Crack Sensing and Filling Using Automatic Robot

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Abstract **- Underground pipeline systems need incredible maintenance. Due to tarnishing and mechanical stresses catastrophic defects are caused. And the cracks are find out and maintain the pipe by manual workers, its takes more time and more man power and death of works due to nitrogen oxides gas. Inspected pipelines were not legible to notify a crack. To rectify this problem manual inspection was decided to replace with a computerized detection with the help of ultrasonic sensor. To overcome this problem a bug sized Robotic was planned to replace the existing digitized inspection mode. This paper presents the total process of this automatic robot and its result. The ultrasonic sensor that is implemented in the Robot is designed to fetch pictures for the calculation of the crack in pipeline. detection operations are performed to detect in pipeline and send the location of crack and the results are observed. Various conditions or cracks if any can be perceived by the sensors attached to the robot and their locations can be acquired via GMS. This research paper is a novice technique to replace the existing automatic robot.**

Index Terms **- Underground pipeline, cracks, ultrasonic, detection using robots, locations of cracks.**

1.INTRODUCTION

Detection of cracks on concert is a vital task for maintaining the structural health and reliability of concrete pipelines. Robotic imaging can be used to obtain concert surface image sets for automated on-site analysis. We present a novel automated crack detection algorithm, the STRUM (spatially tuned robust multifeatured classifier, and demonstrate results on real concert data using a state-of-the-art robotic bridge scanning system. If a small water pipeline bursts a leak, it can be a problem, but it usually does not harm the environment. it can be an environmental and ecological disaster [reference from US pipeline accidental reports at the national sewage transportation safety board Thus, for keeping pipelines operating safely, periodic inspections are per formed to find cracks and damage before they become cause for serious concern. The classification results are obtained with real concert data from hundreds of cracks over two concerts. This comprehensive analysis shows a peak STRUM classifier performance of 95% compared with 69% accuracy from a more typical image-based approach. A crack density map for the concert mosaic provides a computational description as well as a global view of spatial patterns of concert deck cracking.

1.1 OBJECTIVES

- To repair crack in pipeline.
- Easy to work only with robot by remote or automatic.
- To sense the crack in pipeline.
- It carries the material by itself

1.2 NEED FOR STUDY

- To control environment issue.
- To control accidents in road and tunnel
- More use in future road plans.
- Less technical cost without manpower.

2. MATERIALS

2.1LPC2148 Microcontroller

It consists of 64 pins and the group of these pins are called as port. It is the one where all the sensors and modules are connected. It functions like the brain of the system. The LPC2148 microcontroller is designed by Philips with several inbuilt features and peripherals. It will be more reliable as well as efficient for an application developer. LPC2148 microcontroller based on ARM7 family.

Fig-1: LPC2148 Microcontroller

2.2 Ultrasonic sensor

It is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves and convert the reflected sound into electrical signal. These waves travel faster than the audible sound of a human.

Fig-2: Ultrasonic sensor

2.3 HIGH BRIDGE MOTOR

An H-bridge is an electronic circuit that switches the polarity of a voltage applied to a load. ... of power electronics use H bridges. In particular, a bipolar stepper motor is almost invariably driven by a motor controller containing two H bridges. Generally, the H-bridge motor driver circuit is used to reverse the direction of the motor and also to break the motor. When the motor comes to a sudden stop, as the terminals of the motor are shorted. Or let the motor run free to a stop, when the motor is detached from the circuit.

Fig-3: high bridge motor

2.4 Motor pump

The pump can be defined as it is a mechanical device used to convert torque from mechanical hydraulic. It simply makes possible of fluids movement from one location to another with the help of pressure or suction.

