# ARM Based Seismic Data Acquisition System

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**Abstract-** To design, develop, and verify the operation of Seismic Data Acquision system based on Accelerometer, inbuilt ADC and ARM microcontroller and transmit the Stored data to some remote end for further analysis. Now days have seen significant improvement and wide-spread use of digital embedded computers in seismology. However, these commercial devices are normally costly and oppose to modification or up gradation. Here we want to develop a cost-effective seismic acquisition system based on ARM-7, without compromising its performance. A device driver which to act with a Direct Memory Access (DMA) feature is advance for helping the processor manage reading large amount of data from a high resolution ADC.The magnitude is determined by analyzing seismic signals recorded by seismometers at monitoring stations.This includes, for example, embedded computers comprising a powerful microprocessor (MPU), a high-resolution analog to digital converter (ADC) and storage memory.

**Keywords:** ARM-7 LPC2138, Seismic sensor.

## 1. INTRODUCTION

Seismic data acquisition is the system for recording and storing of seismic data on land and sea also with the ultimate aim and objective to make a seismic image of the subsurface. There are many supporting activities are required for good seismic data acquisition. For e.g., for getting seismic data from oil and gas is difficult task for getting correct information require goodmanagement system.

**Important feature are:**
General management concession and permit work Topographic examination and mapping, which is quite for land- or marinework._ More describe aspects,seismic aspects are positioning and determining the seismic source, which on landis either an explosive such as dynamite, or insea. Positioning&act of testing the detectors, hydrophones at sea, seismo sensor on land,; operating the seismic recording system.The organization of a seismic land crew, often faced with not easy logistics, terrain- andapproach to road conditions is quite different from that of sea seismic crew on board of blow up vessel, where a compact streamlined being combine of seismic and top operarations is concentrated on the floor or on the deck of one boat; differentcondition needdifferentstrategies and different technological solutions.
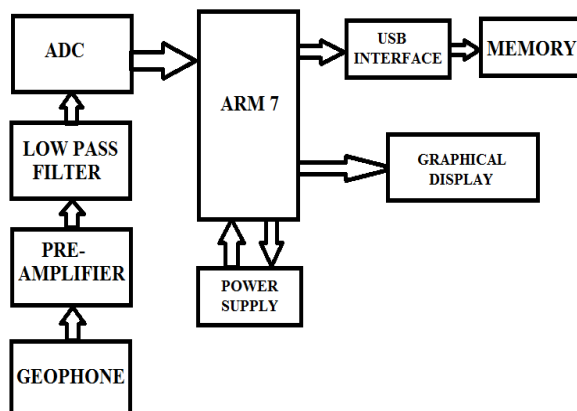
## 2. RELATED WORK

This module interfaces between the ARM7TDMI and the ASB bus, enabling the ARM7TDMI to become an ASB bus master, or to be selected as a slave for test purposes. See Figure 1-1. There are no user-programmable registers in this block.

MeijuanGao et al. [1] represents an ARM based self-adaptive seismic signal collection recording system. The system has been design using MEMS acceleration sensors are used to seismic signal to achieve high data efficiency and high reliabity. But MEMS Acceleration sensors are highly sensitive to temperature. Environmental temperature suddenly changes that causes changes in sensing system.
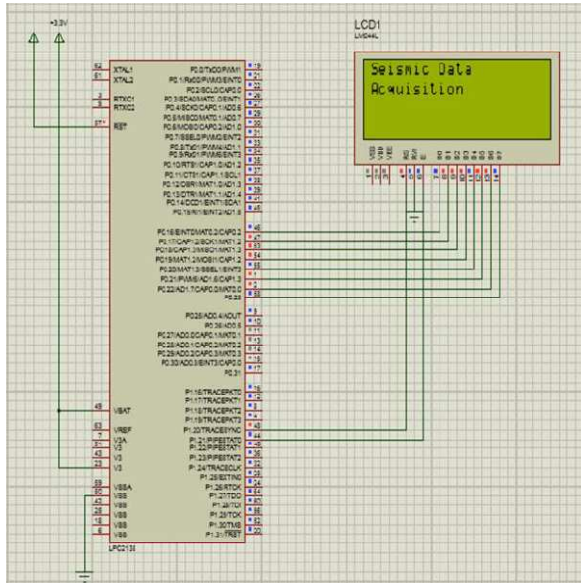
Satishkumar et al. [6] data downloading has been done by Ethernet connectivity without disturbing event data acquisition. This system is design by Disk on chip , GPS, based timing unit ,signal processing module. The system is costly

## 3. PROPOSE SYSTEM
**Block Diagram:**

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## 4. PROTEUS SIMULATION



Simulation & experimental setup has block diagram and proteus simulation as shown in figure .block diagram consists of the ARM-7 LPC2138,geophone,ADC,low pass filter,USB interface , Memory, Graphic display, power supply. Proteus simulation is software use for the simulation and testing of the system, fig shows the interfacing of the ARM-7 LPC2138 with Graphical display.

