CONSTRUCTION OF ADVANCED CHILD RESCUE SYSTEM FROM OPEN BOREWELLS BY USING ROBOTIC CLAWS & RASPBERRY-PI MODULE

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Abstract: People used to dig for water up to a depth of 360 feet, and occasionally even more than 400 feet, in some areas where the ground water table is so low. Children have been known to fall into bore wells as a result of sloppy or indifferent covering. The equipment that is currently available to save the child is less efficient and also more expensive. Typically, to reach the youngster, a parallel hole is dug, and then a horizontal path is created. It is not only a time-consuming operation, but it also carries a number of risks. The community therefore requires a new, more effective and efficient technique. The Borewell Rescue System is able to move inside the same borewell where the youngster has been confined and carries out a number of rescue-related tasks. So we come out with a solution to rescue those innocent children by using Raspberry pi, Robotic claw, LED light, DHT11 sensor and oxygen pump. By using Raspberry Pi we control and monitor the camera module, as the depth increases we use LED lights which is controlled by blynk and the robotic claw is used to pick and hold the baby which is based on the program in it. In addition, we have oxygen pump to supply oxygen inside the hole to the baby and motor to pull and push the Robotic Claw and Raspberry Pi control modules. Because it involves saving lives, this advanced rescue system is a human-controlled computerized system that focuses on cost effectiveness as well as quick reaction time and precision.

Keywords: Child Rescue System, Open Borewells, LED Module, Raspberry-Pi, Robotic Claw & Blynk Platform.

I. Introduction

In the current situation, increasing water shortage is the biggest problem that people face in their daily life. Small children, not noticing the hole dug for the well, slip in and become trapped. These accidents are mainly caused by carelessness or playful activity of a child. The "Child Rescue System from the Clearing" was put into place in an effort to save lives. Well mishaps are frequent as a result of unprotected well openings. It is extremely dangerous and difficult to free captive children. Even a minute's delay in the child's rescue might be fatal. It is difficult to lift a toddler out of a well's confined space. A child who has suffered a fall injury stays in a smaller space where the oxygen level gradually drops. The major objective of this project is to create a portable system that is quick, accurate, and cost-effective. Additionally, this technology has the ability to administer life-saving procedures like oxygen. The Borewell Rescue System may move about inside the well and carry out tasks as directed by the user. A computer continuously monitors the system in accordance with the CCTV camera's observations.

II. Existing Problems

India is the world's largest user of groundwater, consuming approximately 230 cubic kilometers per year. There are about 27 million wells in India. Many wells are dug due to lack of water, lack of rain, drought and depletion of ground water. When the water dries up, the motor and casing pipe are removed and the well is not properly lined or sealed on the outside. According to reports, more than 40 children have fallen into the well since 2009. The absence of oxygen inside the well causes an average of 70% of typical kid rescue operations to fail, and the lack of imaging makes the rescue operation extremely challenging. Such tools are not available to rescue a child who has fallen into a well. The youngster and the parents are unable to communicate in the pit. Because of society's irresponsibility, children wind themselves in a borehole. Additionally, current systems are pricey and less effective. Most of the cases that have been documented so far involve digging a parallel hole and then making a horizontal trail to the youngster. This method is not only time-consuming, but it also carries a number of risks.

