

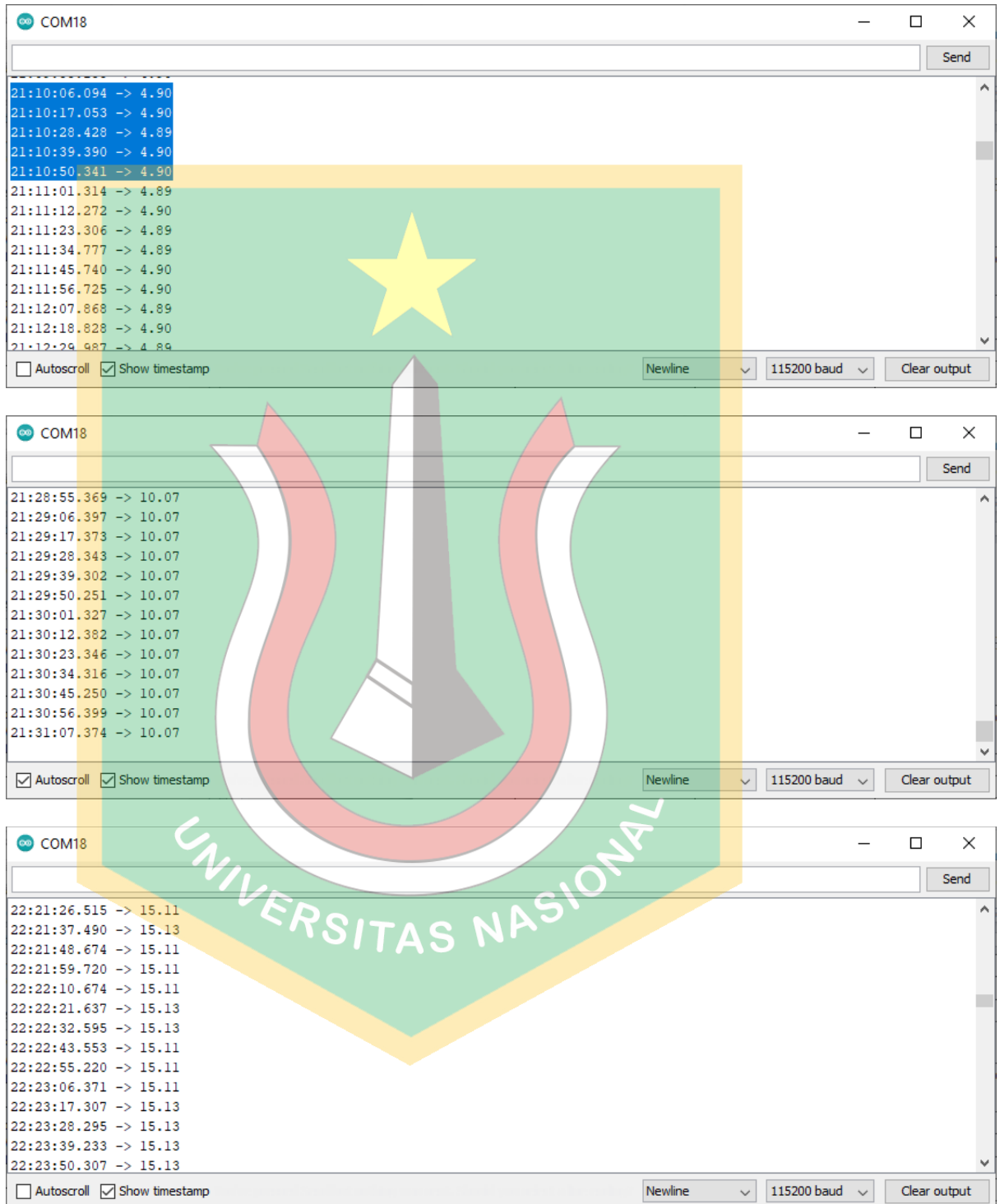
DAFTAR PUSTAKA

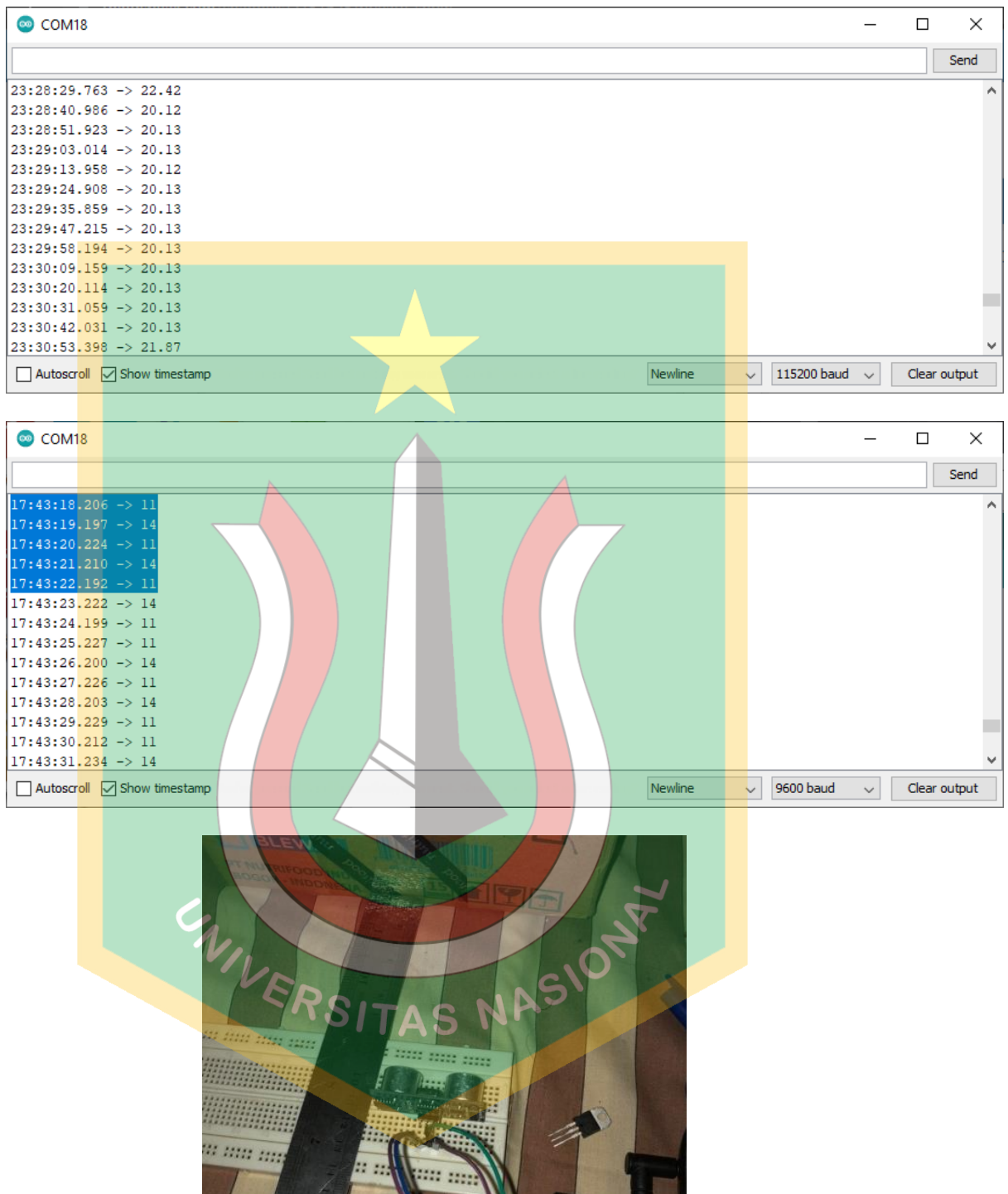
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LAMPIRAN

Lampiran 1 Display Data Pengukuran Sensor pada Serial monitor Arduino IDE





Lampiran 2 Data Pengukuran

Time	Peilschaal Measurement	Ultrasonic Measurement	Tampilan Kondisi di LCD	Buzzer
21:30:47	68	68	Normal	OFF
21:31:03	68	67	Normal	OFF

