Design And Development of Autonomous In-Pipe Inspection Robot

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Abstract- *This Project proposes a design for a pipeline inspection robot that can detect various pipe cracks internally by using cameras at very low cost. The economic value of pipelines which are used in industry for various purposes is very large. Pipeline inspection has become an important issue as replacement of defective pipelines is more costly as well as more complicated. Here the unique 3W chassis design and camera is selected for pipeline inspection robot. The hardware part consists of bot chassis, NodeMCU board, Cmos-Camera with SD card slot, DC geared motors and motor drivers, LED's etc.*

Keywords- Pipe Inspection , camera module, minimum human intervention, live monitoring

I. INTRODUCTION

Basically robots are designed in such a way that they remove human intervention from labor intensive and hazardous work environments, sometimes they are also used to explore inaccessible work places which are generally impossible to access by humans. The inspection of pipes comes in the same category because they carry toxic chemicals, fluids and most of the time have small internal diameter or bends which become inaccessible to humans. The complex internal geometry and hazard content constraints of pipes demand robots for inspection of such pipes in order to check corrosion level of pipe, recovery of usable parts from pipe interior, sampling of sludge and scale formation on pipe internal surface etc. Several designs of In-pipe inspection robots (IPIR) have been proposed in the literature to solve the problems related with inspection of these complicated internal geometries. Designing of an in-pipe inspection robot (IPIR) is a difficult task and hence the designer must take care of the design issues like Mobility, Steer ability, Turning radius, Size and shape adaptability, Online adaptability, Flexibility, Stability, Autonomous operation and obstacle avoidance, Efficiency at uneven surface, Safe operation, Material selection, Type of task to be performed inside the pipe, Number of actuators, Operation in active pipeline, Retrieval of robot, User friendly navigation and control system, Range of operation, Quantitative analysis of defects inside the pipe. Based on the above, this research work presents investigations into design issues pertaining to development of In-pipe inspection robotics and proposes a new model of an In-pipe inspection robot to overcome some critical design issues. This proposed model is a screw drive type wall press adaptable wheeled In-pipe inspection robot. It is able to move through vertical, horizontal pipes and it can easily pass through the elbow of a pipe line. This model comprises three modules- rotor, stator and control unit. The Rotor module has three wheels.

II. PROBLEM STATEMENT

Basically robots are designed in such a way that they remove human intervention from labor intensive and hazardous work environments, sometimes they are also used to explore inaccessible work places which are generally impossible to access by humans. The inspection of pipes comes in the same category because they carry toxic chemicals, fluids and most of the time have small internal diameter or bends which become inaccessible to humans. The complex internal geometry and hazard content constraints of pipes demand robots for inspection of such pipes in order to check corrosion level of pipe, recovery of usable parts from pipe interior, sampling of sludge and scale formation on pipe internal surface etc.

III. MOTIVATION

To help people who are going inside the hazardous environment to inspect pipe remotely

IV. METHODOLOGY

A)When ON/OFF Switch is pressed, the Robot gets Power from the Battery and starts running.

B)When Motor 1 and Motor 2 Run in forward direction, the Robot moves forward.

C)When MOTOR 1 is reverse and Motor 2 Forward, BOT moves Right Side

D)When MOTOR 1 forward and MOTOR 2 Reverse, BOT moves Left

E)When both MOTORS are reversed, BOT moves backwards

F)When BOT Starts inspecting, the Lights turns ON immediately

G)Live streaming is sent to the Mobile APP using VLC Player

H)The authorized person can take actions from the Mobile App / Web Dashboard if fault is detected.

