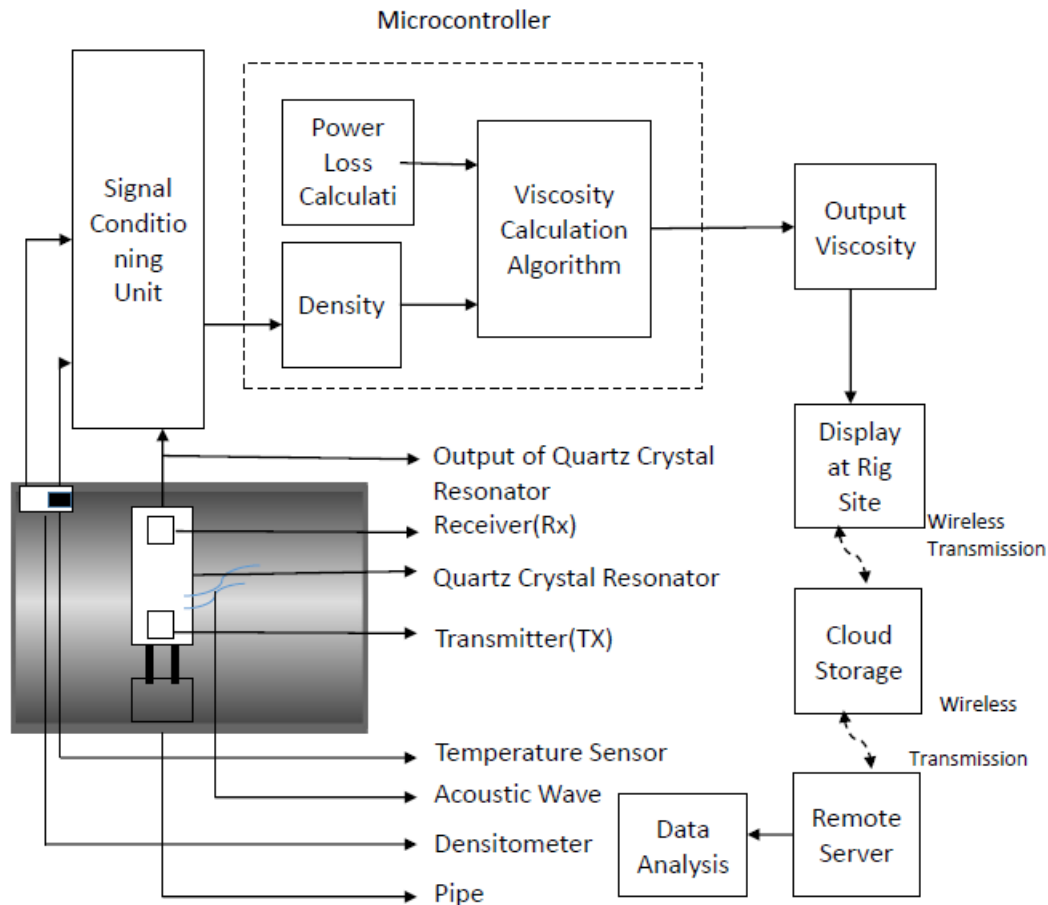


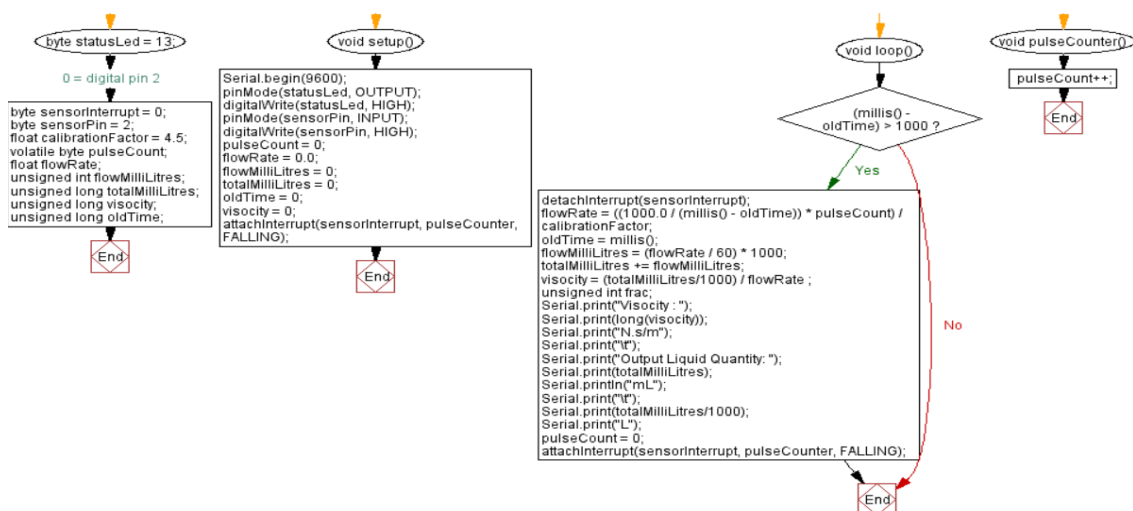
Data Collection and analysis at the Rig site

When the fluid flows through the selective passage the densitometer involves in collecting the density of the fluid running through the passage. After that, the fluid will pass through the Ultrasonic detector and receiver this involves passing the signal through the pipe. The receiver at the other end receives the signal and the feedback system is made to compare the energy loss between the detector signal and receiver signal. The feedback system sends the signal to the microcontroller and finally, the microcontroller involves in the calculation and the results are displayed in the LED display.

Working Flow chart:



Algorithm:



Program:

```
byte statusLed    = 13;
byte sensorInterrupt = 0; // 0 = digital pin 2
byte sensorPin    = 2;
float calibrationFactor = 4.5;
volatile byte pulseCount;
float flowRate;
unsigned int flowMilliLitres;
unsigned long totalMilliLitres;
unsigned long viscosity;
unsigned long oldTime;
void setup()
{
    Serial.begin(9600);
    pinMode(statusLed, OUTPUT);
    digitalWrite(statusLed, HIGH);
    pinMode(sensorPin, INPUT);
    digitalWrite(sensorPin, HIGH);
    pulseCount      = 0;
    flowRate         = 0.0;
    flowMilliLitres  = 0;
    totalMilliLitres = 0;
    oldTime          = 0;
    viscosity        = 0;
    attachInterrupt(sensorInterrupt, pulseCounter, FALLING);
}
void loop()
{
    if((millis() - oldTime) > 1000)
    {
        detachInterrupt(sensorInterrupt);
        flowRate = ((1000.0 / (millis() - oldTime)) * pulseCount) / calibrationFactor;
        oldTime = millis();
        flowMilliLitres = (flowRate / 60) * 1000;
        totalMilliLitres += flowMilliLitres;
        viscosity = (totalMilliLitres/1000) / flowRate ;
        unsigned int frac;
        Serial.print("Visocity : ");
        Serial.print(long(viscosity));
        Serial.print("N.s/m");
        Serial.print("\t");
        Serial.print("Output Liquid Quantity: ");
        Serial.print(totalMilliLitres);
        Serial.println("mL");
        Serial.print("\t");
        Serial.print(totalMilliLitres/1000);
        Serial.print("L");
        pulseCount = 0;
        attachInterrupt(sensorInterrupt, pulseCounter, FALLING);
    }
}

void pulseCounter()
{
    pulseCount++;
}
```