21:31:19	68	68	Normal	OFF
21:31:35	68	68	Normal	OFF
21:31:51	68	68	Normal	OFF
21:32:07	68	67	Normal	OFF
21:32:23	68	68	Normal	OFF
21:32:39	68	68	Normal	OFF
21:32:55	68	65	Normal	OFF
21:33:11	68	68	Normal	OFF
21:33:27	68	68	Normal	OFF
21:33:44	68	68	Normal	OFF
21:34:00	68	67	Normal	OFF
21:34:16	68	68	Normal	OFF
21:34:32	68	68	Normal	OFF
21:34:48	68	68	Normal	OFF
21:35:04	68	67	Normal	OFF
21:35:20	68	67	Normal	OFF
21:35:37	68	67	Normal	OFF
21:35:53	68	67	Normal	OFF
21:36:09	68	68	Normal	OFF
21:36:25	68	67	Normal	OFF
21:36:41	68	69	Normal	OFF
21:36:57	68	68	Normal	OFF
21:37:13	68	68	Normal	OFF
21:37:29	68	69	Normal	OFF
21:37:46	68	67	Normal	OFF
21:38:02	68	68	Normal	OFF
21:38:18	68	68	Normal	OFF
21:38:34	68	67	Normal	OFF
21:38:50	68	68	Normal	OFF
21:39:06	68	67	Normal	OFF
21:39:22	68	68	Normal	OFF
21:39:38	68	67	Normal	OFF
21:39:55	68	68	Normal	OFF
21:40:11	68	65	Normal	OFF

Lampiran Ketiga Data Pemantauan 7 hari 24 jam Rata Rata per 10 Menit

Waktu	Hari Pertama	Hari Kedua	Hari Ketiga	Hari Keempat	Hari Kelima	Hari Keenam
	Tinggi (cm)	Tinggi (cm)	Tinggi (cm)	Tinggi (cm)	Tinggi (cm)	Tinggi (cm)
3:00:00	74.81579	69.65789	70.76316	69.84211	70.15789	72.44737
3:10:00	73.21053	69.65789	70.52632	69.92105	70.35431	72.50000
3:20:00	73.60526	69.26316	70.71053	70.31579	70.67392	72.47368
3:30:00	73.39474	69.10526	70.42105	70.23684	70.23415	72.50000
3:40:00	73.52632	69.42105	72.15789	70.23684	70.16199	72.47368

