APPENDIX

CODING LIBRARY

```
1.  #include <GravityTDS.h>
2.  #include <Ethernet.h>
3.  #include <SPI.h>
```

CONNECT SERVER

```
4.  byte mac[] = {0xDE, 0xAD, 0xBE, 0xEF, 0xFE, 0xED};
5.  char server[] = "192.168.100.39";
6.  IPAddress ip(192,168,137,177); //arduino IP
7.  EthernetClient client;
```

SENSOR PIN

```
8.  #define TdsSensorPin A1
9.  GravityTDS gravityTds;
10.  float ldrPin = A0;
11.  float tdsValue = 0;
12.  float ldrValue = 0;
```

DECLARATION

```
13.  float ldr, tds;
14.  float jernih, keruh, sangatkeruh;
15.  float sedikit, sedang, banyak;
16.  float rol1, rol2, rol3, rol4, rol5, rol6, rol7, rol8, rol9;
17.  float z1, z2, z3, z4, z5, z6, z7, z8, z9;
```

FUZZIFICATION

```
18.  //FUZZIFIKASI
19.
20.  unsigned char ldrJernih(){
21.    if (ldr <= 50){
22.      jernih = 1;
23.      keruh = 0;
24.      sangatkeruh = 0;
25.    }
26.    return jernih;
27.  }
28.
29.  unsigned char ldrKeruh(){
30.    if (50 <= ldr && ldr <= 150){
31.      jernih = ((ldr-50)/100);
```

```
32.      keruh = ((200-ldr)/50);
33.      sangatkeruh = 0;
34.    } else if (150 <= ldr && ldr <= 200){
35.        jernih = 0;
36.        keruh = ((200-ldr)/50);
37.        sangatkeruh = ((ldr-150)/100);
38.    }
39.    return keruh;
40. }
41.
42. unsigned char ldrSangatKeruh(){
43.    if (ldr >= 600){
44.      jernih = 0;
45.      keruh = 0;
46.      sangatkeruh = 1;
47.    }
48.    return sangatkeruh;
49. }
50.
51. unsigned char tdsSedikit(){
52.    if (tds <= 300){
53.      sedikit = 1;
54.      sedang = 0;
55.      banyak = 0;
56.    }
57.    return sedikit;
58. }
59.
60. unsigned char tdsSedang(){
61.     if (300 <= tds && tds <= 900){
62.      sedikit = ((900-tds)/600);
63.      sedang = ((tds-300)/600);
64.      banyak = 0;
65.    } else if (900 <= ldr && ldr <= 1000){
66.        sedikit = 0;
67.        sedang = ((1000-tds)/100);
68.        banyak = ((tds-900)/100);
69.    }
70.    return sedang;
71. }
72.
73. unsigned char tdsBanyak(){
74.    if (tds >= 1000){
75.      sedikit = 0;
76.      sedang = 0;
77.      banyak = 1;
78.    }
79.    return banyak;
80. }
81.
82.
83.
84. //start fuzzyfikasi
85. void fuzzyfikasi(){
86.    ldrJernih();
87.    ldrKeruh();
```

```
88.    ldrSangatKeruh();
89.    tdsSedikit();
90.    tdsSedang();
91.    tdsBanyak();
92. }
93.
```

INFERENCE

```
94.  // Inference
95.
96.  void fuzzy_rule(){
97.   fuzzyfikasi();
98.    //jika air jernih dan kadungan mineral sedikit maka air Layak
99.    rol1 = min(ldrJernih(), tdsSedikit());
100.   z1 = 2;
101.   //jika air jernih dan kandungan Mineral sedang maka air Sedang
102.   rol2 = min(ldrJernih(), tdsSedang());
103.   z2 = 4;
104.   //jika air jernih dan kandungan mineral banyak maka air Tidak Layak
105.   rol3 = min(ldrJernih(), tdsBanyak());
106.   z3 = 6;
107.
108.   //jika air keruh dan kandungan mineral sedikit maka air Sedang
109.   rol4 = min(ldrKeruh(), tdsSedikit());
110.   z4 = 4;
111.   //jika air keruh dan kandungan mineral sedang maka air Sedang
112.   rol5 = min(ldrKeruh(), tdsSedang());
113.   z5 = 4;
114.   //jika air keruh dan kandungan mineral banyak maka air Tidak Layak
115.   rol6 = min(ldrKeruh(), tdsBanyak());
116.   z6 = 6;
117.
118.   //jika air sangatkeruh dan kandungan mineral sedikit maka air Tidak
   Layak
119.   rol7 = min(ldrSangatKeruh(), tdsSedikit());
120.   z7 = 6;
121.   //jika air sangatkeruh dan kandungan mineral sedang maka air Tidak
   Layak
122.   rol8 = min(ldrSangatKeruh(), tdsSedang());
123.   z8 = 6;
124.   //jika air sangatkeruh dan kandungan mineral banyak maka air Tidak
   Layak
125.   rol9 = min(ldrSangatKeruh(), tdsBanyak());
126.   z9 = 6;
127. }
```

