



e-ISSN: 2319-8753 | p-ISSN: 2320-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 10, Issue 4, April 2021

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.512

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com



Remotely Operated Vehicle for Inspection of HRT in Hydro Power Plant

Dr.Muthuraman U¹, Manokaran P², Arumugam S³, EssakkiMuthayan V⁴, AbilashM⁵

Assistant Professor, Department of EEE, Francis Xavier Engineering College, Tirunelveli, Tamilnadu, India¹

UG Scholar, Department of EEE, Francis Xavier Engineering College, Tirunelveli, Tamilnadu, India^{2,3,4,5}

ABSTRACT: The use of Remote Operated Vehicles (ROV) in the inspection and maintenance of hydro dam facilities has provided consistent quality output reducing inspection and maintenance costs. ROV helps in the planning and mapping to ensure the safety of a diver in the hazardous environment. It relays the submerged environment to the top-side in real time, giving clarity of vision in limited surroundings with high-resolution digital video recording technology 'onboard'. The small size of the ROV allows access to areas beyond the reach of divers, allowing comprehensive site inspection. The latest technology that comes in a compact form and can be controlled by single person. Inherent stability, which comes from having high center of buoyancy and low center of gravity, improves the efficiency of ROV as an inspection platform. The versatility of the ROV has enabled various other underwater tasks in and around the dam and lake-areas.

KEYWORDS: RASPBERRY PI , CAMERA , AUDINO UNO , DC MOTOR , RELAY , BLUTOOTH MODULE.

I. INTRODUCTION

Traditionally, surveillance systems are installed in every security critical areas. These systems generally consist of high quality cameras, multiple computers for monitoring, servers for storing these videos and many security personnel for monitoring these videos. When considered as a whole, these systems can yield great complexities while installing as well as for their maintenance. The CCTV camera feeds are only visible in certain locations and they also have limited range within which these can be viewed.

Above all these, the cost of implementations of these systems is so high that they cannot be installed in every household. The traditional systems require continuous monitoring by some dedicated personnel which is not possible in every household. Hiring an unknown person to do so will also raise privacy issues. The CCTV cameras installed these days also have limited vision because they're stationary modules. If an intruder moves away from the field of view of a CCTV camera, it cannot follow or track his motions. The solution to all the above issues is to have a surveillance robot which can monitor the areas where it's installed and send notifications to the owner when an intrusion happens. It also allows the user to login to the Raspberry Pi's webcam from any remote location and view live feed of whatever is happening in his premises.

Tunnel based applications have become an integral part of life. However, knowing that the pipeline systems can be largely deployed in an inaccessible and hazardous environment, active monitoring and frequent inspection of the pipeline systems are highly expensive using the traditional maintenance systems.

Robot agents have been considered as an attractive alternative. Although many different types of pipeline exploration robots have been proposed, they were suffered from various limitations.

Pipeline systems deteriorate progressively over time. Corrosion accelerates progressively and long term deterioration increases the probability of failure of pipelines. Inspection of presently uninspected sections of the pipeline system becomes a must. This project provides information on the "robotic inspection technology".

In the existing system In-Pipe Inspection Robots (IPIRs) are widely used in petrochemical, water supply and fluid transportation industries. Many researchers have been done workto develop new in-pipe robots to enhance various aspects of in pipe inspection robot like design, control and motion or robot. Research work of these researchers are reviewed to find the design philosophy, capabilities and limitation of different types of robot on the bases of review. the sensor based robotic approach is designed to inspect the pipeline. The IR sensor used to detect the cracks in the pipeline. The IR sensor which transmits light which it absorbs means the crack will be deducted; if light will be reflected means there is no crack formed. These conditions will be sent to the computer through the Zigbee module and



sensor values displayed in LCD. Then the values sent to MATLAB unit for plotting and identify the pipe leakages. The proposed architecture is **vision based technology** to inspect the robotic vehicle. Visual inspection is currently one of the most commonly used non-destructive evaluation techniques because it is relatively inexpensive as it requires minimal. Ultrasonic Sensor used to find the obstacle which found in a way. Ultrasonic sensors work on a principle similar to sonar which evaluates distance of a target by interpreting the echoes from ultrasonic sound waves. This ultrasonic module measures the distance accurately which provides 0cm - 400cm with a gross error of 3cm. The sensor transmits an ultrasonic wave and produces an output pulse that corresponds to the time required for the burst echo to return to the sensor. By measuring the echo pulse width, the distance to target can easily be calculated. The Camera used to detect the cracks in the pipeline. The camera will transmit the crack information through cloud. The camera will capture the video then the video converted into frames and then the edge detection algorithms applied. The edge detection algorithm will detect the tunnel crack and other parameters and will update in cloud.

