is used.

Exclusion Criteria

- IOT techniques that is not related to child rescue
- Include Child rescue and exclude the IOT techniques
- Include the robot technique to function in borewell and exclude child rescue.

2. 4 *Quality Assessment*

The quality assessment in performed in the selected reviews to evaluate the quality of the research reviews. In this survey five QAs were defined and each QA is scored as follow as: "Clearly defined" =2,"above average"=1.5, "average"=1, below average="0.5", "not satisfactory"=0. If the result was obtained 5 out of 10 then the article is reviewed otherwise it is excluded. The Quality assessment questions are mention below,

QA1: Weather the research objective is clearly defined and the mechanism traps the child within a short period of time?

QA2: Are data provided by sensor is valid for future prediction? Weather they are generated continuously?

QA3: Is emerging trends or any other new innovation is used in these mechanisms?

QA4: Is robot feeds in the right manner and state that economically possible to implement in real-time?

QA5: Is implementation of hardware, software and functionality of the process is explained in nook and corner?

3. RESULT AND DISCUSSION

3.1 *Survey on Literature Reviews*

The Selected reviewed papers are discussed below as per Article Id, Methodology, Technology used, and Strength and weakness of the paper were discussed below.

Channabasavaraj et al [SA01], PC based Child rescue system from borewell is an alternative scenario for digging hole for bore well, robots mechanism is used. Through remote control the robot is used to perform the actions with microcontroller. Microcontroller handles the entire sub device connected across it. It has the capability of displaying 2x16 words on LED display. LED displays the gas levels in the hole and also displays any other gases in the hole. The wireless camera is used to capture the position of the child that signals can be received by the receiver at the top of the hole. DC motor places in top turns gear mechanism it turns the pushes 3 blocks in 120/360 degree view to locate the gab through the rope holder the DC monitor adjust the lead screw with the arm supports. The resistance of motor measures the consumed current and applied voltage. The arms hold the head of the child in the hole the bladder provides safe setting for the child the data represents in the form of analog signals that is convert to digital signals data (ADE). Crystalloids dot matrix liquid crystals are available in TN types with or without backlight. In this paper it consumes the man power and financial expenses, the robots will find the child from the dig (hole), Limitations of the work is Hugh electronic power and high cost only suits for large scale of industries.

K.P.Sridhar et al [SA02],are design a wireless sensor fusion system to analyze the conditions of the borewell both inside and outside. This must be challenging issue to trap the child from the borewell within quickest possible time. The rescue operation is integrated with wireless sensor system along with visualizing infra-red camera and ultrasonic sensors, sensor will measure the distance between the child and the base. This sensor fusion comprises ten measures like temperature, humidity, carbon monoxide, smoke, breathanalyser, coal gas, butane, methane, air quality and hydrogen. This sensor are integrated through a microcontroller with regulated power supply the acquired data is transmitted signals from the bore well will be received by the wireless RS-485 inside the borewell. The transmitted signals from the borewell will be received by RS-232 to the computer. The implementation of the rescue operation parameters are selected using Modbus software to obtain sensor data and stores in device. This experiment is implemented from Mettupalayam to Pollachi in Tamil Nadu India. This data acquired from the bore well during day time, night time and day/night time of Pollachi. Form the data the vital parameter such as humidity, temperature, oxygen level, CO, are necessary to rescuing the child immediately. Parameters like Humidity and temperature lies between the critical value 20%- 80% and 15C - 37C shows the abnormal state of the child. In abnormal condition, atmospheric air was blown along with 70% of oxygen to maintain the abnormal state inside the borewell. The limitation of the work is supplying oxygen in chemical contaminated land will react and produce poisonous gases inside the borewell these may cause any side effects of the child rescue.

