

Development of Android Based Remote Acquisition- Kroto Finder

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Abstract: Crack inspection is an important task in the maintenance of pipe line and it is closely related to structural health of underground pipes. Currently it is done through a very manual procedure, experienced human monitors the whole structure visually and try to detect cracks on the pipe line structure and marks the location of crack. But this manual approach having some frailty issues as limited accuracy. Proposed research focuses on implementing a system having a robot, equipped with a camera to efficiently detect small leaks in plastic or in any type of pipes with complicated pipeline configurations of inner structure of the pipeline. We have proposed a novel method of pipes leakage detection. When there is any leakage or crack in the pipe in industries the sensors will detect the leakage. As the sensors will detect the corresponding signals will be shown in the phone with which the sensors will be connected through Bluetooth.

Index Terms— Crack detection, Camera, Pipeline Robot, Sensors.

INTRODUCTION

Robotics is one of the fastest growing engineering fields of today. Robots are designed to remove the human factor from labour intensive or dangerous work and also to act in inaccessible environment. Robot capable of Robot capable of moving inside pipes and detecting limestone clogs. It had to be controlled by a basic stamp and includes sensors and actuators. It should be easily monitored and controlled by humans. The inspection of pipes may be relevant for improving security and efficiency in horizontally arranged pipes. The pipelines are the major tools for the transportation of fuel oils and gas. Troubles caused by piping networks aging cracks and mechanical damages are possible. The robots with a flexible structure may boast adaptability to the environment especially to the pipe diameter with enhanced dexterity maneuverability capability to operate under hostile conditions.

I. EXISTING SYSTEM

Instrumented pigs have been in use for the internal inspection of transmission pipelines for over 20 years. They can be classified as: Utility pigs are used to assist in the operation and maintenance of the pipeline. For example cleaning pigs are used to clear wax from inside oil lines, and batching pigs are used to separate different fluids. There are a variety of 'smart' or 'intelligent' pigs that measure and retain pipeline data. Configuration and mapping pigs are used to check the geometry and location of a pipeline, but the most recent advances have produced smart pigs that can detect and measure pipe wall defects such as corrosion and cracks.

The most commonly used intelligent pigs for detecting metal loss defects use magnetic flux leakage techniques to detect defects such as corrosion pits. MFL pigs detect metal loss defects, but are unlikely to detect axially-orientated, planar defects such as cracks. However, they can, and have, detected circumferentially-orientated cracks in both oil and gas pipelines.

Other intelligent pigs use conventional ultrasonics to measure pipewall thickness. They require a liquid coupling between their transducers and the pipewall, which prohibits their use in gas lines, unless they are run in a slug of liquid the coupling has been attached by other means.

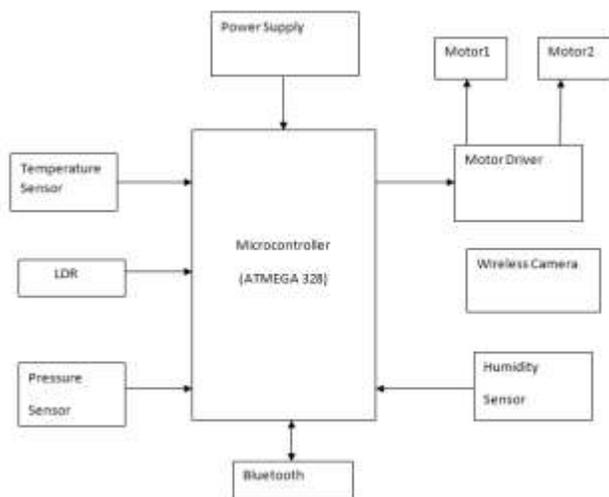
II. PROPOSED SYSTEM

In current scenario there is no particular device to monitor the condition of pipes in industries automatically. We have prepared a concept of monitoring the pipe status by using sensors and camera to detect the cracks and leakages in pipes. This project is mainly implemented for industrial applications. Mainly for detecting the damages inside the oil pipe that cannot be detected by human beings. We have proposed a novel method of pipes leakage detection. When there is any leakage or crack in the pipe in industries the sensors will detect the leakage. As the sensors will detect the corresponding signals will be shown in the phone with which the sensors will be connected through Bluetooth. This project is mainly implemented for industrial applications. Mainly for detecting the damages inside the oil pipe that cannot be detected by human beings. Kroto is the Greek word meaning to crack. Inside the pipe, there is very heavy temperature, pressure and toxic gases. So we are implementing a robot that have a camera, temperature sensor, pressure sensor etc which