DEFUZZIFICATION

```
128. // Defuzzyfikasi
129.
130. float defuzzyfikasi(){
131.   fuzzy_rule();
```

t

```
132.
133.   float                          A                          =
   ((rol1*z1)+(rol2*z2)+(rol3*z3)+(rol4*z4)+(rol5*z5)+(rol6*z6)+(rol7*z7)+(
   rol8*z8)+(rol9*z9)));
134.   float B = (rol1+rol2+rol3+rol4+rol5+rol6+rol7+rol8+rol9);
135.   float C = A/B;
136.   return C;
137. }
138.
139.
140. void setup() {
141.   // put your setup code here, to run once:
142.   Serial.begin(9600);
```

LED PIN

```
143.   pinMode(7,OUTPUT);
144.   pinMode(6,OUTPUT);
145.   pinMode(5,OUTPUT);
146.
```

CONNECT CLIENT

```
147.   Ethernet.begin(mac, ip);
148.   Serial.print("Local IP: ");
149.   Serial.println(Ethernet.localIP());
150.   delay(2000);
151. }
152.
153. void loop() {
154.   // put your main code here, to run repeatedly:
155.
156.     gravityTds.update();
157.     tdsValue = gravityTds.getTdsValue();
158.
159.     ldrValue = analogRead(ldrPin); //Membaca sensor LDR
160.
161.   ldr = ldrValue;
162.   tds = tdsValue;
163.   defuzzyfikasi();
164.
165.
166.     SendtoDB();
167.     delay(30000);
168.
```

TURN LED ON

```
169.     // Menghidupkan LED
170.
171.   if(defuzzyfikasi() == 2){
172.     digitalWrite(7, HIGH);
173.   } else {
174.     digitalWrite(7, LOW);
```

```
175.    }
176.
177.    if(defuzzyfikasi() == 4){
178.       digitalWrite(6, HIGH);
179.    } else {
180.       digitalWrite(6, LOW);
181.    }
182.
183.    if(defuzzyfikasi() == 6){
184.       digitalWrite(5, HIGH);
185.    } else {
186.       digitalWrite(5, LOW);
187.    }
188.
189. }
190.
```

SEND TO DATABASE

```
191. void SendtoDB(){
192.    if (client.connect(server, 80)) {
193.       Serial.println("");
194.       Serial.println("connected");
195.       // Make a HTTP request:
196.       Serial.print("GET /arduino_mysql/sensor.php?dataLDR=");
197.       client.print("GET /arduino_mysql/sensor.php?dataLDR=");
198.       Serial.print(ldrValue);
199.       client.print(ldrValue);
200.       Serial.println("");
201.
202.       Serial.print("&dataTDS=");
203.       client.print("&dataTDS=");
204.       Serial.print(tdsValue,0);
205.       client.print(tdsValue,0);
206.       Serial.println("");
207.
208.       Serial.print("&defuzzifikasi=");
209.       client.print("&defuzzifikasi=");
210.       Serial.println(defuzzyfikasi());
211.       client.print(defuzzyfikasi());
212.       Serial.println("");
213.
214.       client.print("");        //SPACE BEFORE HTTP/1.1
215.       client.print(" HTTP/1.1");
216.       client.println();
217.       client.println("Host: 192.168.137.177");
218.       client.println("Connection: close");
219.       client.println();
220.    } else {
221.       // if you didn't get a connection to the server:
222.       Serial.println("connection failed");
223.    }
    }
```