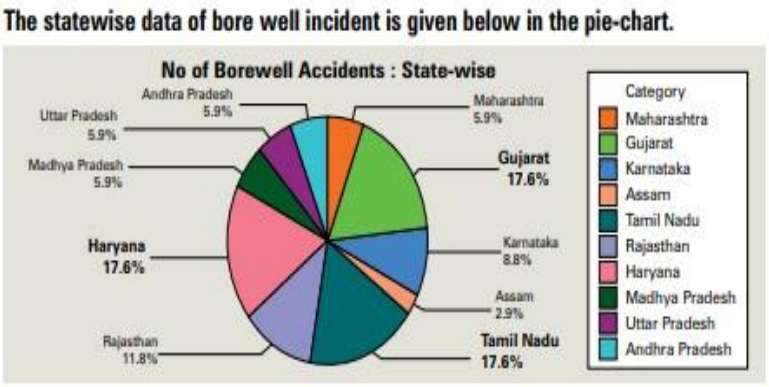

Figure 1: Statewide Data of Borewell Accidents

III. Proposed Work

This Project proposes the Rescue Children from Borewell holes. India reports at least one case every day. Using several methods, everyone tried to save the child, but sometimes it fails. So we came up with a solution to save these innocent children using Raspberry pi, robot claw, LED light, DHT11 sensor and oxygen pump. We monitor and control the camera with the Raspberry pi. As the depth increases, we use LED lights controlled by strobes. The robotic claw is used to grab and hold the child based on this program. In addition, we have an oxygen pump that supplies oxygen to the baby inside the hole, and the robot claws and Raspberry pi control modules are pulled and pushed by a motor.

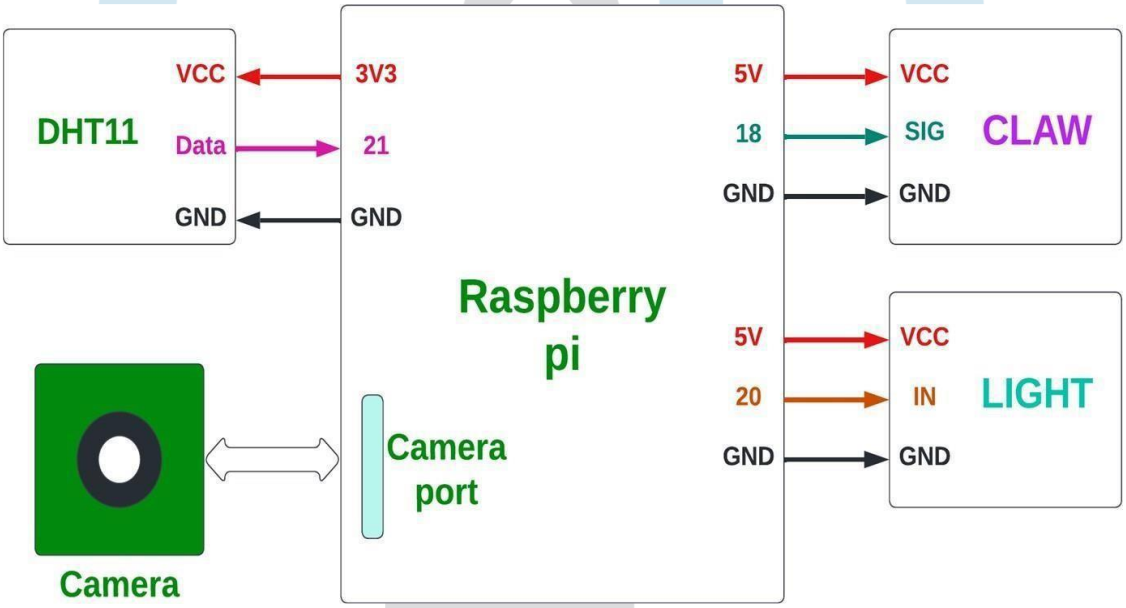

Figure 2: Block Diagram for Child Rescue Borewell Systems

IV. Hardware Description

In this Proposed Paper we are implementing Raspberry Pi- Module hardware description module. The Raspberry Pi is a small, affordable computer the size of a credit card that connects to a computer monitor or television and makes use of a regular keyboard and mouse. It's a capable small gadget that enables users of all ages to learn programming in languages like Scratch and Python and to explore computing. It is capable of carrying out all desktop computer tasks, including HD video playback and web browsing. Raspberry Pi is to satisfy the rising demand for camera modules compatible .An add-on camera module for the Raspberry Pi that is entirely compatible with the official module has just been made available by the Ardu CAM team. Compared to earlier Pi cameras, it optimizes optical performance and provides the user with a noticeably clearer and sharper image. Additionally, it offers FREX and STROBE signals that, when combined with the appropriate camera controller firmware, can be used to synchronize several cameras. One of the two tiny connectors on the top surface of the board is where it connects to the Raspberry Pi.

