



## Design and Development of a Caliper Log



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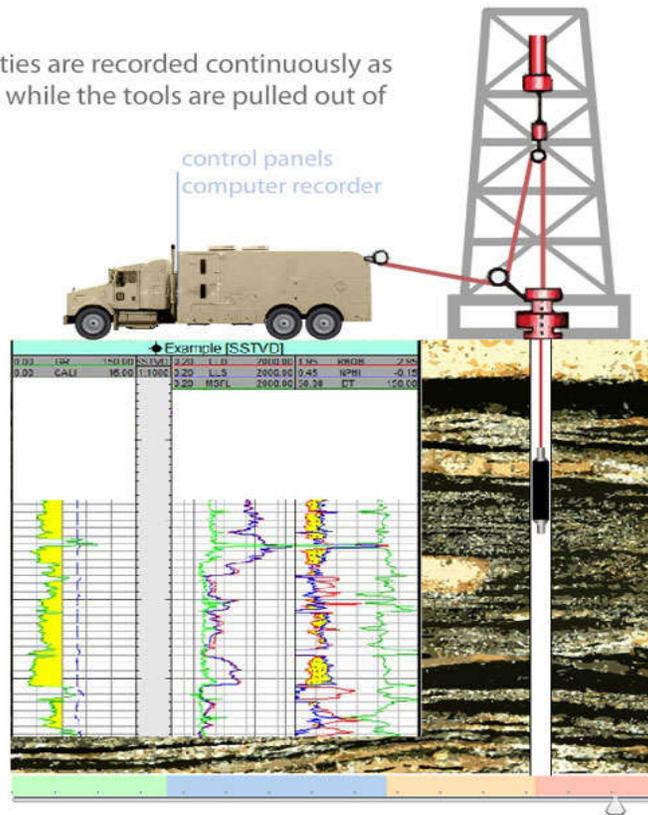
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Wireline logging is the technique that is used to analyze geophysical data performed as a function of oil and gas well bore depth.

*The oil and gas industry uses wireline logging to obtain a continuous record of a formation's rock properties.*

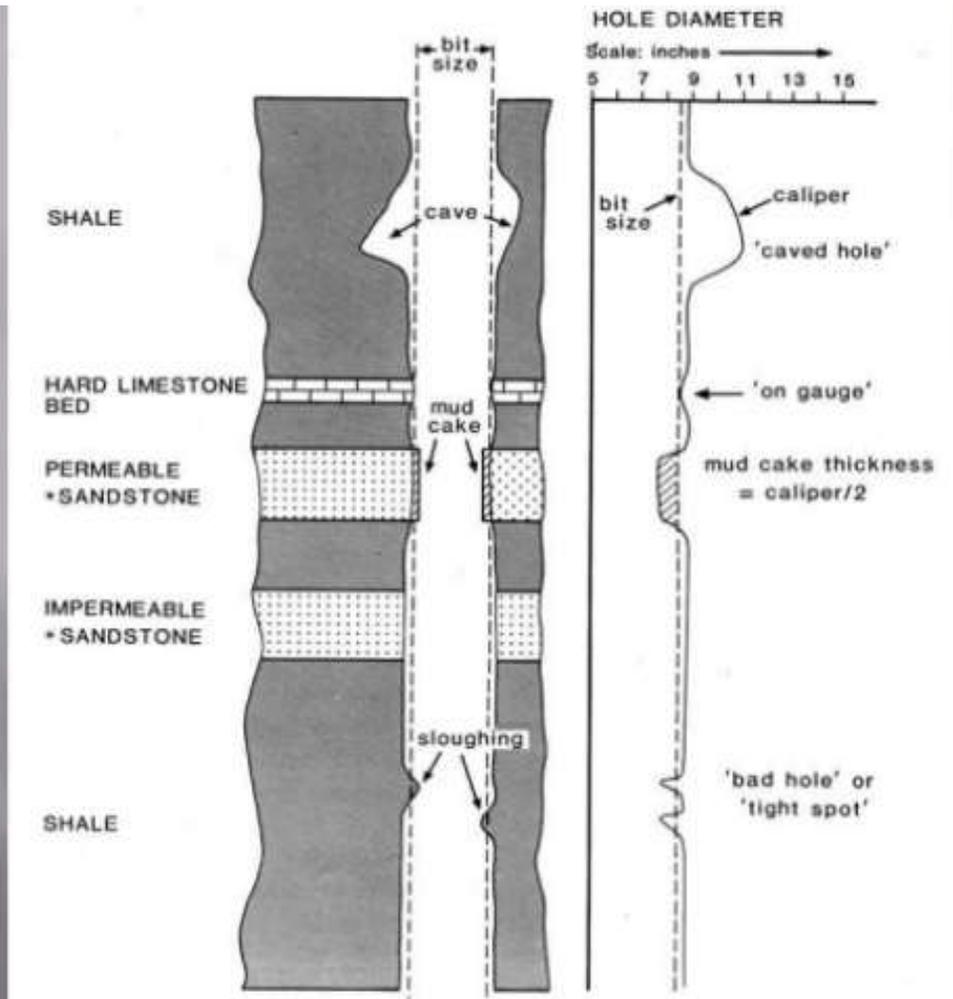
**Caliper log** is a device that uses wireline logging technique. It measures the shape and size of the borehole.. The tools measure diameter at a specific chord across the well. Since wellbores are usually irregular (rugose), it is important to have a tool that measures diameter at several different locations simultaneously. Such a tool is called a MultiFindexcaliper.