SEND TO SERVER

```php
1. <?php
2. class air{
3. public $link='';
4. function __construct($ldr, $tds, $defuzzifikasi){
5. $this->connect();
6. $this->storeInDB($ldr, $tds, $defuzzifikasi);
7. }


8. function connect(){
9. $this->link = mysqli_connect('localhost','root','')  or  die('Cannot
   connect to the DB');
10.      mysqli_select_db($this->link,'sensor_air')  or  die('Cannot  select
   the DB');
11.      }


12.      function storeInDB($ldr, $tds, $defuzzifikasi){
13.      $query   =   "insert   into   data_sensor   set   ldr='".$ldr."',
   tds='".$tds."', defuzzifikasi='".$defuzzifikasi."'";
14.      $result = mysqli_query($this->link,$query) or die('Errant query:
   '.$query);
15.      }


16.      }
17.      if($_GET['dataLDR']  !=  ''  and  $_GET['dataTDS']  !=  ''  and
   $_GET['defuzzifikasi'] != ''){
18.      $air=new
   air($_GET['dataLDR'],$_GET['dataTDS'],$_GET['defuzzifikasi']);
19.      }


20.      ?>
```

DISPLAY ON WEB

```php
1. <?php


2. $servername = "localhost";
3. $username = "root";
4. $password = "";
5. $dbname = "sensor_air";


       a. $koneksi  =  mysqli_connect($servername,  $username,  $password,
          $dbname);
```

```
6.  ?>


7.  <!DOCTYPE html>
8.  <html>
9.  <head>
10.         <meta http-equiv="refresh" content="5">
11.         </head>
12.         <body>
13.         <style>
14.         #wntable {
15.         border-collapse: collapse;
16.         width: 50%;
17.         }


18.         #wntable td, #wntable th {
19.         border: 1px solid #ddd;
20.         padding: 8px;
21.         }


22.         #wntable tr:nth-child(even){background-color: #f2f2f2;}


23.         #wntable tr:hover {background-color: #ddd;}


24.         #wntable th {
25.         padding-top: 12px;
26.         padding-bottom: 12px;
27.         text-align: left;
28.         background-color: #00A8A9;
29.         color: white;
30.         }
31.         </style>


32.         <div id="cards" class="cards" align="center">
33.         <h1> Data Sensor Air Bersih dan Air Keruh </h1>
34.         <table id="wntable">
35.         <tr>

        <th>NO</th>

        <th>LDR</th>

        <th>TDS</th>

        <th>DEFUZZIFIKASI</th>

        <th>Waktu</th>

36.         </tr>
37.         <?php


38.     $sql = mysqli_query($koneksi, "SELECT * FROM data_sensor ORDER BY
    id DESC");
```

```php
39.     if(mysqli_num_rows($sql) == 0){
echo '<tr><td colspan="14">Data Tidak Ada.</td></tr>';
40.     }else{
$no = 1;
while($row = mysqli_fetch_assoc($sql)){
echo '
<tr>
<td>'.$no.'</td>
<td>'.$row['ldr'].'</td>
<td>'.$row['tds'].'</td>
<td>'.$row['defuzzifikasi'].'</td>
<td>'.$row['waktu'].'</td>
</tr>
';
$no++;
}
41.     }
42.     ?>
43.     </table>
44.     </div>
45.     </body>
46.     </html>
```

Report #13361913

Introduction Background Water is the main need that is very important for every living thing to carry out life , one of which is for human daily activities such as cooking , drinking , washing , and cleaning the body. With so then the man in need of water with a quality that is clean and well used everyday . The quality of water is bad happen because of the contamination of material pollutants , in physical, chemical or biological . To determine the quality of the water we use is not Mudan because not all substances are contained in the water can be seen by the naked eye . To determine the quality of a water, there are several parameters that must be met by the Regulation of the Minister of Health number 416 / Menkes / Per / IX / 1990 concerning the terms - terms of quality water. On duty late this parameter that is used is the parameter turbidity of the water or the often called Turbidity and parameter TDS (Total Dissolved Solid) by using algorithms of Fuzzy Logic as a determination output. Based on the

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