

SENSOR NETWORK BASED OIL WELL HEALTH MONITORING AND INTELLIGENT CONTROL

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Abstract: The prerequisite of oil has expanded the potential risk of the mishaps of the marine oil progressively apparent, which critically needs human to focus on checking oil generation so as to diminish the financial misfortune and natural harm. Albeit numerous endeavors has been made to create gadgets or instruments for marine oil slick observing, the bead preparing in smaller scale condition is as yet not clear. The utilization of advanced holographic innovation is the dependable method for finding and checking the spilling bead in situ. To this end, we structured and built up a lot of observing framework for oil slick of submarine pipeline with in-line advanced holographic framework. By utilizing a laser of 660 nm and a monochrome CCD, the watching size of the oil bead and others ranges from 20 μ m to 200 μ m. This framework has been demonstrated compelling in the test to watch oil bead just as other suspended particles, microorganism or emulsification. The primary procedure and related research will be quickly tended to in this article.

I. INTRODUCTION

Over the most recent couple of years, conveyed sensors have worked successfully together by means of wired link joins. These wired sensors are exorbitant to send, work and keep up, are not most appropriate for brief establishments and are hard to set up in antagonistic and remote conditions. Remote Sensor Network[2] (WSN) innovation gives a quicker, less expensive, progressively adaptable and increasingly advantageous choice to the wired sensor frameworks. The field of WSN has developed significantly because of building progresses in Micro-Electro-Mechanical Systems (MEMS) innovation which encouraged the

advancement of brilliant sensors with decreased size, weight and cost. Advances in the field of web, correspondences and data innovations have likewise added to improvement of WSNs. They anticipate that there will be almost 24 million remote empowered sensors and actuators conveyed worldwide by 2016 and WSN technology[3] would affect applications. Remote sensor networks[2] comprise of a lot of remote sensor hubs, which are smaller, light-weighted, and battery-controlled gadgets that can be utilized in for all intents and purposes any condition.

Because of the vitality imperative of individual sensor hubs, vitality protection gets one of the significant issues in sensor systems. In remote sensor organizes, an enormous part of the vitality in a hub is expended in remote correspondences. The measure of vitality expended in a transmission is relative to the comparing communication[3] separation. Consequently, long separation interchanges among hubs and the base station are typically not supported. One approach to lessen vitality utilization in sensor systems is to embrace a grouping calculation. A bunching calculation attempts to compose sensor hubs into groups.

II. PROPOSED SYSTEM

A sensor organize based insightful framework is proposed and applied for remote oil well wellbeing checking and programmed oil-siphoning control. Underground oil deficiency, gas impact, oil siphon on the touch, oil siphon under the touch, wax affidavit, siphoning bar severed, unclogger stuck, oil siphon genuine spillage, no glitch. System topology for oil well wellbeing observing and OPU insightful control. The inspiration of building up this framework is that 1)

because of the extraordinary idea of oil investigation and oil boring, most of oil siphoning units (OPU) are spread over infertile slopes, mountains and deserts, and 2) the current oil-siphoning frameworks still receive manual control. Existing manual control frameworks have three apparent disadvantages: 1) The OPU heads need to regularly go to the oilfield to check the OPU status and gather its wellbeing examination information. 2) Power utilization for OPU is tremendous during the oil siphoning process. 3) Since a director needs to assume responsibility for various oil wells, an OPU glitch is hard to find and fix in a sensible time, which causes an oil creation drop.

The most important parameters for oiler is its level, gas leakages and Temperature inside the well. These Parameters should be monitored to avoid Hazardous accidents occurring. to watch these parameters we used Level sensor, MQ2 gas sensor and LM35 temperature sensor.

The objective of our proposed system is to utilize different wireless technologies to watch the oil wells. The wireless network we utilized in this proposed system is Zigbee wireless technology which provides an extended distance communication. This prototype monitors different parameters of oiler like oil level, Gas leakages, heat detection and sends the knowledge through Zigbee wireless technology to remote location and also this technique will give an audible alert through the buzzer to alert the working people in hazardous situations.