Fig-4: motor pump

2.5 GSM

GSM procedures are sets of steps performed by the GSM network and devices on it in order for the network to function. GSM (Global System for Mobile Communications) is a set of standards for cell phone networks. GSM use two frequency bands of 25 MHz width: 890 to 915 MHz frequency band for up-link and 935 to 960 MHz frequency for down-link

Fig-5: GSM

2.6Liquid Crystal Display

Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. LCDs are used in a wide range of applications, including LCD televisions, computer monitors, instrument panels, aircraft cockpit displays, and indoor and outdoor

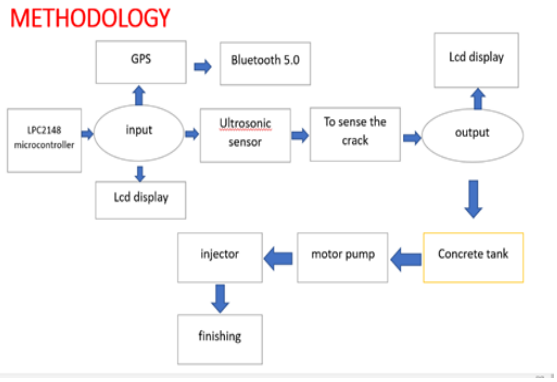
Fig-6: LCD

3. METHODOLOGY

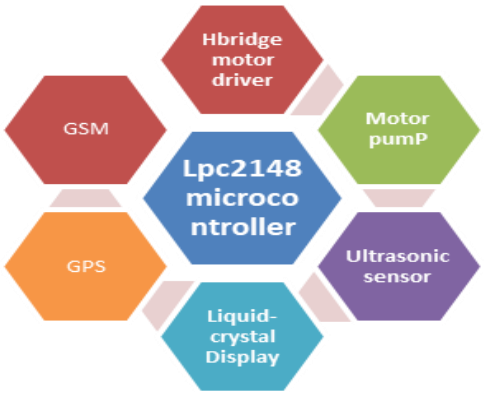
3.1 General

Crack is were defects occurring in the concert parts, with particular consequences to fluid transport pipes. The cause of the cracks generation is the exposure of the concert to mechanical stress, resulting in a defect consisting in the separation of the internal crystals, A vast network of pipelines transport large volumes of sewage products over long distances to treatment planet or dispose in sea. The pipeline or made by cement concrete and it placed in underground. They must meet measurement specification for long distances at high density sewage, gauges (PIGs). We used these technologies are being implemented to overcome these barriers, sometimes.

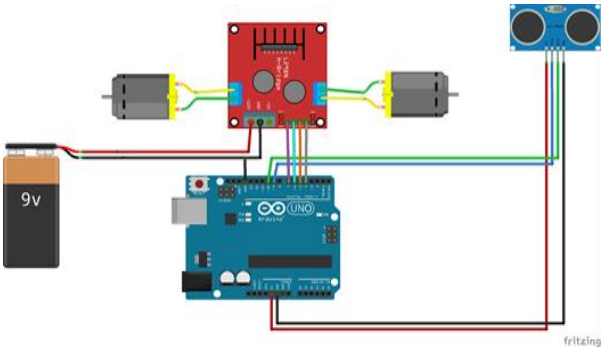
III. METHODOLOGY



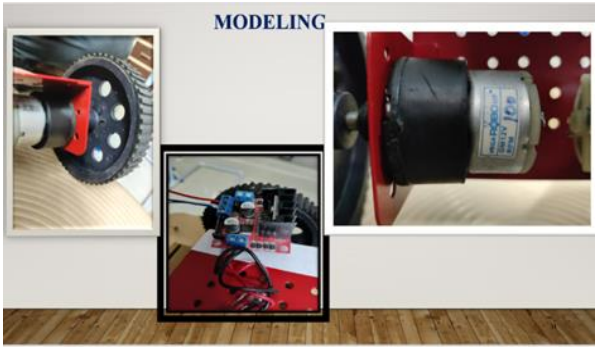
COMPONENTS



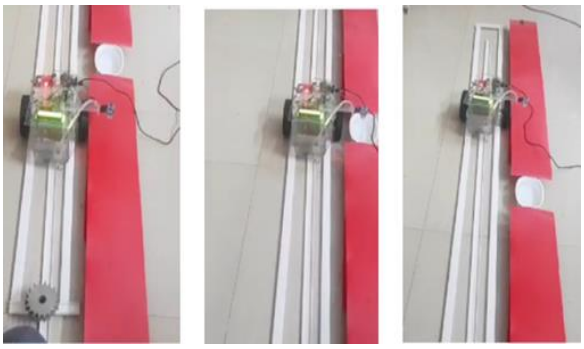
3.2 PROTOTYPE MODEL SKECTH:

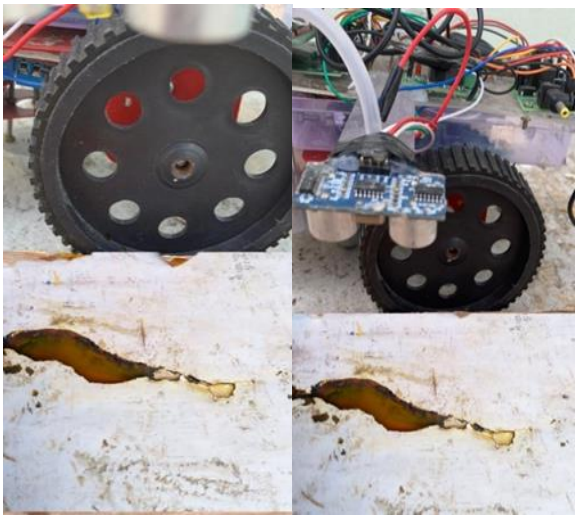


3.3 ROBOT IMAGES



3.4 ROBOT MOVING IMAGES





3.5 EXPERIMENTAL SETUP:

- The Display module is used to establish the user interface by adding an LCD Display integrated with LPC 2148 Microcontroller.
- ultrasonic working for sensing the surface and when it differ in the scale or path hole is detected the senser intimate to the H bridge motor and it will stops wheel.
- And next the GPS were note the location and with the help of GSM it send SMS to the user.
- At the same time the robot pump the motor in the path hole and fill by using cement after fill the hole the sensor check the distance and move to the next area.

3.6 Experimental Programming

Ulgtrasonic.vhd

Open using notepad

4. RESULTS AND DISCUSSION

Complete reding with depth in cm and filling process by robot.

Trial 1:

Table 4.1:

Ultrasonic Reading Given = 6 cm	Chanege in depth in (cm)	Path hole depth in (cm)	Process of robot
006	6	0	Moving
006	8	2	Stop wheels ans note the location for send and pump the cement to fill
006	6	0	Moving
006	7	1	Stop wheels ans note the location for send and pump the cement to fill

Trial 1 result:

In trial 1, there is no path hole in some more distance so the ultrasonic gives same input as given input so, the robot were moving and after the path hole were detected and it calculate the depth in cm is total depth is 8cm but given is 6cm and TOTAL – GIVEN = DEOTH OF PATH HOLE is 2cm and Stop wheels and note location for send and pump the cement in to fill. and after the path hole were detected and it calculate the depth in cm is total depth is 8cm but given is 6cm and TOTAL – GIVEN = DEOTH OF PATH HOLE is 2cm and Stop wheels and note location for send and pump the cement in to fill.

Trial2:

Table4.2:

Ultrasonic Reading Given = 6 cm	Chanege in depth in (cm)	Path hole depth in (cm)	Process of robot
006	6	0	Moving
006	10	4	robot send SMS pipe broken
006	8	2	Stop wheels ans note the location for send and pump the cement to fill
006	6	0	Moving

Trial 2 result:

In trial 2, there is no path hole in some more distance so the ultrasonic gives same input as given input so, the robot were moving and after the path hole were detected and it calculate the depth in cm is total depth is 10cm but given is 6cm and TOTAL – GIVEN = DEOTH OF PATH HOLE is 4cm so the thickness of pipe is 4 that robot kown so send the SMS as pipe broken. and some more distance other path hole were detected and it calculate the depth in cm is total depth is 8 cm but given is 6cm and TOTAL – GIVEN = DEOTH OF PATH HOLE is 2cm and Stop wheels and note location for send ans pump the cement in to fill.

4.3 SMS IMAGES SEND BY ROBOT

5. CONCLUSIONS

This CRACK SENSING AND FILLING USING AUTOMATIC ROBOT based on sensors is very clear cracks in pipe or road using this technology we can prevent many workers life. This research has represented an effective system of detect form very small crack with Ultrasonic and calculate the depth of path hole and fill it on spot at the same type using GSM send the SMS to user. This robot is do all this process by automaticly.so it reduces time compared with manual maintenance. This is evry useful to upcoming generation using this automatic robot, we can fix the all type of path hole in underground pipeline and roadways with more accurate location with longitude and latitude. And it has no risk and loss of workers.

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