3:50:00	72.52632	69.78947	71.02632	70.92105	70.47268	72.68421
4:00:00	72.86842	69.92105	70.73684	70.31579	70.05262	72.50000
4:10:00	73.13158	70.15789	70.65789	70.26316	70.43424	72.50000
4:20:00	73.23684	69.97368	73.10526	70.60526	70.15392	72.52632
4:30:00	73.10526	70.10526	73.42105	71.14474	70.55623	72.60526
4:40:00	73.21053	70.02632	70.89474	71.15789	70.24367	72.57895
4:50:00	73.44737	70.18421	70.52632	71.05263	70.37954	72.60526
5:00:00	73.39474	70.57895	70.34211	71.10526	70.08263	72.78947
5:10:00	73.13158	70.52632	71.10526	71.28947	70.60526	72.94737
5:20:00	73.42105	70.60526	70.68421	70.60526	70.93241	72.89474
5:30:00	72.15789	70.39474	70.73684	70.60526	71.21053	72.86842
5:40:00	72.15789	70.15789	70.57895	71.21053	70.81579	72.89474
5:50:00	72.21053	69.47368	69.97368	71.47368	71.34121	72.94737
6:00:00	72.15789	69.68421	70.23684	71.39474	71.46635	72.92105
6:10:00	72.21053	70.00000	70.28947	71.57895	71.75292	73.00000
6:20:00	71.94737	70.23684	70.39474	70.97368	71.82513	72.78947
6:30:00	72.00000	70.26316	70.42105	71.07895	71.94737	72.73684
6:40:00	72.73684	69.97368	70.36842	71.26316	71.71723	72.55263
6:50:00	72.05263	70.26316	70.15789	71.18421	71.94737	72.65789
7:00:00	72.28947	70.26316	70.15789	71.28947	71.92105	72.65789
7:10:00	72.00000	69.97368	70.07895	71.15789	72.02632	72.76316
7:20:00	71.84211	70.26316	70.21053	71.00000	72.23684	72.76316
7:30:00	72.00000	71.63158	69.94737	71.60526	72.55263	72.89474
7:40:00	71.81579	72.28947	69.94737	71.18421	72.76316	72.92105
7:50:00	72.00000	74.73684	69.89474	71.21053	72.21053	73.07895
8:00:00	71.55263	69.60526	70.05263	71.07895	71.92105	73.10526
8:10:00	71.63158	69.31579	70.26316	71.81579	71.91709	73.10526
8:20:00	71.63158	69.15789	69.86842	70.76316	72.18161	73.10526
8:30:00	71.10526	69.36842	69.73684	71.94737	71.92105	73.21053
8:40:00	71.34211	69.84211	70.02632	71.23684	72.18421	73.34211
8:50:00	71.23684	69.73684	69.81579	71.21053	72.29325	73.28947
9:00:00	71.26316	70.23684	69.57895	71.50000	72.50000	73.28947
9:10:00	71.13158	69.89474	69.63158	70.81579	72.47368	73.05263
9:20:00	71.42105	70.18421	69.81579	70.97368	72.50000	73.23684
9:30:00	70.68421	70.05263	69.55263	70.97368	72.47368	73.23684
9:40:00	70.78947	70.10526	69.73684	70.73684	72.68421	73.23684
9:50:00	70.92105	70.57895	69.76316	70.47368	72.50000	73.26316
10:00:00	70.89474	70.44737	69.63158	70.34211	72.51945	73.28947
10:10:00	70.71053	70.50000	69.78947	70.42105	72.52632	73.18421
10:20:00	70.71053	70.63158	69.60526	70.02632	72.60526	73.18421
10:30:00	70.71053	70.13158	69.71053	70.13158	72.57895	72.00000
10:40:00	70.68421	69.55263	69.65789	70.60526	72.60526	72.09091
10:50:00	71.05263	69.55263	69.81579	70.84211	72.78947	71.81818
11:00:00	71.10526	69.86842	69.84211	70.28947	72.94737	71.81818