SENSOR NETWORK BASED OIL WELL HEALTH MONITORING THROUGH ZIGBEE WIRELESS TECHNOLOGY
1. TRANSMITTER SECTION

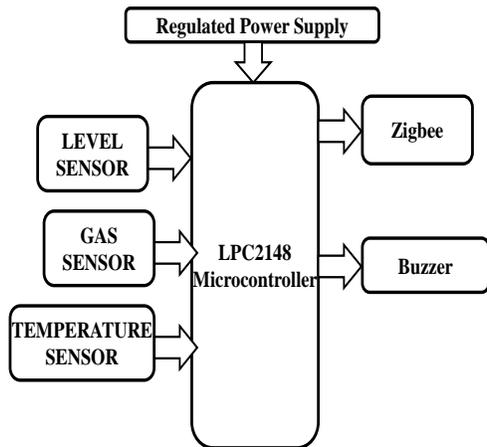


Fig1. Transmitter Section

SENSOR NETWORK BASED OIL WELL HEALTH MONITORING THROUGH ZIGBEE WIRELESS TECHNOLOGY
2. RECEIVER SECTION

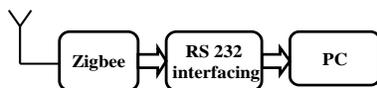


Fig2. Receiver section

III. HARDWARE DESCRIPTION

LPC2148: ARM7 is a gathering of more established 32-piece RISC ARM processor centers authorized by ARM Holdings for microcontroller use.[1] The ARM7 center family comprises of ARM700, ARM710, ARM7DI, ARM710a, ARM720T, ARM740T, ARM710T, ARM7TDMI, ARM7TDMI-S, ARM7EJ-S. The ARM7TDMI and ARM7TDMI-S were the first well known centers of the family.

Since ARM7 centers were discharged from 1993 to 2001, they're not suggested for fresh out of the box new IC plans; rather ARM Cortex-M or ARM Cortex-R centers are liked.

LPC might be a group of 32-piece microcontroller incorporated circuits by NXP Semiconductors (some time ago Philips Semiconductors).[1] The LPC chips are gathered into related arrangement that are based round the equivalent 32-piece ARM processor center, similar to the Cortex-M4F, Cortex-M3, Cortex-M0+, or Cortex-M0. Inside, each microcontroller comprises of the processor center, static RAM memory, non-unpredictable stockpiling, investigating interface, and different peripherals. The most punctual LPC arrangement were bolstered the Intel 8-piece 80C51

core.[2] As of February 2011, NXP had delivered more than one billion ARM processor-based chips.

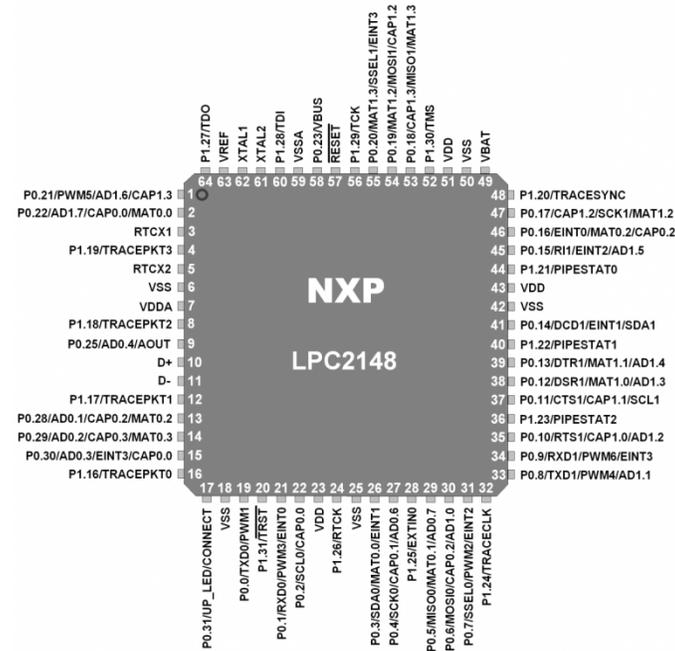


Fig3. Pin Diagram of LPC2148 controller

MQ2 SENSOR: A gas identifier is a gadget that distinguishes the nearness of gases in a region, regularly as a major aspect of a security framework. This kind of hardware is utilized to distinguish a gas spill or different discharges and can interface with a control framework so a procedure can be naturally closed down. A gas identifier can sound a caution to administrators in the territory where the break is happening, allowing them the chance to leave. This sort of gadget is significant in light of the fact that there are numerous gases that can be unsafe to natural life, for example, people or creatures.