V. BLOCK DIG

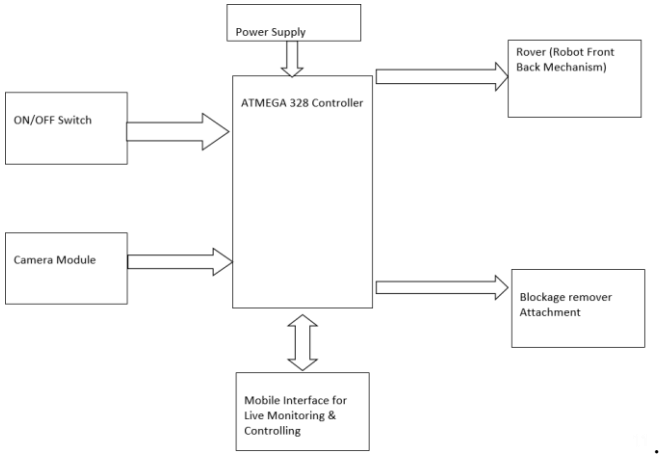

Fig. Block Dig of Pipe Inspection Robot.

VI. EXPERIMENT OUTPUT

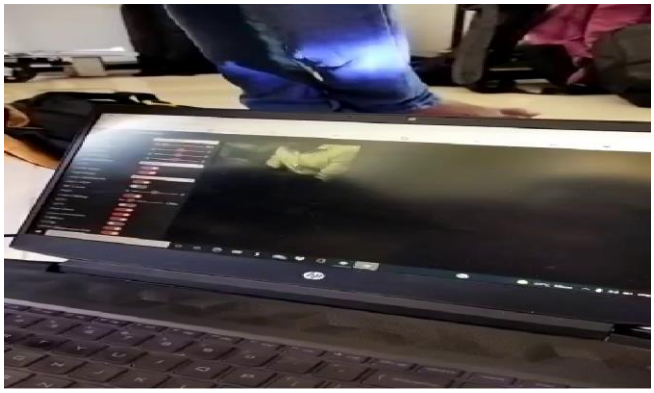

Fig.Live streaming image

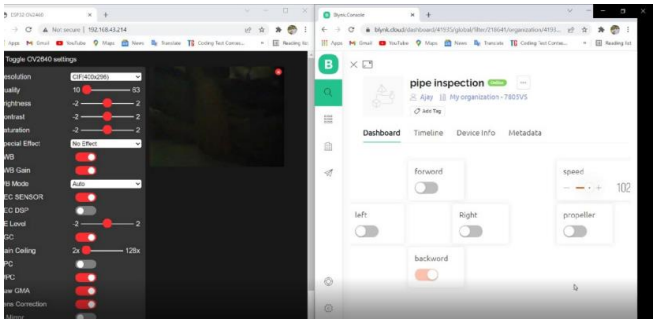

Fig.Blynk App interface

VII. IOT Blynk App

Blynk is a new platform that allows you to quickly build interfaces for controlling and monitoring your hardware projects from your iOS and Android device. After downloading the Blynk app, you can create a project dashboard and arrange buttons, sliders, graphs, and other widgets onto the screen.

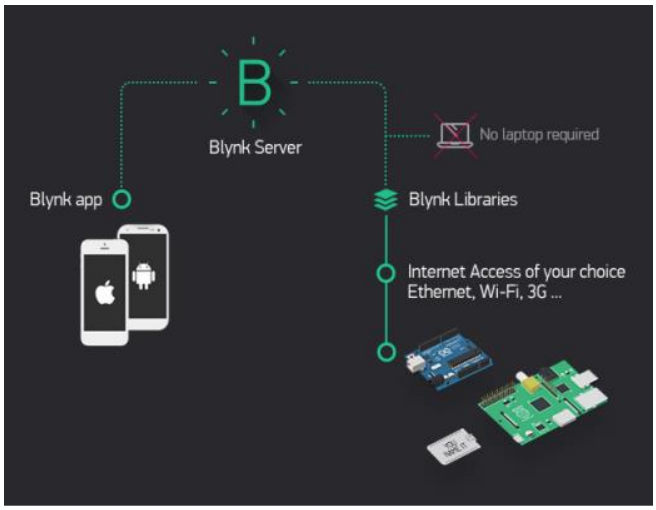

Fig.Blynk App

VIII. CONCLUSION

The initialization was then achieved for recording live streaming of the camera. A very important design of the robotic system is the adaptability to the inner diameters of the pies. So we had proposed a new design in inspecting pipelines. The major advantage is that it could be used detect the cracks, blockage, hole etc in the pipe can remove the blockage from the pipe give the live streaming remotely

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