This interface makes use of a unique CSI interface made for connecting cameras. The CSI bus solely transports pixel data and is capable of very high data rates. The most recent version of Raspbian, the preferred operating system for Raspberry Pi, is compatible with the camera. The board is only 36mm by 36mm in size. The distinguishing feature of our module is that, in contrast to the official lens, the lens is replaceable, making it perfect for mobile devices or other applications where size and image quality are crucial. With the Raspberry Pi, it is linked with a short ribbon connection. The CSI bus, a higher bandwidth link that sends pixels from the camera back to the processor, connects the camera to the Raspberry Pi's BCM2835/BCM2836 processor. The ribbon wire that links the camera to the Pi is run along by this bus. The sensor itself features a fixed focus lens and a 5 megapixel resolution. The camera can take pictures with a resolution of 2592 x 1944 pixels and can record videos in 1080p30, 720p60, and 640x480p60/90.

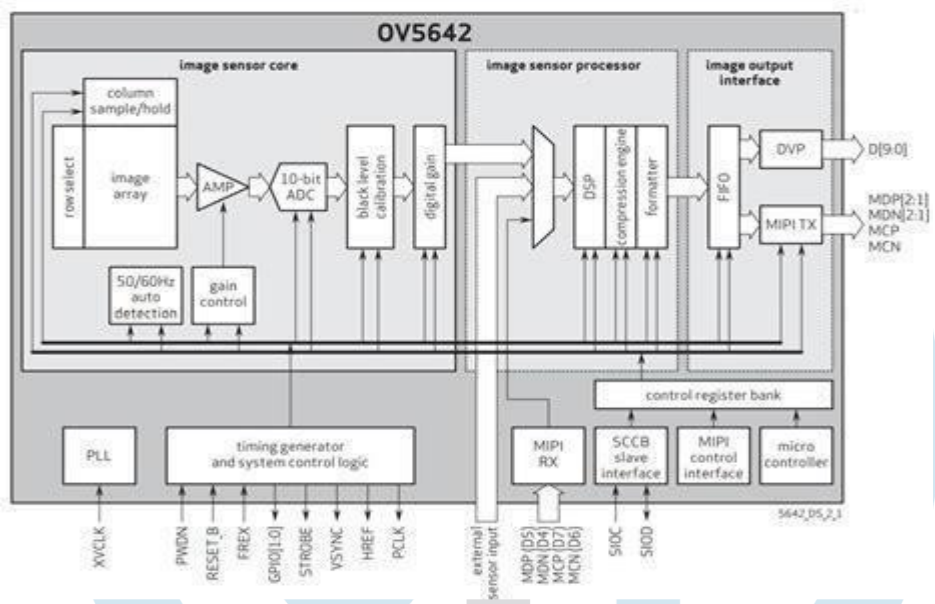

Figure 3: Raspberry Pi- Architecture

Pin No.	PIN NAME	TYPE	DESCRIPTION
1	DGND	Ground	Power ground
2	CAM_D0_N	Output	MIPI data lane0 negative output
3	CAM_D0_P	Output	MIPI data lane0 positive output
4	DGND	Ground	Power ground
5	CAM_D1_N	Output	MIPI data lane1 negative output
6	CAM_D1_P	Output	MIPI data lane1 positive output
7	DGND	Ground	Power ground
8	CAM_C_N	Output	MIPI clock negative output
9	CAM_C_P	Output	MIPI clock positive output
10	DGND	Ground	Power ground
11	POWER_EN	Input	Camera module power enable active high
12	LED_EN	Input	Reserved
13	SCL	Input	Two-Wire Serial Interface Clock
14	SDA	Bi-directional	Two-Wire Serial Interface Data I/O
15	+3.3V	POWER	3.3v Power supply

Table 2 P2 Connector Pin Definition

Pin No.	PIN NAME	TYPE	DESCRIPTION
1	+3.3V	POWER	3.3v Power supply
2	DGND	Ground	Power ground
3	STROBE	Output	Strobe output

Figure 4: Pin Connections of Raspberry Pi

V. Robotic Claw

One of the simplest kinds of grippers are robotic claws. They are well-liked by amateurs who are drawn to the straightforward design and usefulness of this kind of grip. Typically, robotic claws—also referred to as "robot claws"—consist of two claws or "jaws" that attach to opposing sides of an object to grasp it. The term "claw" is used in this article to refer to any gripper with fingers or jaws that hold objects and close the object from the outside. These fingers can be firm or soft, and soft grippers are quite useful for handling delicate goods and producing food. A variety of end devices, including as grippers with claws, are supported by UR robots.