11:10:00	71.00000	70.26316	69.89474	70.34211	72.89474	71.36364
11:20:00	70.34211	70.05263	70.00000	70.10526	72.86842	71.81818
11:30:00	70.36842	70.28947	70.15789	70.60526	72.89474	72.00000
11:40:00	70.86842	70.23684	70.13158	70.68421	72.94737	71.27273
11:50:00	70.65789	71.31579	70.10526	70.71053	72.92105	71.27273
12:00:00	70.42105	72.52632	70.50000	70.89474	73.00000	71.36364
12:10:00	69.92105	73.39474	70.50000	70.76316	72.78947	71.36364
12:20:00	70.50000	90.94737	70.57895	70.97368	72.73684	71.36364
12:30:00	69.89474	90.65789	70.31579	70.02632	72.55263	71.36364
12:40:00	69.84211	85.47368	70.55263	70.31579	72.65789	71.45455
12:50:00	69.84211	88.36842	70.68421	71.36842	72.65789	71.45455
13:00:00	69.89474	90.94737	71.86842	71.00000	72.76316	71.45455
13:10:00	70.02632	90.81579	70.78947	71.60526	72.76316	71.45455
13:20:00	69.78947	92.07895	71.63158	71.28947	72.89474	71.36364
13:30:00	69.89474	90.15789	71.47368	71.42105	72.92105	71.36364
13:40:00	70.13158	74.26316	71.89474	71.28947	73.07895	71.45455
13:50:00	69.97368	74.63158	71.13158	72.10526	73.10526	71.36364
14:00:00	70.15789	72.78947	71.00000	72.00000	73.10526	71.36364
14:10:00	69.73684	78.89474	71.60526	71.26316	73.10526	71.81818
14:20:00	69.89474	89.81579	71.50000	71.15789	73.21053	71.63636
14:30:00	69.57895	86.42105	71.07895	71.44737	73.34211	71.81818
14:40:00	70.10526	80.02632	71.86842	71.44737	73.28947	71.90909
14:50:00	70.18421	72.71053	71.52632	71.78947	73.28947	72.00000
15:00:00	70.92105	74.73684	72.02632	71.63158	73.05263	71.45455
15:10:00	71.07895	72.78947	71.92105	71.44737	73.23684	72.00000
15:20:00	70.84211	71.31579	71.52632	71.05263	73.23684	72.00000
15:30:00	70.89474	71.42105	71.76316	70.86842	73.23684	72.00000
15:40:00	70.86842	72.18421	72.89474	70.78947	73.26316	72.00000
15:50:00	71.10526	75.00000	72.97368	70.52632	73.28947	72.00000
16:00:00	71.34211	75.34211	72.02632	70.65789	73.18421	71.63636
16:10:00	71.13158	71.84211	72.23684	70.55263	73.18421	71.81818
16:20:00	71.21053	72.21053	72.55263	70.73684	72.44737	72.00000
16:30:00	70.92105	71.92105	72.76316	70.60526	72.50000	72.09091
16:40:00	70.50000	72.15789	73.50000	70.86842	72.47368	71.81818
16:50:00	70.52632	71.97368	74.57895	70.73684	72.50000	71.81818
17:00:00	70.63158	71.76316	72.89474	70.44737	72.47368	71.36364
17:10:00	70.92105	71.52632	74.42105	71.23684	72.68421	71.81818
17:20:00	70.73684	71.26316	72.36842	71.52632	72.50000	72.00000
17:30:00	70.86842	71.36842	73.10526	71.31579	72.50000	73.54545
17:40:00	70.94737	71.34211	73.68421	70.94737	72.52632	73.54545
17:50:00	70.94737	71.78947	75.28947	70.94737	72.60526	73.54545
18:00:00	70.71053	71.63158	73.50000	71.81579	72.57895	73.09091
18:10:00	70.97368	71.36842	74.26316	71.13158	72.60526	72.36364
18:20:00	70.39474	70.86842	73.57895	71.13158	72.78947	72.36364