Gas identifiers can be utilized to distinguish ignitable, combustible and lethal gases, and oxygen exhaustion. This kind of gadget is utilized broadly in industry and can be found in areas, for example, on oil rigs, to screen make forms and developing innovations, for example, photovoltaic. They might be utilized in firefighting.

Gas spill recognition is the way toward distinguishing possibly dangerous gas spills by sensors. Furthermore a visual recognizable proof should be possible utilizing a warm camera These sensors typically utilize a perceptible caution to alarm individuals when a perilous gas has been identified. Presentation to dangerous gases can likewise happen in activities, for example, painting, fumigation, fuel filling, development, removal of debased soils, landfill tasks, entering restricted spaces, and so on. Basic sensors incorporate flammable gas sensors, photograph ionization locators, infrared point sensors, ultrasonic sensors, electrochemical gas sensors, and metal-oxide-semiconductor sensors (MOS sensors). All the more as of late, infrared imaging sensors have come into utilization. These sensors are utilized for a wide scope of utilizations and can be found in mechanical plants, processing plants, pharmaceutical assembling, fumigation offices, paper mash factories, airplane and shipbuilding offices, hazardous materials activities, squander water treatment offices, vehicles, indoor air quality testing and homes.

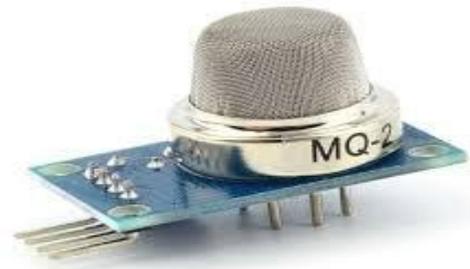


Fig4. MQ2 sensor

LM35 SENSOR: In general, a temperature sensor is a gadget which is structured explicitly to gauge the hotness or briskness of an object. LM35 is an exactness IC temperature sensor with its yield relative to the temperature (in °C). With LM35, the temperature can be estimated more precisely than with a thermistor. It additionally have low self warming and doesn't cause more than 0.1 °C temperature ascend in still air. The working temperature run is from - 55°C to 150°C. The LM35's low yield impedance, linear yield, and exact intrinsic alignment make interfacing to readout or

control hardware particularly easy. It has discover its applications on control supplies, battery management, appliances, etc. The LM35 is an incorporated circuit sensor that can be utilized to gauge temperature with an electrical yield corresponding to the temperature (in °C).It can quantify temperature more precisely than an utilizing a Thermistors. The sensor hardware is fixed and not expose to oxidation. The LM35 produces a higher yield voltage than thermocouples and may not necessitate that the yield voltage be amplified. The LM35 has a yield voltage that is corresponding to the Celsius temperature. The scale factor is .01V/°C.

The LM35 doesn't require any outside adjustment or cutting and keeps up an exactness of +/- 0.4°C at room temperature and +/- 0.8°C over a scope of 0°C to +100°C. Another significant trait of the LM35 is that it draws just 60 miniaturized scale amps from its inventory and has a low self-warming capability. The LM35 comes in a wide range of bundles, for example, TO-92 plastic transistor-like package, TO-46 metal can transistor-like package, 8-lead surface mount SO-8 little blueprint bundle.