A servo motor is part of the robot arm, which is used to angle the arm to grasp (hold, release, spin, and put) things. The microcontroller programming technology and the programme used to control the movement of the robot arm control this servo motor, which operates on the Fleming's left hand rule principle. Industrial robots are employed in a variety of industrial tasks, including welding, putting objects, heating products or materials to extremely high temperatures, etc. In particular, the imaging and positioning robot's robotic arm is employed in industrial applications for object holding.

Figure 5: Robotic Claw

VI. DHT-11 & DC-AIR PUMP

The DHT11 sensor is made up of a thermostat for measuring temperature and a capacitive humidity sensing element. A moisture-retaining substrate serves as insulation between the two electrodes of the humidity sensing capacitor. Along with changes in humidity levels, capacitance values also change. The IC measures, analyses, and digitalizes the resistance values after they have changed. This sensor employs a negative temperature coefficient thermistor to measure temperature, which causes its resistance value to drop as temperature rises.

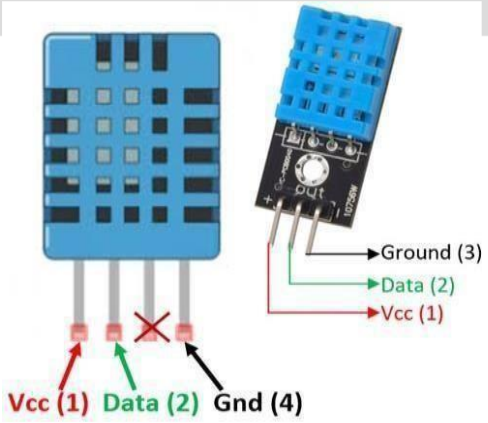

Figure 6: DHT11–Temperature

The vacuum DC air pump has a long service life, a wide range of operating temperatures, high efficiency, low noise, low vibration, ability to pump gas or liquid, good cyclone stability, and 24-hour continuous operation. The micro air pump has enough suction power to work with vacuum adsorption automation equipment and most do-it-yourself projects. In order to suck air from the atmosphere into the pump, electricity is required to generate a vacuum inside the pump. Aerators, rings, and balloons are among the chambers into which air is compressed and driven. A battery or a DC source can provide electricity immediately.

Figure 7: Air Pump

VII. LIGHT EMITTING DIODE (LED)

Solid-state light-emitting diodes or LEDs, are semiconductor devices used in electronics that, when charged by an electric current, emit visible or infrared light. The rear window and brake lights in cars, as well as alphanumeric displays and even full-color posters on billboards and signage, all use visible LEDs as indicator lights. Infrared LEDs are utilised as light sources in fiber-optic communication systems, autofocus cameras, and television remote controls. Here, the LED functions as per our instructions.

LEDs are a better choice than LEDs for visible light. At wavelengths of 1.3 and 1.55 micrometres in the infrared spectrum, optical glass fibre transmission losses are the lowest. LEDs constructed of gallium-indium arsenide diphosphide deposited on an indium phosphide substrate are used to match these transmission properties. It is possible to carefully tune the material's composition to emit radiation at wavelengths of 1.3 or 1.55 micrometres.