RASPERRY PI HARDWARE SPECIFICATIONS



Fig.1 Raspberry-Pi

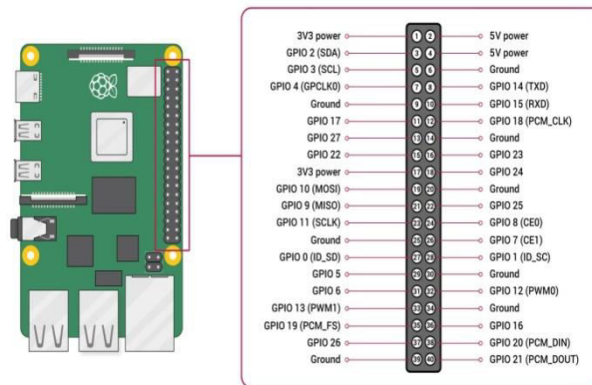


Fig. 2 raspberry pin diagram

The raspberry pi comes with a set of open source technologies, i.e. communication and multimedia web technologies. In the year 2014, the foundation of the raspberry pi board launched the computer module that packages a model B raspberry pi board into module for use as a part of embedded systems, to encourage their use.

II. MODEL B RASPERRY PI BOARD

The Raspberry Pi is a Broadcom BCM2835 System on Chip board. It comes equipped with a 700 MHz, 512 MB of SDRAM and ARM1176JZF-S core CPU. The USB 2.0 port of the raspberry pi boards uses only external data connectivity options.

The Ethernet in the raspberry pi is the main gateway to interconnect with other devices and the internet in model B. This draws its power from a micro USB adapter, with a minimum range of 2.5 watts (500 MA). The graphics, specialized chip is designed to speed up the manipulation of image calculations. This is in built with Broadcom video core IV cable that is useful if you want to run a game and video through your raspberry pi.

ULTRASONIC SENSOR

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound

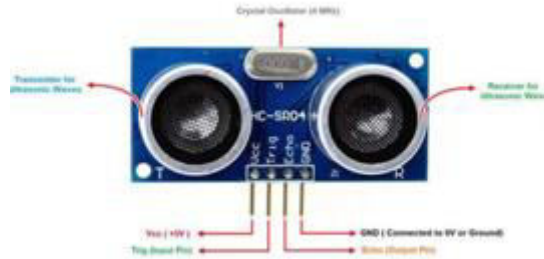


Figure 3 ultrasonic sensor

Ultrasonic sensors work on a principle similar to sonar which evaluates distance of a target by interpreting the echoes from ultrasonic sound waves. This ultrasonic module measures the distance accurately which provides 0cm - 400cm with a gross error of 3cm. The sensor transmits an ultrasonic wave and produces an output pulse that corresponds to the time required for the burst echo to return to the sensor. By measuring the echo pulse width, the distance to target can easily be calculated.

III. THE WORKING PRINCIPLE OF DIGITAL CAMERAS

The structure of a digital camera can be divided into optical lens and viewfinder, optical sensors, micro-computer, the connection interface, power supply and battery, control panel, LCD display, memory card and flash the different parts. When you press the shutter, the lens will converge light to a photoelectric converter, it replaces the common position of the camera in the film, its function is to light signals into electrical signals.

In this way, we get the corresponding electronic image shooting scene, media converter is an analogue of the sensors, so the digital image signal need converter by simulation (Analogue to Digital Converter, ADC, hp hstnn-db20 battery) to simulate the signals to digital signals conversion before the data stored. Then the microprocessor can be compressed and converted the data into a specific image format. Describing two-dimensional image file formats such as Tag Image File Format, (TIFF), Raw data Format (RAW), Flash Pix (FPX), JPEG File Interchange Format (JFIF), Panasonic or Macintosh, PICT Format digital. The video interface is connected to the TV for the video terminals.