18:30:00	70.52632	71.05263	74.47368	71.02632	72.94737	72.36364
18:40:00	70.78947	70.68421	74.52632	70.94737	72.89474	72.09091
18:50:00	71.05263	71.23684	72.55263	70.94737	72.86842	72.09091
19:00:00	71.52632	71.21053	72.28947	70.21053	72.89474	72.09091
19:10:00	71.36842	70.92105	73.44737	70.50000	72.94737	72.36364
19:20:00	71.31579	70.92105	69.90891	70.65789	72.92105	72.36364
19:30:00	71.36842	73.05263	69.22342	70.94737	73.00000	72.36364
19:40:00	71.39474	73.52632	69.47368	70.73684	72.78947	72.36364
19:50:00	71.55263	73.65789	69.73684	71.13158	72.73684	72.54545
20:00:00	71.63158	72.50000	70.28947	70.52632	72.55263	72.54545
20:10:00	71.50000	71.57895	69.97368	70.71053	72.65789	72.72727
20:20:00	71.34211	71.94737	69.86842	70.00000	72.65789	72.63636
20:30:00	71.60526	72.34211	70.50000	69.89474	72.76316	72.63636
20:40:00	71.76316	72.65789	69.57895	69.78947	72.76316	73.09091
20:50:00	71.57895	72.55263	70.68421	69.55263	72.89474	73.00000
21:00:00	71.68421	71.44737	71.86842	70.13158	72.92105	73.00000
21:10:00	71.57895	70.94737	70.73684	69.50000	73.07895	72.72727
21:20:00	71.55263	70.84211	70.94737	69.65789	73.10526	73.18182
21:30:00	71.60526	71.00000	71.15789	70.10526	73.10526	73.54545
21:40:00	71.52632	71.15789	71.36842	70.47368	73.10526	73.36364
21:50:00	71.21053	72.02632	71.86842	70.65789	73.21053	73.36364
22:00:00	71.81579	71.97368	70.86842	70.21053	73.34211	73.27273
22:10:00	71.52632	71.05263	70.10526	70.15789	73.28947	73.45455
22:20:00	71.55263	72.05263	69.57895	70.36842	73.28947	73.45455
22:30:00	71.60526	71.31579	69.34211	70.52632	73.05263	73.00000
22:40:00	71.97368	72.55263	69.15789	70.34211	73.23684	73.00000
22:50:00	71.81579	72.13158	69.34211	70.36842	73.23684	73.72727
23:00:00	72.28947	72.18421	69.94737	70.18421	73.23684	73.63636
23:10:00	72.36842	72.50000	70.02632	70.34211	73.26316	73.18182
23:20:00	72.28947	71.36842	70.31579	69.71053	73.28947	72.81818
23:30:00	72.44737	71.31579	70.05263	69.81579	73.18421	72.81818
23:40:00	72.44737	71.15789	69.92105	69.97368	73.18421	73.27273
23:50:00	72.34211	71.68421	69.86842	70.15789	72.44737	73.27273
0:00:00	72.57895	70.86842	69.52632	70.39474	72.50000	73.90909
0:10:00	72.52632	72.13158	69.31579	70.31579	72.47368	71.36364
0:20:00	72.57895	71.65789	69.44737	70.63158	72.50000	71.36364
0:30:00	72.50000	71.60526	69.73684	70.57895	72.47368	71.27273
0:40:00	72.78947	71.89474	69.68421	70.71053	72.68421	71.18182
0:50:00	72.57895	70.73684	70.23684	70.76316	72.51542	71.63636
1:00:00	72.57895	70.78947	69.78947	70.15789	72.57635	71.63636
1:10:00	72.76316	71.94737	70.31579	70.02632	72.52632	71.36364
1:20:00	72.71053	70.60526	70.26316	69.97368	72.60526	71.36364
1:30:00	73.02632	74.13158	69.55263	70.15789	72.57895	71.36364
1:40:00	72.44737	72.78947	70.65789	70.42105	72.60526	71.36364

1:50:00	73.02632	71.65789	70.73684	70.47368	72.78947	71.45455
2:00:00	72.85389	70.84211	70.15789	69.89474	72.94737	72.09091
2:10:00	72.61789	71.23684	70.31579	70.31579	72.89474	71.36364
2:20:00	72.50000	71.23684	70.42105	70.47368	72.86842	71.36364
2:30:00	72.05263	71.60526	69.84211	70.18421	72.89474	71.27273
2:40:00	72.15789	70.84211	69.92105	70.00000	72.94737	71.18182
2:50:00	71.25364	70.57895	70.31579	70.31579	72.92105	71.63636
3:00:00	72.76922	69.65789	70.76316	69.84211	73.00000	71.63636

Lampiran Keempat Data Pengujian Dengan Prototipe

No.	Ketinggian(cm)			Tampilan LCD	Buzzer
	Ketinggian Air di Prototipe	Simulasi Ketinggian dari 0-182	Ultrasonik		
1	0	0	0	Normal	OFF
			0		
			1		
			0		
			1		
2	3.4	18.2	19	Normal	OFF
			19		
			18		
			17		
			18		
3	5.3	28.2	29	Normal	OFF
			29		
			27		
			29		
			29		
4	6.3	33.7	33	Normal	OFF
			35		
			34		
			32		
			33		
5	7	37	36	Normal	OFF
			37		
			37		
			36		
			38		
6	9	48	49	Normal	OFF
			48		
			49		
			49		
			48		
7	10.7	58	57	Normal	OFF

