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Oil Rate Design and Control System for Wells using Microcontroller

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Abstract:- An MCU-based system is designed to accurately measure and regulate the hydraulic pumping unit's output. The device AT89C2051 is a modern vibratory ultrasonic transmitter and receiver with LED indicator circuit for monitoring of pumping unit states. The essence of a compensator is using a one-line optical temperature sensor to test errors induced by the difference in the ambience of the room. The program for the machine is written in C, interrupting usage of patterns to capture and to monitor the time data for proper oil level calculation. This is worth expanding, because this has the benefit of operating consistently and genuinely calculating during debugging.

Keywords:- *Ultrasonic detection; oil level; Control System. Microcontroller.*

I. INTRODUCTION

Permeability is poor and oil volumes gradually reach during oil exploration in some petroleum sector (Sun, 2017). The pumping machine should absorb power and be inactive after some time has elapsed. Artificial measurement of oil output to monitor the operation of pumping units in order to lower power consumption (Sun, 2011). It does not save time or effort and it does not have a low oil yield. In order to measure the oil level, Ultrasonic Emission and Recipient must be placed on the bottom of the pumping machine. The MCU device will automatically detect the oil level and monitor the condition of pump units (start & stop and run). This saves energy and saves time and increases the performance of production (Yang et al, 2011).

II. MEASUREMENT AND CONTROL SYSTEM

➢ *System Structure*

It is used to monitor petroleum rates and regulate pumping unit conditions in the device circuit shown as Figure.1 (Zhang et al, 2018), inclusive central power, ultrasound and sensor emissions, temperature compensator, pumping machine and oil level indicator. AT89C2051 is a high-performance microcontroller with a low voltage center that is used to monitor the states of an oil-based pump machine (Sun et al, 2018). Ultrasonic circuit with the 74LS04 and T/R40 inverters as seen in Figure.2. The AT89C2051 square signals can be obtained via the circuit and inverted by 74LS04, which is produced to the two emission cups that make the resonance plate vibrate to ultrasound (Dai et al, 2015).

Circuit of ultrasonic receptor shown as Figure.3 consisting of T / R40 and identification and reception of the chip CX20106A (emitter & receiver paired). The reversing echo from the oil level interface is sent to the same chip after sampling, recording and creation of the vibrations (Bu et al, 2016). Virtual single line DS18B20 sensor manufactured in the US by DALLAS semiconductor, available in network format and with a good quality measuring system, simple communication and few occupancies port line and so on. DS18B20 is quick to use (Wang et al, 2014). (Lei, 2014) Figure.4 of the temp compensator is measured by a circuit and, as the temperature changes and the precision of measurement, the device reduces the effect of ultrasonic frequency. The user tracking uses actual-time data from the LED petroleum level indicator.

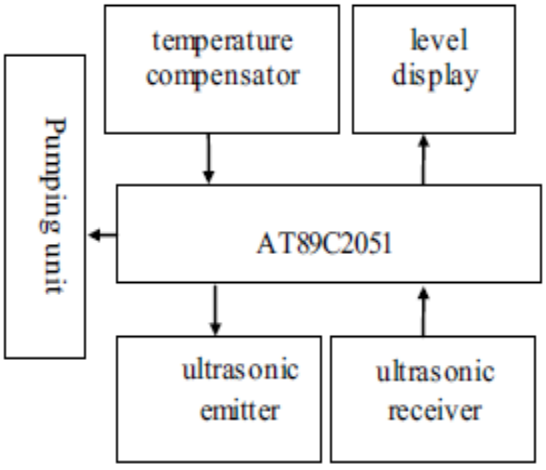

Fig 1:- measurement and control system circuit (Source: Feng, 2019)

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III. METHODOLOGY

Ultrasound emitter is supplied with a different regularly pulse signal from MCU after starting the measuring and control system to send out the Ultrasound indicated as Figure.5, while on-chip timer is initiated. In the meantime. The ultrasonic interface enters the petroleum interface via the air medium into a mirrored echo, which travels through the air to ultrasonic receivers. The reception of the Sound Wave must be transferred to an electronic signal receiver and processed and optimized to be sent to the MCU as Figure.1. Clock will be calculated by the pulse period t from ultrasound released in reception. The v-spread range can be calculated (S=vt/2) as a consequence of the ultrasonic spreading speed, which is compared to a fixed range and translated to high oil H. Ultrasonic diffusion speed is related to ambient temperature, and the calculation accuracy requires a temperature correction sensor. It can give a control signal that begins the pumping device at a certain volume of oil and prevents the pumping unit when below the value to avoid idling.

