

LAMPIRAN

Lampiran 1. Codingan sistem

```
1  #include <Wire.h>
2  #include <QMC5883LCompass.h>
3  #include <DFRobotDFPlayerMini.h>
4  #include <NewPing.h>
5  #include <WiFi.h>
6  #include <HTTPClient.h>
7  #include <WiFiClientSecure.h>
8  #include <UniversalTelegramBot.h>
9  #include <TinyGPS++.h>
10
11 // ==== Konfigurasi WiFi & Telegram ====
12 const char* ssid = "REALME 5 PRO";
13 const char* password = "123456789";
14 const char* botToken = "8159067170:AAETqzUfwAqy8E-UyZ-f-d3-nI9eUgtLXAc";
15 const char* chatId = "6529511122";
16
17 WiFiClientSecure secured_client;
18 UniversalTelegramBot bot(botToken, secured_client);
19
20 // ==== Ultrasonik ====
21 #define TRIG_LEFT 13
22 #define ECHO_LEFT 12
23 #define TRIG_FRONT 14
24 #define ECHO_FRONT 27
25 #define TRIG_RIGHT 26
26 #define ECHO_RIGHT 25
27 #define MAX_DISTANCE 200
28
29 NewPing sonarLeft(TRIG_LEFT, ECHO_LEFT, MAX_DISTANCE);
30 NewPing sonarFront(TRIG_FRONT, ECHO_FRONT, MAX_DISTANCE);
31 NewPing sonarRight(TRIG_RIGHT, ECHO_RIGHT, MAX_DISTANCE);
32
33 // ==== Kompas ====
34 QMC5883LCompass compass;
35
36 // ==== DFPlayer Mini ====
37 HardwareSerial mySerial(1); // RX=16, TX=17
38 DFRobotDFPlayerMini myDFPlayer;
39
40 // ==== GPS ====
41 HardwareSerial gpsSerial(2); // RX=4 (GPS TX), TX=2 (GPS RX)
42 TinyGPSPlus gps;
43
44 unsigned long lastBotCheck = 0;
45 const unsigned long BOT_CHECK_INTERVAL = 2000;
46 int lastPlayed = 0;
47 String lastDirection = "";
48
49 void setup() {
50   Serial.begin(115200);
51   Wire.begin();
52   compass.init();
53
54   mySerial.begin(9600, SERIAL_8N1, 16, 17);
55   if (!myDFPlayer.begin(mySerial)) {
56     Serial.println("Gagal menghubungkan DFPlayer Mini.");
57     while (1);
58   }
59   myDFPlayer.volume(20);
60
61   gpsSerial.begin(9600, SERIAL_8N1, 4, 2);
62
63   WiFi.begin(ssid, password);
64   while (WiFi.status() != WL_CONNECTED) {
65     delay(1000);
66     Serial.println("Menghubungkan ke WiFi...");
67   }
68   Serial.println("Terhubung ke WiFi");
```

```

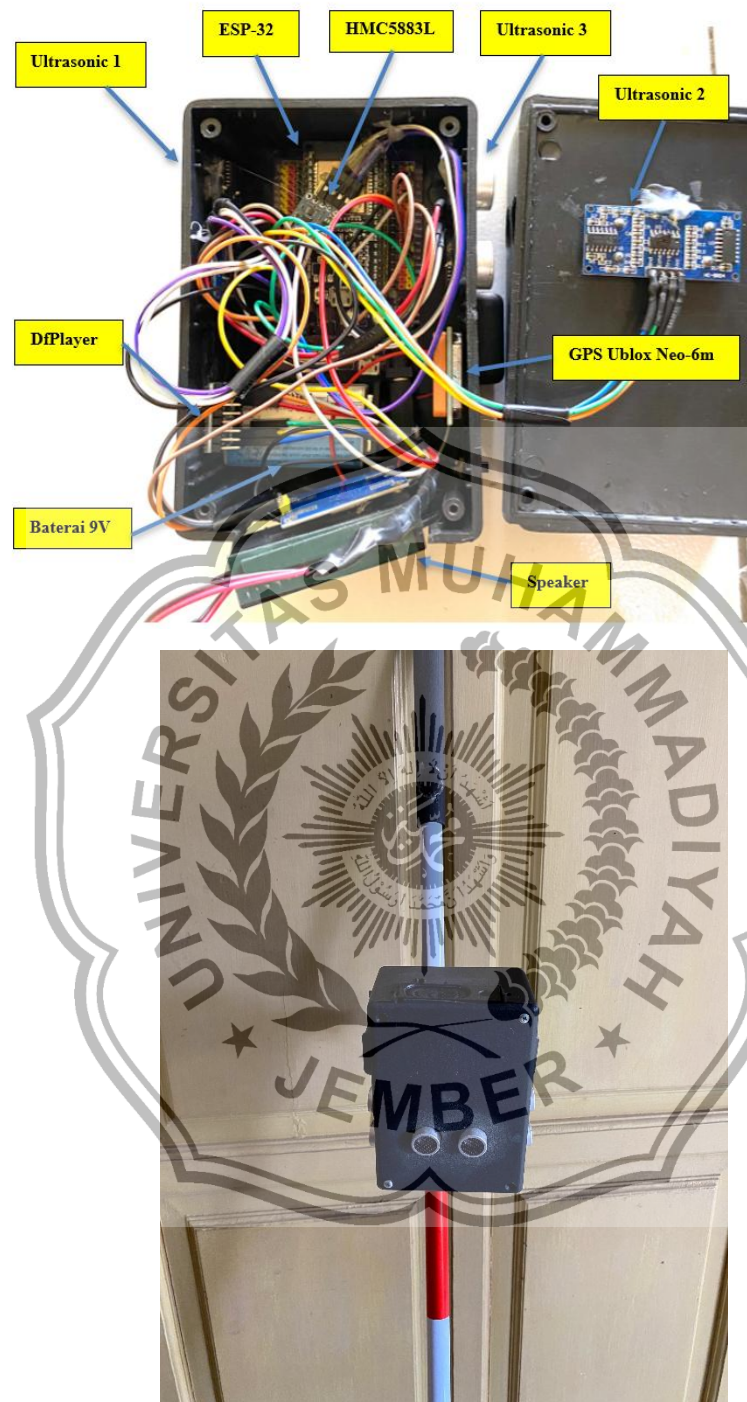
70 | secured_client.setInsecure();
71 | }
72 |
73 void sendGPSLocationToTelegram() {
74 | if (gps.location.isValid()) {
75 |     float latitude = gps.location.lat();
76 |     float longitude = gps.location.lng();
77 |     String message = "Lokasi Terkini:\n";
78 |     message += "https://maps.google.com/?q=" + String(latitude, 6) + "," + String(longitude, 6);
79 |     bot.sendMessage(chatId, message, "Markdown");
80 |     Serial.println("Dikirim ke Telegram: " + message);
81 | } else {
82 |     bot.sendMessage(chatId, "GPS tidak valid atau belum fix.", "Markdown");
83 | }
84 | }
85 |
86 void handleTelegramMessages() {
87 | int numNewMessages = bot.getUpdates(bot.last_message_received + 1);