			58		
			57		
			59		
			58		
8	12	64.2	63	Normal	OFF
			63		
			65		
			63		
			63		
9	12.8	68.5	69	Normal	OFF
			68		
			69		
			69		
10	13.9	74.4	75	Waspada	OFF
			75		
			75		
			75		
11	15.2	81.3	81	Waspada	OFF
			81		
			82		
			81		
12	17	91	91	Waspada	OFF
			91		
			91		
			91		
13	18.7	100	101	Siaga	ON
			101		
			100		
			99		
			100		
14	20.7	110.8	111	Siaga	ON
			111		
			111		
			109		
15	22.4	119.9	120	Siaga	ON
			120		
			120		
			120		
16	24.2	129.5	130	Siaga	ON
			130		

			128		
			130		
			128		
17	26	139.7	140	Bahaya	ON
			141		
			140		
			140		
			147		
18	27.5	147.5	148	Bahaya	ON
			148		
			148		
19	28.7	153	154	Bahaya	ON
			154		
			154		
			154		
20	30.6	163.8	167	Bahaya	ON
			161		
			161		
			161		
			166		
21	32.1	171.8	169	Bahaya	ON
			169		
			169		
			169		
			171		
22	32.5	173.9	171	Bahaya	ON
			171		
			171		
			171		
23	33	176.6	171	Bahaya	ON
			171		
			171		
			171		
24	34	182	168	Bahaya	ON
			165		
			163		
			163		



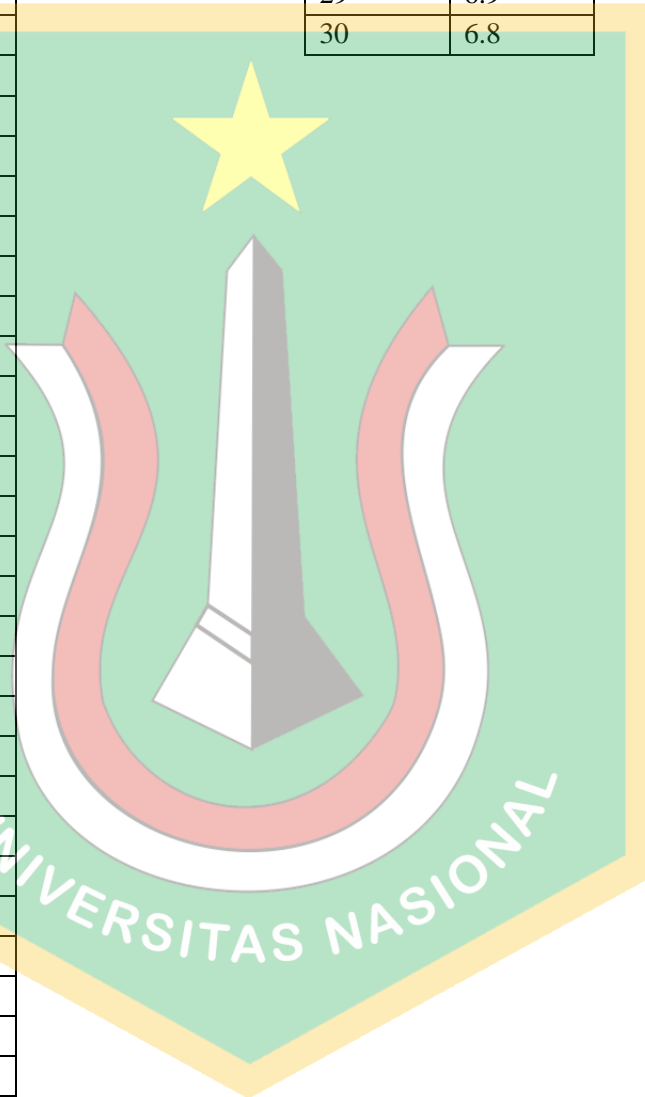


Lampiran Kelima Data Penurunan Tegangan Baterai

Accumulator	
Jam	Tegangan
1	14.4
2	14.26
3	14.12
4	13.98
5	13.84
6	13.7
7	13.56
8	13.42
9	13.28
10	13.14
11	13
12	12.86
13	12.72
14	12.58
15	12.44
16	12.3
17	12.16
18	12.02
19	11.88
20	11.74