M.Sujatha, et al [SA03], was designed and implemented LabView based borewell child rescue robot. Children accidentally fall into the uncovered surface of yielded water. In this robot is operated

through PC using wireless Zigbee technology and wireless camera to view both audio as well as video. This robot has a high power LED for light source when light intensity inside the pipe is low. The switch cushion has four small scales changes associated with Microcontroller I/O pins. One end of the switch is grounded and other end is associated with the microcontroller port. The contribution of DC engine is present /voltage and its yield is torque(speed). Then the solenoid Valve is three-port valve, the outpouring is exchanged between the two outlets ports. The Shut circuit TV (CCTV) utilize of camcorders to transmit the flag to particular place. It is associated with the TV tuner to demonstrate the infant position inside the barrel. The oxygen system noticeable if the rate of oxygen turns under 18%. The tube is fixed with robot to supply the crisis oxygen to infant. The microcontroller stores the data received by the robot. Similar to the temperature and smoke values using NI lab VIEW.

V.Venmathi, et al [SA04], describes the borewell rescue using robot. The robot structure consists of power supply, switch pad, gear motors, oxygen concentrator, camera and Microcontroller. The trapped child is captured with CCTV camera and monitored TV. The rope is connected to the top of the robot. The oxygen hose is fixed to the upper plate of the robot movement; the length is adjusted from outside of the borewell. Using the motor detector and other special features of the camera, the baby position is seen through the computer. 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 which provides a safe seating to the child. If the baby is trapped in the middle the motor connected at the lower end of the hallow tube, initially the gas tube is end of the robot hands to avoid the stabbing of gas tube on the baby. Now the baby moves under the robot control, slowly the baby moves upward by pulling the rope using pulley control system. When the robot is pulled out, the rope is cut off. This is implemented through the Embedded C which is executed by MP Lab Integrated Development Environment.

Singuru Rajesh et al [SA05], developed a multipurpose prosthetic bore well system for rescuing trapped children from borewell in less time. As per Indian government report, Newspaper article and Google search in last 10 years resulted in a total of 39 borewell incidents. The reason behind the death is while rigging bore people leave these holes not by covering or closing. If children play in that area and suddenly fall into the borewell and troubled for long time, lack of oxygen, dry leaves and sticks. The manipulator part is capable revolving around 360 degree and slide to side for holding the child and done with commands given by micro-computer to servo motors. The prosthetic system to chain at top is connected to the rope, runs inside narrow hole through two pulleys. It sends the arms to the bore through controls by watching virtual images in PC or Mobile. This setup is supported by tripod stand with oxygen concentrator aside. Once detecting the child arm will stop at some distance give the data ground depth, position of child, surrounding temperature, pressure, O2 level and smoke gases. The position of the trapped human images can be viewed by mobile or PC, which is connected thorough Wi-Fi camera running in LED light. Servo motor is to revolve the gripper hand as per child position. It holds the child body safety now safety balloon at the bottom to avoid the slips. The captured images, ultrasonic signals, radiography images will be received by host computer. This arm is more invincible and easier in operation.

Sachin Vastrad et al [SA06], is developed of child rescue mechanism from open borewell. Major problem faced by human society in water scarcity, which leads a large no of borewell being sunk. The conceptual design is designed based on light weight that goes down into the borewell pipe and holds the trapped child systematically. The parts are assembled by a motor and screw mechanism with needed accessories. The requirements are controlled by rope and pulley which goes down the hole and perform the rescue operation. In developed model fabricated mechanism with threaded shaft with a nut. The motor is connoted to 12V DC battery which is operated causes the threaded shaft to rotate. The nut moves upwards and downwards depending on the direction of rotation which in turn causes the lower link to extend and retract. This mechanism is made to suit every possible situation of rescuing the child at limited cost and time without use of robot.

Kalavathi K S et al [SA07], is developed a child rescue system against open borewell. Method is implemented through metal plate is placed in the front of the borewell. IR technology is used to identify he child into the borewell. IR sensors receiver is connected to comparator. It is connected with microcontroller. The microcontroller sends SMS via GSM to protect the child. The microcontroller activates another DC motor to pull the child from the hole. LCD will display the working of every unit. This IR sensor senses the data in four directions.