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is used to detect the crack and conditions inside the pipe. This data from all the high precision sensors will be transmitted using Bluetooth module from the robot to the controlling android device. The robot incorporates a wireless camera and the data from the cam is transmitted to the TV monitor. We are controlling the robot through an android application in which camera rotation and robot movements are controlled.

III. SYSTEM DESCRIPTION



ATMEGA 328

Architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers. The ATmega48PA/88PA/168PA/328P provides the following features: 4K/8K bytes of In-System Programmable Flash with Read-While-Write capabilities, 256/512/512/1K bytes EEPROM, 512/1K/1K/2K bytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible Timer/Counters with compare modes, internal and external interrupts, a serial programmable USART, a byte-oriented 2-wire Serial Interface, an SPI serial port, a 6-channel 10-bit ADC (8 channels in TQFP and QFN/MLF packages), a programmable Watchdog Timer with internal Oscillator, and five software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, USART, 2-wire Serial Interface, SPI port, and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next interrupt or hardware reset.

In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC, to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping. This allows very fast start-up combined with low power consumption. The device is manufactured using Atmel's high density non-volatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional non-volatile memory programmer, or by an On-chip Boot program running on the AVR core. The Boot program can use any interface to download the application program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write operation. By combining an 8-bit RISC CPU with In-System Self-Programmable Flash on a monolithic chip, the Atmel ATmega48PA/88PA/168PA/328P is a powerful microcontroller that provides a highly flexible and cost effective solution to many embedded control applications.

PRESSURE SENSOR:PK 80083

A pressure sensor measures pressure, typically of gases or liquids. Pressure is an expression of the force required to stop a fluid from expanding, and is usually stated in terms of force per unit area. A pressure sensor usually acts as a transducer; it generates a signal as a function of the pressure imposed. For the purposes of this article, such a signal is electrical. Pressure sensors are used for control and monitoring in thousands of everyday applications. Pressure sensors can also be used to indirectly measure other variables such as fluid/gas flow, speed, water level, and altitude. Pressure sensors can alternatively be called pressure transducers, pressure transmitters, pressure senders, pressure indicators and piezometers, manometers, among other names. Pressure sensors can vary drastically in technology, design, performance, application suitability and cost. A conservative estimate would be that there may be over 50 technologies and at least 300 companies making pressure sensors worldwide. There is also a category of pressure sensors that are designed to measure in a dynamic mode for capturing very high speed changes in pressure. Example applications for this type of sensor would be in the measuring of combustion pressure in an engine cylinder or in a gas turbine. These sensors are commonly manufactured out of piezoelectric materials such

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as quartz. Some pressure sensors, such as those found in some traffic enforcement cameras, function in a binary (on/off) manner, i.e., when pressure is applied to a pressure sensor, the sensor acts to complete or break an electrical circuit. These types of sensors are also known as a pressure switch.

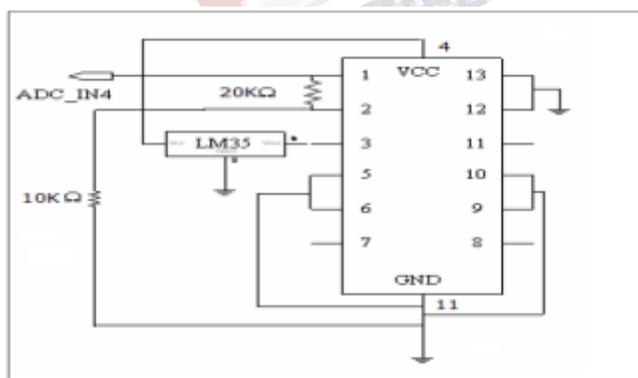


TEMPERATURE SENSOR:

National Semiconductor's LM35 IC has been used for sensing the temperature. It is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in oC). The temperature can be measured more accurately with it than using a thermistor. The sensor circuitry is sealed and not subject to oxidation, etc.