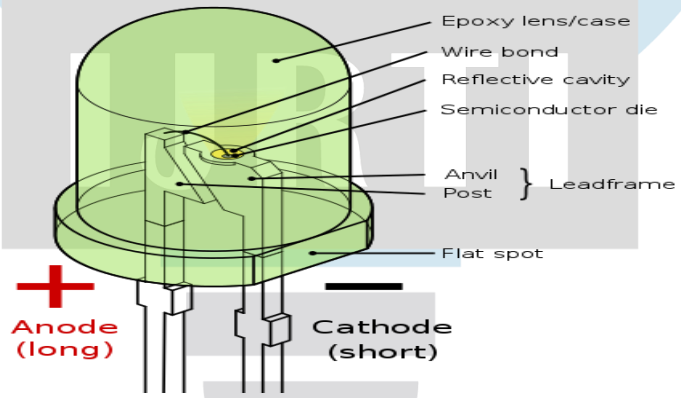

Figure 8: LED

VIII. BLYNK PLATFORM

With the use of iOS and Android apps, Blynk's platform enables users to remotely control gadgets like Arduino, ESP8266, Raspberry Pi, and others. You may make graphical user interfaces for all of your projects by simply dragging and dropping widgets. For usage with the Internet of Things, Blynk was created. It performs a number of amazing tasks, such as storing data, visualizing data, controlling devices remotely, and displaying sensor data. The three primary components of the Blynk Platform are as follows:

Blynk App enables you to design outstanding user interfaces for your projects with the help of the many widgets

Blynk Server is open-source, easily manages thousands of devices, and can even be started on a Raspberry Pi. All connections from hardware to smart phones are managed by Blynk Server. Local hosting of your private Blynk server is an option, as is using our Blynk Cloud.

Blynk Libraries allow server communication and manage all incoming and outgoing commands for all widely used hardware systems.

Imagine a scenario in which a message is delivered to the Blynk Cloud each time you press a button on the Blynk app, then finds its way to your hardware. Going the other way, the procedure is identical, and it all happens in a split second.