Albert Francis et al [SA08], implemented a methodology for child rescue from borewell. It gives the idea for rescuing a child from borewell through posture finding mechanism where the child is trapped by the position with the help of fixed shaft. 12 volts DC motor is connected to a small gear. By rotating robotic device we find the gesture of the child. Grasping mechanism hold the child inside the bore

when the DC motor rotates the arm will trapped the child, if it rotates anti clockwise it automatically release the child. Safety mechanism is implemented through the nylon bladder at bottom of the arm. It expand and hold a child when system foes failure. In this paper it minimizes the time taken for protect.

Thiruvarutselvan [SA09], implemented through android based rescue arm robot. The main objective of the paper is to rescue the children who fell into the borewell. The child who suffered in the hole, it is difficult to protect from the small area and within the minimum time the oxygen supply also reduces. In this method robotic arm manipulates the function to human arm. DC motor helps to rotate the arm with same number of degree as a human arm. In this 12V AC is rectified to DC using bridge rectifier. The output of the capacitor was unregulated, here 7805 warned to regulate the voltage to 5V. Microcontroller will monitor the system depends on control operation. The power on circuit will use the resistor followed by capacitor to turn out low to high pulse at power up. The Oscillator circuit in microcontroller has knack to recognize diverse types of oscillar. Relay is connected with the RD4 pin of PIC IC. LCD display is connected with RBO-RB7 of PIC IC. These pins will controls the lines of the LCD display. In future it connects with temperature sensor and smoke sensor to get the temperature zones and concentration of smoke or gases respectively. In future knowledge of the wireless camera can provide more exact information about the child in the borewell.

John Jose Pattery et al [SA10], is developed a borewell rescue robot to trap the child from the borewell. Here the system is design with robot embedded with camera, through the clamping mechanism, which consist of 3 lamping jaws separated by 120 degrees driven by a DC geared motor. The gear ratio 1:1.5, rotary motion of the three bevel gears is converted into linear motion using screw mechanism. The mechanism is designed the joints between the clamp and screw shaft will break if the rope with a force greater than 50N. If the clamps get stuck while unclamping, continue to rescue the child by pulling the rope this will break the collapsible joints. The positioning mechanism builds in the lower part of the robot to rotate the clamps with dc gear motor. It lift rod towards the side of the borewell of different diameter 25.4-45.72 centimeters. Lifting mechanism estimates the gap between the child and the wall is slid through the opening; the child is secured and lifted as the robot is hoisted. The system consists of a pneumatic piston with a stroke length of 140 cm. Here high pressure air is supplied using a compressor along with safety valve. In control system on-board controller which control the robot and controller at the control station. This control system connects with the control system and motor driver for driving a Maxon motor. In case of system failure to backup from the system a bypass circuit is designed. To evaluate these mechanisms various models has been implemented. The alpha prototype was tested to prove the conceptually functional. In beta version tested allowing the robot to handle a doll filled with sand weighing 15 kilometers, the robot was designed to incorporate all the extra safety measures. In gamma prototype mechanism was refined by safety cage which directly hang from the rope. The child will be adequate cushioning with the help of the air bag. Thus the child can be rescued with less in time.

Palwinder kaur [SA11], has developed a hardware and software based implementation a robot for borewell rescue operation. The goal of this work is to develop a platform to reduce the risk by constructing a prototype robot which will be controlled through tale-operation. The scheme that three sets of parallelogram wheeled leg mechanism is circumferentially and symmetrically spaced in 120 degree view. Here four DC gear motors are used. First motor placed in the bottom where 3 blocks arranged at 120 degree view. The second motor helps to adjust the gripper to grasp the target. If any gaps have been found third and fourth motor move towards ups and down inside the pipe. In front of the robot the robotic arm will pick and places the objects. The camera will gives the visual display of the position and location of the child. The Radio Frequency (RF) is used to transmit the receive radio signal frequencies. The sensors like temperature, smoke are concentration inside the hole. The system includes the programming the controller by using micro C software and GUI using Lab view. GUI helps to generated to the data produced by sensors and video recording.