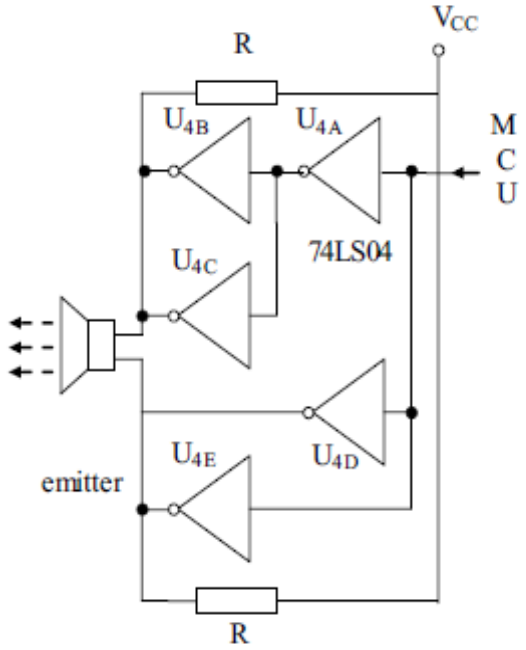

Fig 2:- ultrasonic emitter (Source: designed by ETAP Software)

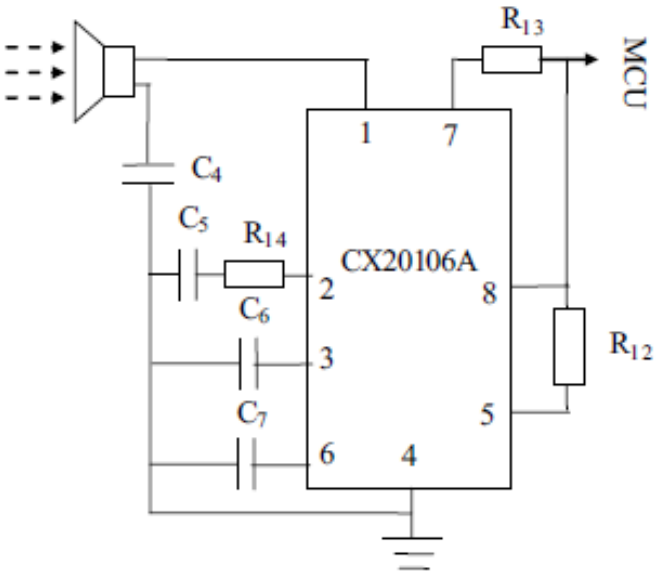

Fig 3:- ultrasonic receiver
(Source: designed by Husky Intelligence Software**)**

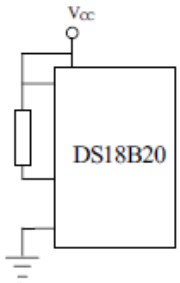

Fig 4:- temperature sensor
(Source: designed by Tabware Software**)**

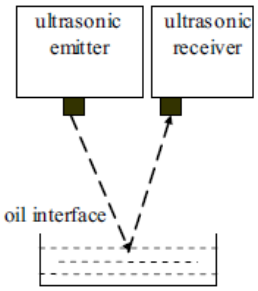

Fig 5:- oil level detecting chart
(Source: designed by Fieldcap Software)

IV. RESULT

Full C-language system software includes primary routines, sub-routines for temperature measurement, range measurement routines, show routines etc. In the key routines, which is fundamental to the program of systems and the interrupt service subroutines, the show of oil level and the power pump units are applied. Figure.6 shows the central flow chart.

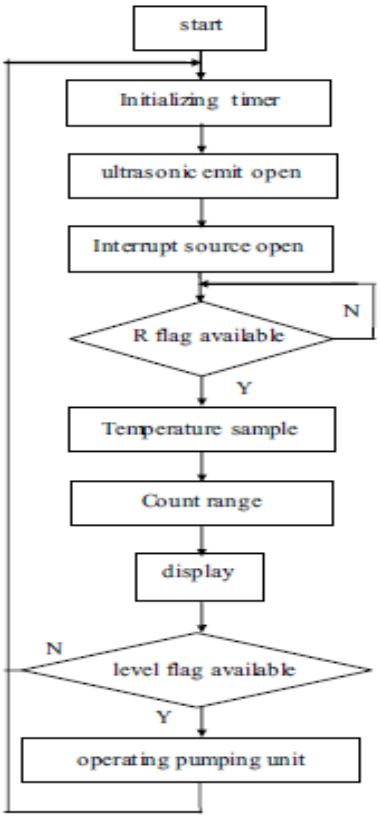

Fig 6:- main flow chart
(Source: designed by Visio Software**)**

V. CONCLUSION

In oil fields of low permissibility and on some places, at the end of oil production the measurement and control system described in this paper can be widely applied. The system gains from continuously operating and correctly measured by adopting an unused ultrasonic detection method and high-performance AT89C2051.

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