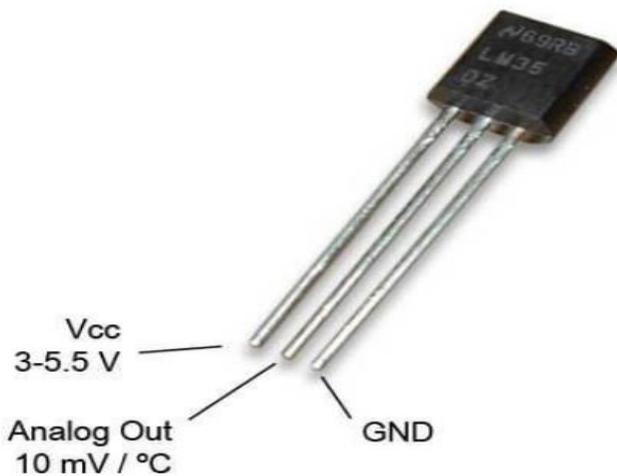


Fig5. LM35 Temperature sensor

LEVEL SENSOR: Level sensors recognize the degree of fluids and different liquids and fluidized solids, including slurries, granular materials, and powders that show an upper free surface. Substances that stream become basically even in their

compartments (or other physical limits) in light of gravity though most mass solids heap at an edge of rest to a pinnacle. The substance to be estimated can be inside a holder or can be in its regular structure (e.g., a stream or a lake). The level estimation can be either nonstop or point esteems. Constant level sensors measure level inside a predetermined range and decide the definite measure of substance in a specific spot, while point-level sensors just demonstrate whether the substance is above or beneath the detecting point. By and large the last identify levels that are unreasonably high or low. Conductive level sensors utilize a low-voltage, current-restricted power source applied crosswise over isolated terminals. The power supply is coordinated to the conductivity of the fluid, with higher voltage variants intended to work in less conductive (higher opposition) mediums. The power source every now and again consolidates some part of control, for example, high-low or exchanging siphon control. A conductive fluid reaching both the longest test (normal) and a shorter test (return) finishes a conductive circuit. Conductive sensors are amazingly protected in light of the fact that they utilize low voltages and flows. Since the current and voltage utilized is innately little, for individual security reasons, the strategy is likewise fit for being made "Naturally Safe" to fulfill universal guidelines for dangerous areas. Conductive tests have the extra advantage of being strong state gadgets and are exceptionally easy to introduce and utilize. In certain fluids and applications, upkeep can be an issue. The test must keep on being conductive. In the event that development protects the test from the medium, it will quit working appropriately. A straightforward examination of the test will require an ohmmeter associated over the speculate test and the ground reference.

Ordinarily, in most water and wastewater wells, the well itself with its stepping stools, siphons and other metal establishments, gives a ground return. Be that as it may, in synthetic tanks, and other non-grounded wells, the installer must stock a ground return, commonly an earth bar.



Fig6. Level sensor

ZIGBEE: ZigBee is an IEEE 802.15.4-based determination for a suite of significant level correspondence conventions used to make individual territory systems with little, low-control advanced radios, for example, for home robotization, therapeutic gadget information assortment, and other low-control low-data transmission needs, intended for little scale ventures which need remote association. Subsequently, ZigBee is a low-control, low information rate, and closeness (i.e., individual territory) remote specially appointed system.

The innovation characterized by the ZigBee particular is planned to be more straightforward and more affordable than different remote individual territory systems (WPANs, for example, Bluetooth or increasingly broad remote systems administration, for example, Wi-Fi. Applications incorporate remote light switches, home vitality screens, traffic the board frameworks, and other buyer and mechanical gear that requires short-run low-rate remote information move.

Its low power utilization limits transmission separations to 10–100 meters viewable pathway, contingent upon control yield and ecological characteristics.[2] ZigBee gadgets can transmit information over long separations by going information through a work system of halfway gadgets to arrive at increasingly inaccessible ones. ZigBee is normally utilized in low information rate applications that

require long battery life and secure systems administration (ZigBee systems are verified by 128 piece symmetric encryption keys.) ZigBee has a characterized pace of 250 kbit/s, most appropriate for discontinuous information transmissions from a sensor or information gadget.



Fig7. ZIGBEE Module

IV. RESULTS

The proposed system was built and checked successfully. The results can be shown in the below images.