Manish Raj[SA12], has give an approach towards rescue robotics in bore well environment. A mechanical system will be attached to the higher plate which holds the robot in position by pushing the wall of the bore well. Another mechanical gear system will attach to the lower plate. Two high resolution camera is fixed with lower plate, the high resolution camera will provide the view of the entire environment which helpful in tale-operating the two arms. it also provide the lighting source in dark environment. The victim can communicate with their family members through teleconferencing by LCD and audio systems. There will be a supplementary oxygen mask which can supply the oxygen in emergency situations. The whole scenario will be feuded live through the communication module will publish the images from the cameras of the robot. The arm-tip cameras will provide the view of the route of the arms for adding straps of the harness, food-bag or oxygen mask to the victim.

3.2 *Discussion*

In this section we tabulated the strength and weakness of the review papers which is reviewed in the above section. The Table: 1 explained with Article Id, Mechanism, Technology and followed by Strength. In Table: 2 it explained with Article Id Mechanism, Technology and followed by Weakness

3.2.1 Article Quality Criteria: Mark based

Table 1: Mark based Quality Assessment

ID	QA1	QA2	QA3	QA4	QA5	Total
SA01	1.5	1	1	2	1.5	**7**
SA02	1	0.5	1.5	1	1.5	**5.5**
SA03	1.5	1	1.5	1	1.5	**6.5**
SA04	2	1.5	1.5	2	1.5	**8.5**
SA05	1.5	2	1.5	1	1.5	**7.5**
SA06	1	1	1.5	1	1.5	**6**
SA07	1.5	0.5	1	1	1	**5**
SA08	1.5	1	1.5	1	1.5	**6.5**
SA09	1	1	1	1	1	**5**
SA10	2	1.5	1.5	1.5	2	**8.5**
SA11	1	1.5	1	1.5	1	**6**
SA12	1.5	1	1.5	1	1	**6**

In table 1, it shows the quality assessment for each research question for each reviewed articles. The summation of all questions obtained for 10. If the summation less than 5 then the article is removed for the review it all based on the quality assessment mentioned in section 2.5.

3.2.2 Strength and Weakness of the articles

Table 2: Strength

Article ID	Technology/ Mechanism	Strength
SA01	Microcontroller, Gas Sensor, 3-D CAD	It consumes the man power and financial expenses, the robots will find the child from the dig (hole),
SA02	Modbus Software, Sensor fusion,	The operation was successfully rescued the child in 20 minutes in real time.
SA03	Zigbee Wireless Technology, LabView Microcontroller – robot, Altitude sensor	The rescue operation time will be reduced and retain many lives.
SA04	Embedded C, MP Lab- IDE PIC microcontroller, Robot.	Rescued the child with minimum period of the time.
SA05	Conventional method, Stabilizing mechanism, Crack Detection	Helpful for crack detection, rocket motor casings, mining rescues.
SA06	Fabricated , Motor & Screw Mechanism	Suit every possible situation of rescuing child at limited cost and tie without robot.
SA07	IR, GSM, Infra-red	Simple, easily scalable, reliable.
SA08	Posture fining mechanism, Grasping mechanism, Safety mechanism	Minimizes the time taken for protect.
SA09	Android , ARM robot,	Automatic control over the circuit, Stand-alone system.
SA10	Mechanism: Clamping Positioning, Lifting, Prototype: alpha , beta, gamma.	Reduce time taken to protect, reduces human effort,
SA11	Remote controlled robot, Tele - operated robot, GUI, Lab view, Radio Frequency	Prototype based on Software, hardware. Sensing modules, camera module, RF communication.
SA12	Robot, Camera, Teleportation, LCD.	Telecommunicate with their family members, food-bag, oxygen mask will be supplied.