Temperature sensing circuit:



Functional description:

The sensor has a sensitivity of 10mV / oC. The output of LM35 is amplified using a LM324 single power supply (+5V) op-amp. The op-amp is designed to have a gain of 5. The circuitry measures temperatures with a resolution of up to 0.5 degree Celsius.

LIGHT DEPENDENT RESISTORS

A photoresistor or light-dependent resistor (LDR) or photocell is a light-controlled variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. A photoresistor can be applied in light-sensitive detector circuits, and light- and dark-activated switching circuits.

A photoresistor is made of a high resistance semiconductor. In the dark, a photoresistor can have a resistance as high as a few megaohms (MΩ), while in the light, a photoresistor can have a resistance as low as a few hundred ohms. If incident light on a photoresistor exceeds a certain frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electrons (and its hole partners) conduct electricity, thereby lowering resistance. The resistance range and sensitivity of a photoresistor can substantially differ among dissimilar devices. Moreover, unique photoresistors may react substantially differently to photons within certain wavelength bands.

A photoelectric device can be either intrinsic or extrinsic. An intrinsic semiconductor has its own charge carriers and is not an efficient semiconductor, for example, silicon. In intrinsic devices the only available electrons are in the valence band, and hence the photon must have enough energy to excite the electron across the entire bandgap. Extrinsic devices have impurities, also called dopants, added whose ground state energy is closer to the conduction band; since the electrons do not have as far to jump, lower energy photons (that is, longer wavelengths and lower frequencies) are sufficient to trigger the device. If a sample of silicon has some of its atoms replaced by phosphorus atoms (impurities), there will be extra electrons available for conduction. This is an example of an extrinsic semiconductor.

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SPECIFICATION AND MODEL



LDR07 CdS Light Dependent Resistor

APPLICATIONS

Photoresistors come in many types. Inexpensive cadmium sulphide cells can be found in many consumer items such as camera light meters, street lights, clock radios, alarm devices, night lights, outdoor clocks, solar street lamps and solar road studs, etc.

They are also used in some dynamic compressors together with a small incandescent lamp or light-emitting diode to control gain reduction.

The use of CdS and CdSe photo resistors is severely restricted in Europe due to the RoHS ban on cadmium. Lead sulphide (PbS) and indium antimonide (InSb) LDRs (light-dependent resistor) are used for the mid-infrared spectral region. Ge:Cu photoconductors are among the best far-infrared detectors available, and are used for infrared astronomy and infrared spectroscopy.

GAS SENSOR :MQ-7

FEATURES

High sensitivity to carbon monoxide
Stable and long life

APPLICATION

They are used in gas detecting equipment for carbon monoxide(CO) in family and industry or car.

SENSITIVITY ADJUSTMENT

Resistance value of MQ-7 is difference to various kinds and various concentration gases. So, When using this components, sensitivity adjustment is very necessary. we recommend that

you calibrate the detector for 200ppm CO in air and use value of Load resistance that(RL) about 10 KΩ(5KΩ to 47 KΩ).

When accurately measuring, the proper alarm point for the gas detector should be determined after considering the temperature and humidity influence. The sensitivity adjusting program:

Connect the sensor to the application circuit.

Turn on the power, keep preheating through electricity over 48 hours.

Adjust the load resistance RL until you get a signal value which is respond to a certain carbon monoxide concentration at the end point of 90 seconds.

Adjust the another load resistance RL until you get a signal value which is respond to a CO concentration at the end point of 60 seconds .

MOTOR DRIVER

A motor controller is a device or group of devices that serves to govern in some predetermined manner the performance of an electric motor. A motor controller might include a manual or automatic means for starting and stopping the motor, selecting forward or reverse rotation, selecting and regulating the speed, regulating or limiting the torque, and protecting against overloads and faults.

Applications

Every electric motor has to have some sort of controller. The motor controller will have differing features and complexity depending on the task that the motor will be performing.