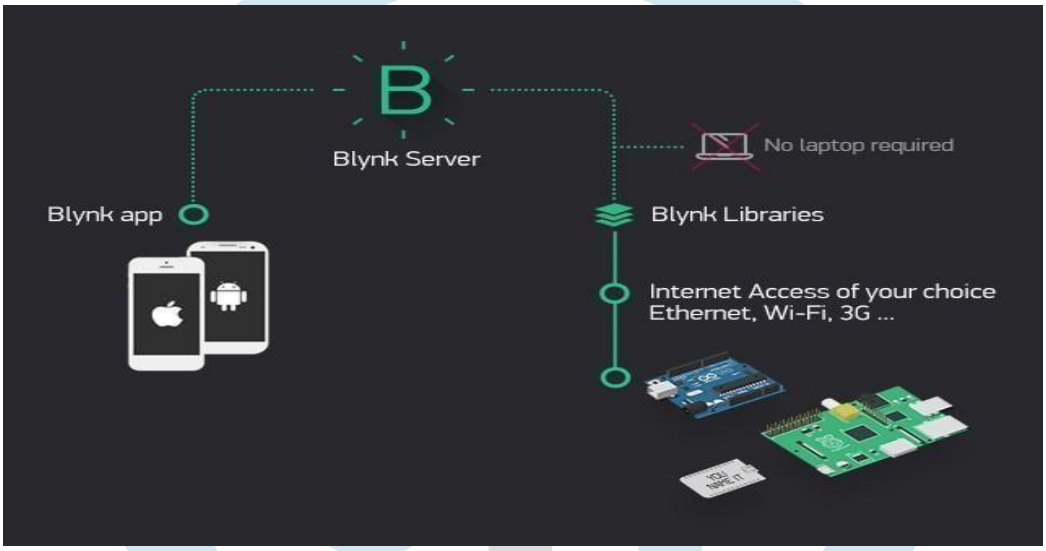

Figure 9: Blynk Working Procedure

IX. RESULTS

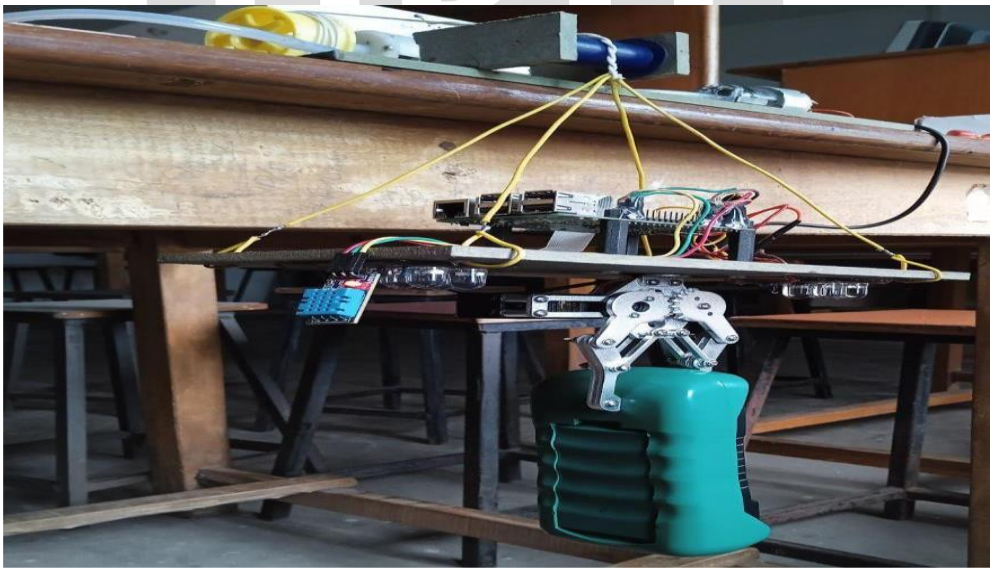

Figure 10: Lifting Body

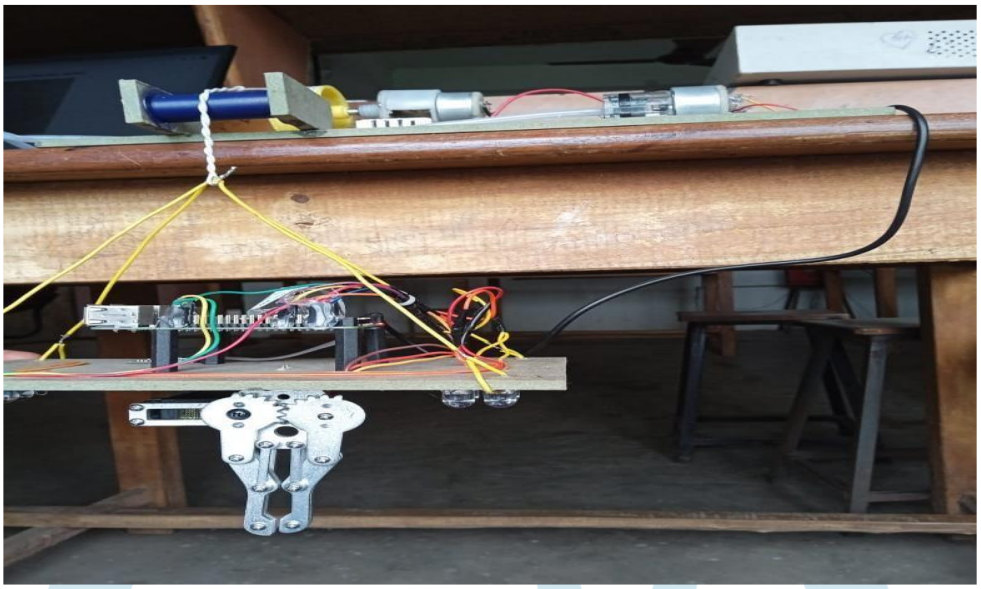

Figure 11: Claw Moment

Figure 12: Camera and Blynk Operating

X. CONCLUSION

In this Paper Child Rescue System from Open Borewells were designed, prototype and tested. We can undertake a rescue operation with this rescue robot without harming the child. Life in general is valuable. Our approach for rescuing children from bore wells is a big effort to save the victim's life. In addition to this, the machine's special capacity to climb through vertical and slope pipes opens up a wide range of potential applications in the industrial sector and other relevant industries. The current design of the child saver equipment for bore wells has been created to accommodate every scenario that might arise during a rescue operation. The time and labour required by this rescue robot are significantly reduced. Future graphing mechanisms will be combined with contemporary technologies for improved performance.

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