Table 3: Weakness

Article ID	Technology/ Mechanism	Limitations
SA01	Microcontroller, Gas Sensor, 3-D CAD	Limitations of the work are Hugh electronic power and high cost only suits for large scale of industries.
SA02	Modbus Software, Sensor fusion,	While supplying oxygen in a chemical contaminated land will react and also affects the child inside the borewell.
SA03	Zigbee Wireless Technology, LabView Microcontroller – robot, Altitude sensor	Economically not suitable. High power consuming.
SA04	Embedded C, MP Lab- IDE PIC microcontroller, Robot.	Temperature sensor to the robot can get the temperature of dangerous zones in PC to avoid that we send the robot to the hole.
SA05	Conventional method, Stabilizing mechanism, Crack Detection	The functionality of the more components makes complex to maintain.
SA06	Fabricated , Motor & Screw Mechanism	Adjust the wide range of diameter to sustain all possible loads.
SA07	IR, GSM, Infra-red	Cost effective.
SA08	Posture fining mechanism, Grasping mechanism, Safety mechanism	-
SA09	Android , ARM robot	Always need of android phone
SA10	Mechanism: Clamping Positioning, Lifting, Prototype: alpha, beta, gamma.	Further sensors can be attached to the system. The system should learn for better performances during the rescue operations.
SA11	Remote controlled robot, Tele - operated robot, GUI, Lab view, Radio Frequency	It performs in the task according to the user's command.
SA12	Robot, Camera, Teleportation, LCD.	Mapping unknown environment, real-time tele-operation in low lighting condition.

3.2.3 *Dashboards on Child Rescue System against Open Borewell*

This dashboard gives the analytical perspective for the end used for better understanding the statistics analysis from the visualized charts. This data analysis the Age wise bore well accidents, year wise accidents in India and State wise analysis in India were visualized below.

a) Age wise analyze of Child Deaths in Borewell Accidents.

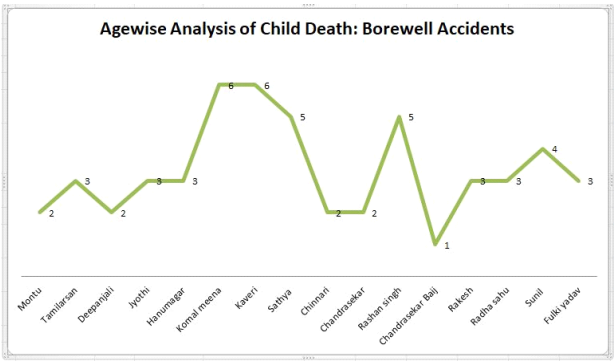

Fig 1.2: Age wise analysis of Child Death: Borewell Accidents

It shows the age factors of the child rescue against open borewell. The children under the age 2-3 were met the bore accidents shows in Fig 1.2.

b) Year wise Borewell accidents in India

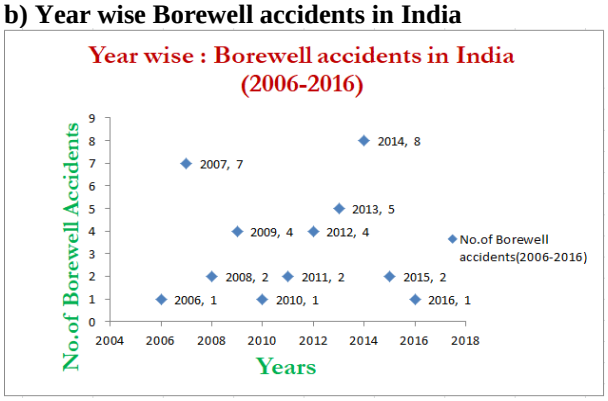

Fig 1.3: Year wise Borewell accidents in India

Fig 1.3 shows the number of accidents that have occurred in India from the year 2006-2016. The most number of death occurred in the year 2014, 8 members died because of borewell accident. In 2007, 7 members died due to this.

c) State wise analysis of Borewell Accidents

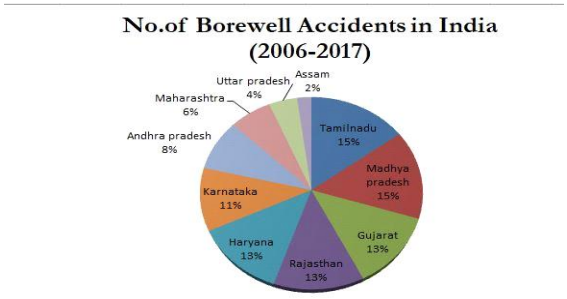

Fig 1:4: Satewise analysis of BorewellAccidents [SA08]

In Fig 1.4 it shows the percentage of borewell accidents in state wise. In that Tamilnadu has 15% occurrence of death in India. Among ten states Assam has least number of deaths in India.