88 |
89 | while (numNewMessages) {
90 |     for (int i = 0; i < numNewMessages; i++) {
91 |         String text = bot.messages[i].text;
92 |         if (text == "/lokasi") {
93 |             sendGPSLocationToTelegram();
94 |         } else {
95 |             bot.sendMessage(chatId, "Perintah tidak dikenal. Gunakan /lokasi untuk menerima lokasi.", "Markdown");
96 |         }
97 |     }
98 |     numNewMessages = bot.getUpdates(bot.last_message_received + 1);
99 | }
100 | }

102 String getCardinalDirection(int azimuth) {
103 | if ((azimuth >= 315 && azimuth <= 360) || (azimuth >= 0 && azimuth < 45))
104 |     return "Utara";
105 | else if (azimuth >= 45 && azimuth < 135)
106 |     return "Timur";
107 | else if (azimuth >= 135 && azimuth < 225)
108 |     return "Selatan";
109 | else
110 |     return "Barat";
111 | }
112 |
113 void loop() {
114 | // GPS
115 | while (gpsSerial.available()) {
116 |     gps.encode(gpsSerial.read());
117 | }
118 |
119 | unsigned long currentMillis = millis();
120 | if (currentMillis - lastBotCheck > BOT_CHECK_INTERVAL) {
121 |     handleTelegramMessages();
122 |     lastBotCheck = currentMillis;
123 | }
124 |
125 | // Ultrasonik
126 | int distLeft = sonarLeft.ping_cm();
127 | int distFront = sonarFront.ping_cm();
128 | int distRight = sonarRight.ping_cm();
129 |
130 | bool detectLeft = (distLeft > 0 && distLeft <= 60);
131 | bool detectFront = (distFront > 0 && distFront <= 40);
132 | bool detectRight = (distRight > 0 && distRight <= 60);
133 |
134 | // Kompas
135 | compass.read();

136 | int azimuth = compass.getAzimuth();
137 | String direction = getCardinalDirection(azimuth);
138 | Serial.printf("Kiri: %d cm | Depan: %d cm | Kanan: %d cm | Arah: %s\n", distLeft, distFront, distRight, direction.c_str());
139 |
140 | int soundToPlay = 0;
141 |
142 | if (detectLeft && detectFront && detectRight) {
143 |     soundToPlay = 4;
144 | } else if (detectLeft) {
145 |     soundToPlay = 1;
146 | } else if (detectFront) {
147 |     soundToPlay = 2;
148 | } else if (detectRight) {
149 |     soundToPlay = 3;
150 | } else {
151 |     if (direction != lastDirection) {
152 |         lastDirection = direction;
153 |         if (direction == "Utara") soundToPlay = 5;
154 |         else if (direction == "Timur") soundToPlay = 6;
155 |         else if (direction == "Selatan") soundToPlay = 7;
156 |         else if (direction == "Barat") soundToPlay = 8;
157 |     }
158 | }
159 |
160 | if (soundToPlay != 0 && soundToPlay != lastPlayed) {
161 |     myDFPlayer.play(soundToPlay);
162 |     lastPlayed = soundToPlay;
163 | }
164 |
165 | if (soundToPlay == 0) {
166 |     lastPlayed = 0;
167 | }
168 |
169 | delay(300);

```

Lampiran 2. Desain Hardware



Lampiran 3. Foto Pengambilan Data