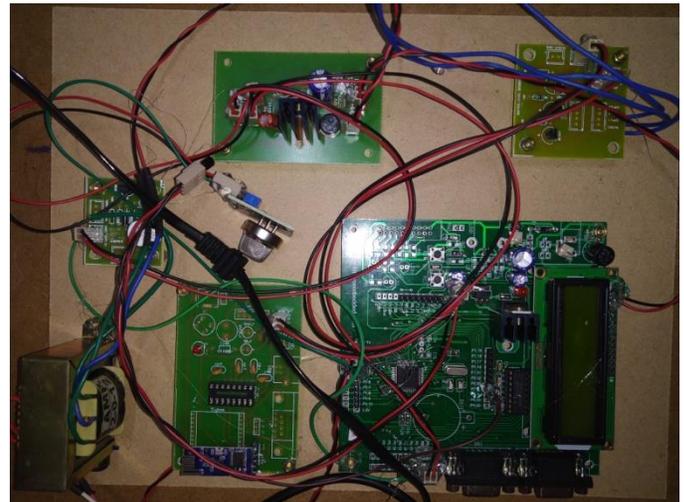


Fig8. Hardware setup of project

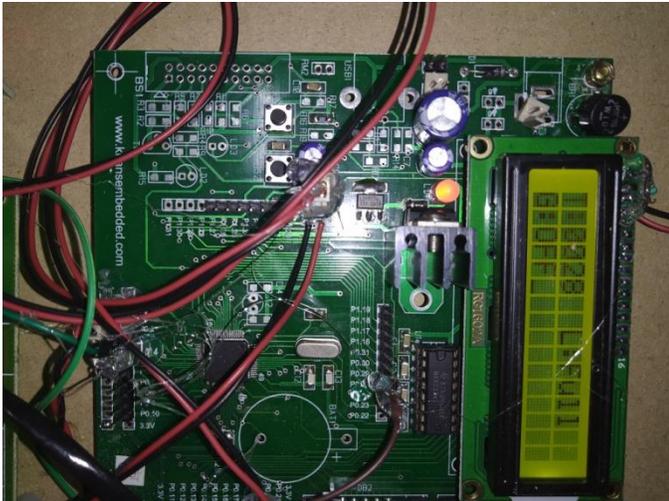


Fig9. Displaying Values on LCD display

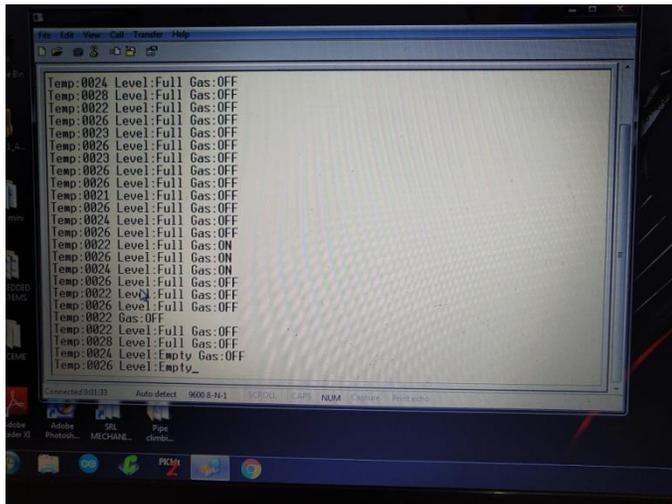


Fig10. Displaying data on PC

V. CONCLUSION

In Oil industry, a security and productively activity depends of a steady checking and the board of a scope of parameters and an assortment of encompassing condition, similar to temperature, pressure, vibration, gas, fire, tank level, gas spillage, hardware condition, mechanical pressure, object speed, and so forth. WSN innovation presents critical advantages in cost, simplicity of organization, adaptability and accommodation in connection to the wired elective that is entrenched in the business. Huge research focuses to projection of far reaching organization of WSN in

mechanical robotization. The utilization of remote sensor arrange lessen upkeep and establishment costs and spontaneous framework disappointment, give the likelihood to access and control remotely in perilous situations. The utilization of vitality gathering improves these advantages to give a self-controlled arrangement. Due to these attributes, WSN frameworks utilizing vitality collecting turned into a component normally received in Oil and Gas industry. The proposed framework oil well wellbeing observing and control dependent on WSNs is confirmed with various degrees of seriousness.

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