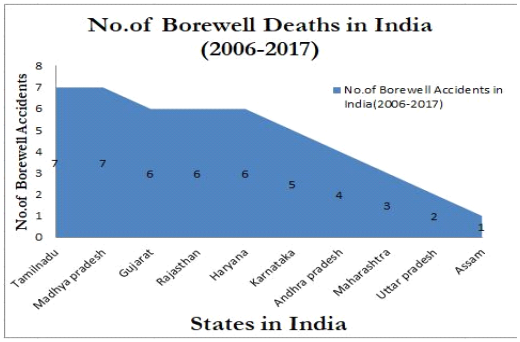

Fig 1:5: Satewise analysis of BorewellAccidents [SA06]

In Fig 1.5 it shows the spread of borewell accidents all over the India. Tamilnadu has the high occurrence of death and Gujarat, Rajasthan; Haryana has the second highest occurrence accidents. Assam and Uttar Pradesh has the least deaths.

d) Source of the Accidents from the Media

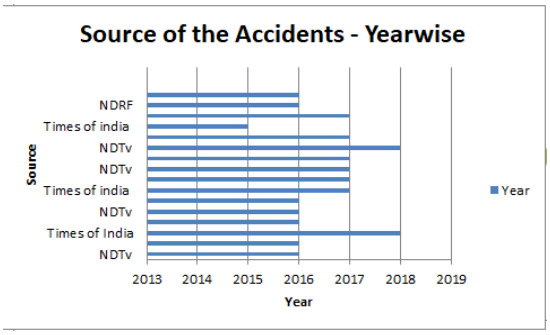

Fig 1.6: Sources of Accidents

In Fig 1.6 the media like NDTv, Times of India has covered the borewell accident news. From this in the year 2017 more number of accidents has been occurred and that has been covered by all Medias.

4. CONCLUSION

In this Survey sight saw journal articles for borewell rescue operations from the year to 2014-2017, article were revised based on the research questions. Conclusion is summarized as follow:

RQ1: The Robot arm can go through the trapped borewell without any support and hold and seat the child by using safety balloon. If any difficult in consuming oxygen sensors along with the robot, supply the oxygen to the human. Depending upon the movement of the robot the hose length is adjusted from the outside of the borewell. Now the baby is completely with robot control, movements of the baby captured by the monitor.

RQ2: Wireless sensor fusion comprises ten sensors. That measure humidity, carbon monoxide, smoke breathalyzer, coal gas, butane, methane, air quality and hydrogen. Digital Wi-Fi camera is to find the position of the baby in the hole.

RQ3: Ultrasonic sensor for distance calculation, temperature sensor is to finding the temperature in the borewell, gas sensor for calculates other gaseous levels inside the bore. The Wireless sensor fusion will start acquiring the data simultaneously.

RQ4: By using Modbus software to monitor the sensor data from the borewell and stores the data. Zigbee technology uses wireless camera to view both audio and video on the monitor.

RQ5: The robot is computerized; safety balloon is more safety case of avoiding further falling of baby during the rescue. The robot is Eco friendly because it eliminates the harmful gases. The limitation of this work is sometimes it is hard to maintain the hardware as well as software.

5. FUTURE ENHANCEMENT

The future work is to gather the papers automatically to validate all the criteria manually. To create an API tool to done all this reviews and do the analytics based on the data which is sense by the sensor data. It also gives the prediction about the future with the exact scenario. The data is which is observed by the wireless technology will be analyzed through the visual boards automatically.

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