The simplest case is a switch to connect a motor to a power source, such as in small appliances or power tools. The switch may be manually operated or may be a relay or contactor connected to some form of sensor to automatically start and stop the motor. The switch may have several positions to select different connections of the motor. This may allow reduced-voltage starting of the motor, reversing control or selection of multiple speeds. Overload and over current protection may be omitted in very small motor controllers, which rely on the supplying circuit to have over current protection. Small motors may have built-in overload devices to automatically open the circuit on overload. Larger motors have a protective overload relay or temperature sensing relay included in the controller and fuses or circuit breakers for over current protection. An automatic motor controller may also include limit switches or other devices to protect the driven machinery.

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WIRELESS CAMERA



We are specialized in offering a competitive range of Wireless Spy Cameras, which are available as most popular CCTV form. These products are used for surveillance and are available in tiny sizes. We procure these products from the trustworthy vendors and these products are easily available in the national as well as international market. Our products are available in standard as well as customized specifications and we deliver these products within given time period.

BLUETOOTH

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz[2]) from fixed and mobile devices, and building personal area networks (PANs). Invented by telecom vendor Ericsson in 1994,[3] it was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization.

Bluetooth is managed by the Bluetooth Special Interest Group (SIG), which has more than 19,000 member companies in the areas of telecommunication, computing, networking, and consumer electronics. Bluetooth was standardized as IEEE 802.15.1, but the standard is no longer maintained. The SIG oversees the development of the specification, manages the qualification program, and protects the trademarks.[5] To be marketed as a Bluetooth device, it must be qualified to standards defined by the SIG.[6] A network of patents is required to implement the technology, which is licensed only for that qualifying device.

Bluetooth operates in the range of 2400–2483.5 MHz (including guard bands). This is in the globally unlicensed (but not unregulated) Industrial, Scientific and Medical (ISM) 2.4 GHz short-range radio frequency band. Bluetooth uses a radio technology called frequency-hopping spread spectrum. The transmitted data are divided into packets and each packet

is transmitted on one of the 79 designated Bluetooth channels. Each channel has a bandwidth of 1 MHz. Bluetooth 4.0 uses 2MHz spacing which allows for 40 channels. The first channel starts at 2402 MHz and continues up to 2480 MHz in 1 MHz steps. It usually performs 1600 hops per second, with Adaptive Frequency-Hopping (AFH) enabled.

IV. SOFTWARE COMPONENTS

Embedded C Programming is the soul of the processor functioning inside each and every embedded system we come across in our daily life, such as mobile phone, washing machine, and digital camera. Each processor is associated with an embedded software. The first and foremost thing is the embedded software that decides functioning of the embedded system. Embedded C language is most frequently used to program the microcontroller.

Salient features of the language:

C language is a software designed with different keywords, data types, variables, constants, etc.

Embedded C is a generic term given to a programming language written in C, which is associated with a particular hardware architecture.

Embedded C is an extension to the C language with some additional header files. These header files may change from controller to controller.

V. FUTURE ENHANCEMENT

The key rationale of robotics application has always been to avoid human exposure to hazardous environments and tasks ranging from scrutiny and general maintenance to decontamination and post accidental activities. To execute these activities, robots need to incorporate artificial intelligence, improved sensors capability, enhanced data fusion and compliant human like leg and hand structures for efficient motions. Robot can be designed which can adopt to the inner diameters of the pipe. Robots with oil and water resistant can be made.

VI. APPLICATIONS

So many robots are used for inspection, surveillance, monitoring and nondestructive tasks. Some current applications are as below:

Allow inspection of inaccessible and or hazardous equipment or work areas.

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Provide on-line inspection or maintenance without loss of equipment/plant availability and remove humans from potentially hazardous work situations.

Provide information about the health and condition of critical plant components to facilitate decision-making regarding plant life management.

Reduce equipment/plant downtime and improve maintenance and inspection procedure through better coverage and documentation.

VII. CONCLUSION

As a conclusion, all objectives for this project were managed to achieve such as to build a fully autonomous pipeline robot. The major advantage is that it could be used in case of pipe diameter variation with the simple mechanism. A real prototype was developed to test the feasibility of this robot for inspection of in-house pipelines. We used a PCB board that can operate DC motors. Good conceptive and element design could manage all the problems. The type of inspection tasks varies according to the environment. For the next robot development, it is hoped that this robot can be reconstructed with some modification to improve the abilities and to provide benefits in future and also be able to be marketed or commercialized.

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