Digital and movie camera share an optical system, typically using a lens with a variable diaphragm to focus light onto an image pickup device. The diaphragm and shutter admit the correct amount of light to the imager, just as with film but the image pickup device is electronic rather than chemical. However, unlike film cameras, digital cameras can display images on a screen immediately after being recorded, and store and delete images from memory. Many digital cameras can also record moving videos with sound.

IV. WORKING PRINCIPLE

Wi-Fi is a high speed internet connection and network connection without use of any cables or wires. The wireless network is operating three essential elements that are radio signals, antenna and router. The radio waves are keys which make the Wi-Fi networking possible.

The computers and cell phones are ready with Wi-Fi cards. Wi-Fi compatibility has been using a new creation to constituent within the ground connected with community network. The actual broadcast is connected with in sequence in fact it is completed by way of stereo system surf as well as the worth of wires with monitor to classification prone.

Wi-Fi allows the person in order to get access to web any place in the actual provided area. You can now generate a system within Resorts, library, schools, colleges, campus, personal institutes, as well as espresso stores as well as on the open public spot to help to make your company much more lucrative as well as interact with their own customer whenever.

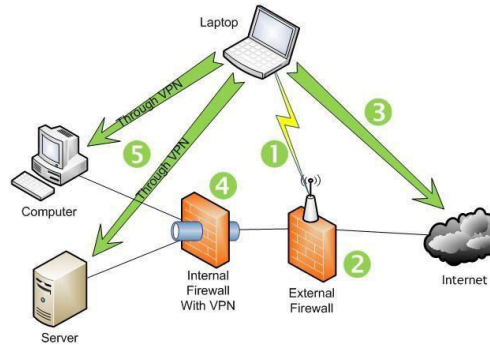


Fig 4 Wi-Fi Working Principle

Wi-Fi compatibility can make surf with stare to company using their inspiring cable television much a smaller amount force down. The radio signals are transmitted from antennas and routers that signals are picked up by Wi-Fi receivers, such as computers and cell phones that are ready with Wi-Fi cards. Whenever the computer receives the signals within the range of 100-150 feet for router it connect the device immediately.

V. OVERVIEW OF HARDWARE

The range of the Wi-Fi is depends upon the environment, indoor or outdoor ranges. The Wi-Fi cards will read the signals and create an internet connection between user and network. The speed of the device using Wi-Fi connection increases as the computer gets closer to the main source and speed is decreases computer gets further away.

Many new laptops, mobile phones have inbuilt Wi-Fi card you don't have to do anything which is one of the best thing. If it is a free- based type of network connection the user will be promoted with a login id and password. The free base network connections also well in some areas.

The Wi-Fi network connection is creating hot spots in the cities. The hot spots are a connection point of Wi-Fi network. It is a small box that is hardwired in to the internet. There are many Wi-Fi hot spots available in public places like restaurants, airports, and hotels offices, universities etc