In block diagram geophone or seismic sensors are used take seismic data in land or in sea which then send to the pre-amplifier, which is used to amplify the low seismic signal and pass it to low pass filter. Low pass filter is used to reduce the noise in signal. These noise free signals are then pass to the analog-to-digital converter, which is used to convert the analog signal information into digital form.
This digital form data then process in processor viz. ARM-7 LPC2138. Process data is then stored in the memory through USB interface for storage. And result will be display on the graphical display. ARM-7 LPC2138 is processed by providing power supply.

The LPC2131/32/34/36/38 microcontrollers are based on a 16/32 bit ARM7TDMI-S™
CPU with real-time emulation and embedded trace support, which combines the microcontroller with 32 kB, 64 kB, 128 kB, 256 kB and 512 kB of embedded high speed Flash memory. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical

code size applications, the alternative 16-bit Thumb® Mode reduces code by more than 30 % with minimal performance penalty.
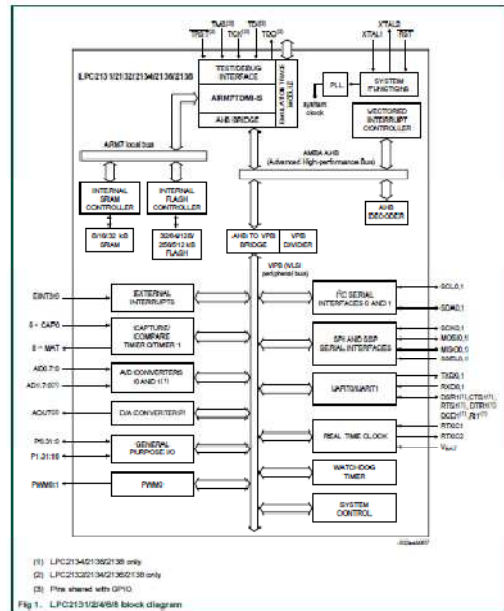


Block Diagram of ARM-**7 LPC2138**

## 5. METHODOLOGY
The existing seismic data acquisition system is rugged, costly and takes more time to collect samples and store result. In existing system there is not enough space for storing data & to maintain it, that system have the measurement system not so as propose system., Existing system restricts the modification or upgrade, whereas proposed system allowed system to be upgrade. Existing system is unable to display temperature in both C and E.
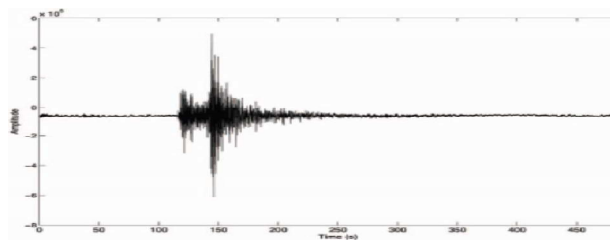
Propose system providing accuracy in real time .measurement is carry in project are fast which is helpful to real time operation, Data is record in real time but not store for future need. . Existing system is very much costly as it has many parameters. Proposed system has cost effective solutions. Propose system is able to display temperature in both C and E.

## 6. RESULT & DISCUSSION
The proposed system is more accurate and quick to collect samples.
System implement using LPC 2138 microcontroller.
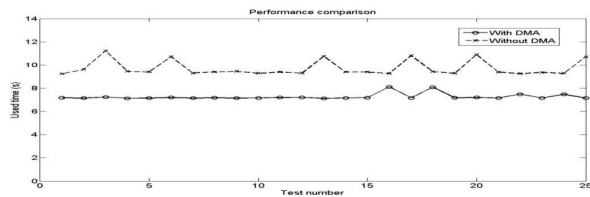
Performance comparison of device driver with/without DMA



Seismic signal

## 7. CONCLUSION

The objective of this project is to achieve desired accuracy in measurement. It providing accuracy in real time .measurement is carry in project are fast which is helpful to real time operation .Project is also useful for the storing data in large quantity for storing data we have USB interface along with memory . In existing system there is not enough space for storing data & to maintain it, that system have the measurement system not so as propose system.

The propose system is cost effective whereas the existing system is costly. Existing system has many parameter which take more space. Propose system require small space along with small size it provides accuracy in result. Proposed system provide Low power consumption as less as possible. Existing system restricts the modification upgrade, whereas proposed system allowed system to be upgrade

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