The physical properties are recorded continuously as a function of depth, while the tools are pulled out of the well.



### Importance of caliper log in oil well analyses:

1. It provides the information about the lithology of the bore hole.
2. Indicator of good permeability and porosity zones due to development of mud cakes.
3. Measurement of borehole volume.
4. Measurement of required cement volume etc.



Caliper log showing hole Diameter and some Typical Responses

## Kinds of caliper log available:

1. Mechanical caliper
2. Ultrasonic caliper
3. Acoustic caliper

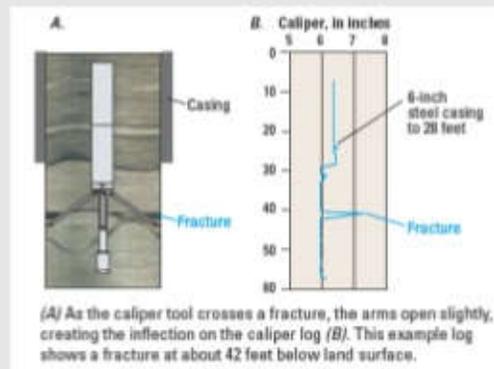
### Caliper Log

Well logging tool that provides a continuous measurement of the size and shape of a borehole along its depth.

The caliper tool measures the variation in borehole diameter as it is withdrawn from the bottom of the hole, using two or more articulated arms that push against the borehole wall



Multi-finger Caliper, MFC model (Landau Petroleum Technology Co.).



(Wikipedia.org)

### Challenge:

To design and develop a caliper log using Arduino Uno microprocessor.

The team is working on the project caliper log that will be using the ultrasonic waves to find the diameter of the borehole at varying depth and plot the same in real time.

### Planning to execute the project model:

The team is planning to make small model of caliper log with the help of Arduino (microcontroller) and using sensors (ultrasonic). *An **Ultrasonic sensor** is a device that can measure the distance to an object by using sound waves. It measures distance by sending out a sound wave at a specific frequency and listening for that sound wave to bounce back.*

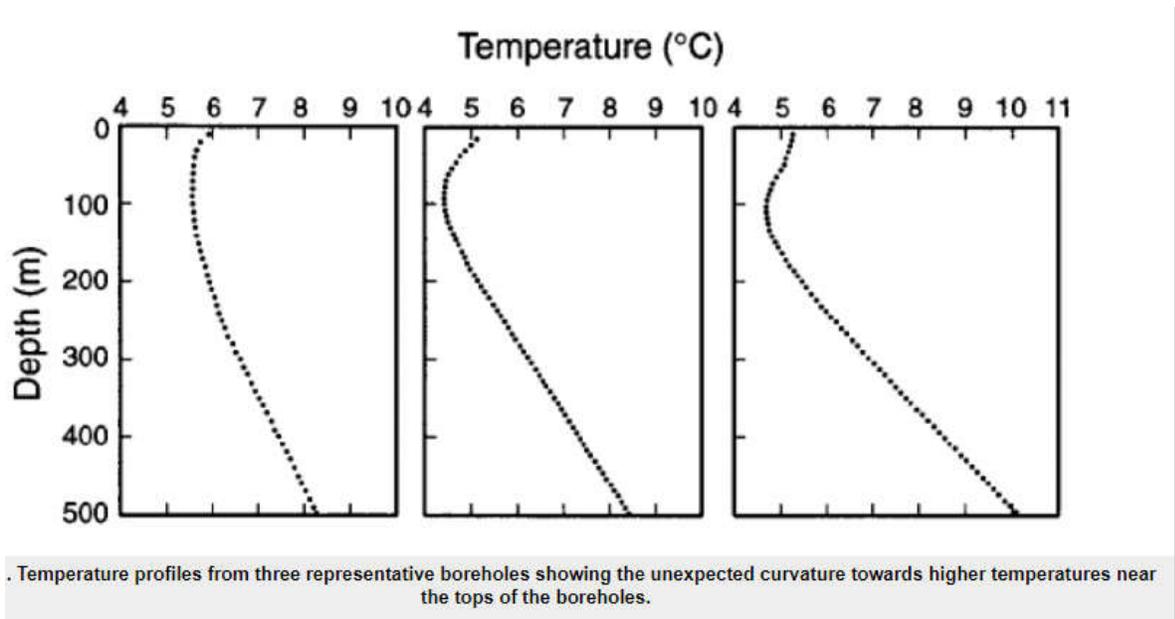
Programming the microcontroller using ARDUNIO open software and simultaneously plotting the graph using PYTHON.

Hardware proposed for the project:

- 1.Arduino Uno (microcontroller)
- 2.Ultrasonic Sensors
- 3.light emitting diodes(led)
- 4.Jumpur wires (M to M, F to F, M to F)
- 5.Resistors
- 6.Breadboard for circuit making plus other accessories

The project mainly lacks:

- 1.The wave used in the project cannot into penetrate mediums like heavy drilling mud.
- 2.The tool cannot sustain at high temperature and pressure.



## Future Plans:

Following are some ideas the team is planning to achieve in future: -

1. **Corrosion Monitoring:** The log finds its application in detecting the corrosion in the heavy machinery.
2. To Make model that could function in presence of mud.
3. To make it wireless and able to plot copies of graph using 2d Arduino controlled printers.

*The team is thankful to S & T committee(RGIPT) for providing them opportunity to work for this project.*