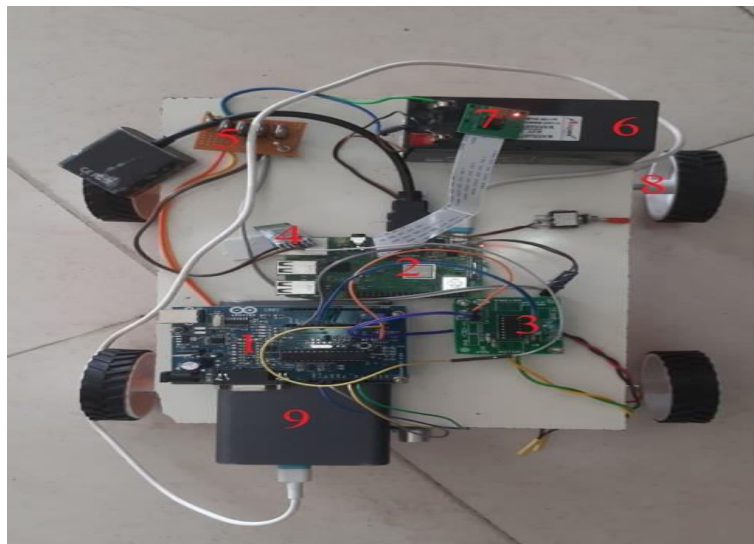


Fig 5 Overview Of Hardware

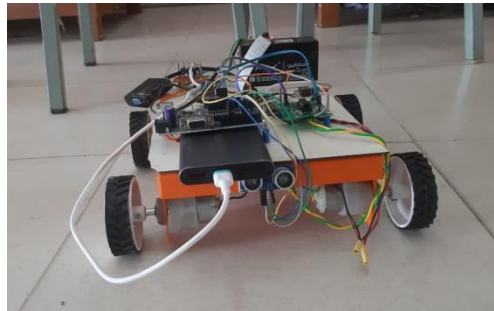


Fig 6 FRONT VIEW OF THE HARDWARE

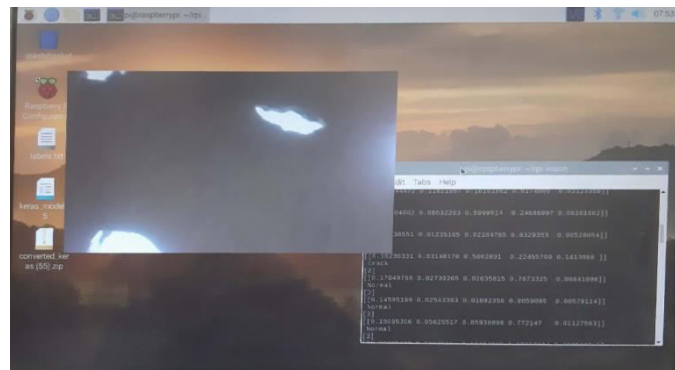


Fig.7 camera output by using raspberry-pi

VI. CONCLUSION

The system always collected information of value, and during operation the tunnels were inspected, the system performed without any issue. The continual improvement and application of remote technologies to asset management projects can help reduce overall inspection costs, eliminate the risk to inspection personnel and eliminate structural risks associated with dewatering a tunnel. The ROV will continue to be used to provide assurances that the tunnel can be effectively monitored without any problem.

REFERENCES

- [1] Structural Health Monitoring Development of a Real-time Remote Structural Monitoring Scheme for Civil Infrastructural Systems, Sritharsathyanarayan 9th February 2021 <https://www.researchgate.net/publication/233816069>
- [2] Aircraft non-destructive testing using an unmanned aerial vehicle, Shakeb Deane, Nicolas P. Avdelidis on April 2020 Unmanned aerial vehicles are a modern day solution for reducing the time of inspections. This work aims to address the difficulties of using a UAV to inspect aircraft structures.
- [3] A Novel Ultrasonic Inspection Methodology for Submerged Metallic Structures using a Remotely Operated Vehicle (ROV) Ashish ANTONY JACOB1, Manas Currently, ultrasonic inspection of submerged structures is performed with Remotely Operated Vehicles (ROVs) In conjunction with divers
- [4] Advancements in Structural Health Monitoring Using Vision-Based and Optical Techniques. A. Sarrafi1, Z. Mao1, on November 2018 Engineering structures continue to be used despite that they have reached or are approaching their design lifetime. <https://cpb-us-w2.wpmucdn.com/sites.uml.edu/dist/3/262/files/2019/09/Sabato-et-al.-2018-Adv>
- [5] Structural health monitoring: research and practice, a. Sabato. A, c. Niezrecki1, 2018 <https://cpb-us-w2.wpmucdn.com/sites.uml.edu/dist/3/262/files/2019/09/Sabato-et-al.-2018-Adv>
- [6] Robot for Tunnel Inspection: Design and Control, Rodrigo F. Carneiro, Antonio C. Leite, 2006, <https://www.researchgate.net/publication/323489086>



INNO SPACE
SJIF Scientific Journal Impact Factor

**Impact Factor:
7.512**

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details