Baterai ABC	
Menit	Tegangan
1	9.7
2	9.6
3	9.5
4	9.4
5	9.3
6	9.2
7	9.1
8	9
9	8.9
10	8.8
11	8.7
12	8.6
13	8.5
14	8.4
15	8.3
16	8.2
17	8.1
18	8
19	7.9
20	7.8

21	11.6		21	7.7
22	11.46		22	7.6
23	11.32		23	7.5
24	11.18		24	7.4
25	11.04		25	7.3
26	10.9		26	7.2
27	10.76		27	7.1
28	10.62		28	7
29	10.48		29	6.9
30	10.34		30	6.8
31	10.2			
32	10.06			
33	9.92			
34	9.78			
35	9.64			
36	9.5			
37	9.36			
38	9.22			
39	9.08			
40	8.94			
41	8.8			
42	8.66			
43	8.52			
44	8.38			
45	8.24			
46	8.1			
47	7.96			
48	7.82			
49	7.68			
50	7.54			
51	7.4			
52	7.26			
53	7.12			
54	6.98			
55	6.84			
56	6.7			
57	6.56			
58	6.42			
59	6.28			
60	6.14			



Lampiran Keenam Hasil Pengujian Karakteriasi Sensor

Acuan (cm)	Pengujian 1 (cm)	Pengujian 2 (cm)	Pengujian 3 (cm)	Pengujian 4 (cm)	Pengujian 5 (cm)	Rata Rata	Error (%)
5	4.9	4.9	4.89	4.9	4.9	4.898	2.04
10	10.07	10.07	10.07	10.07	10.07	10.07	0.70
20	20.12	20.13	20.13	20.12	20.13	20.12	0.63
30	30.13	30.13	30.16	29.64	30.06	30.02	0.08
40	39.47	39.38	39.52	39.49	39.49	39.47	1.32
50	49.8	49.46	49.35	49.33	49.37	49.46	1.07
60	59.04	59.37	59.06	59.44	58.94	59.17	1.38
70	70.03	70.05	70.02	70.02	69.63	69.95	0.07
80	79.74	79.69	79.18	80.04	79.64	79.65	0.42
90	89.03	89.05	89.03	88.67	89.07	88.97	1.14
100	99.43	99.55	99.45	99.99	99.94	99.67	0.32

Lampiran Ketujuh Program Arduino IDE

```
#include <ESP8266WiFi.h>
#include <ThingSpeak.h>
#include <WiFiClient.h>
#include <LiquidCrystal_I2C.h>
#define TRIGGER_PIN D6
#define ECHO_PIN D5

float distance;
long duration;
LiquidCrystal_I2C lcd(0x3F, 16,2);

String apikey = "YC9PZKTUQV14XM9Z";
const char* ssid = "POCO F3";
const char* password = "b1smillah";
const char* server = "api.thingspeak.com";
WiFiClient client;
unsigned long myChannelNumber = 2151625;
const char* myWriteAPIKey = "YC9PZKTUQV14XM9Z";

void setup() {
  lcd.begin(16,2);
  lcd.init();
  lcd.backlight();
  pinMode(TRIGGER_PIN, OUTPUT);
  pinMode(ECHO_PIN, INPUT);
  pinMode(D7, OUTPUT);
  Serial.begin(115200);
  delay(10);
  lcd.setCursor(0,0);
  lcd.print("Connecting to ");
  lcd.setCursor(0,1);
```

```

lcd.print(ssid);

WiFi.mode(WIFI_STA);
WiFi.begin(ssid, password);

while (WiFi.status() != WL_CONNECTED) {
  delay(500);
  lcd.print(".");
}
lcd.clear();
lcd.setCursor(0,0);
lcd.print("WiFi connected");
lcd.setCursor(0,1);
lcd.print("IP address: ");
lcd.print(WiFi.localIP());
ThingSpeak.begin(client);
}

void loop() {
  lcd.clear();
  digitalWrite(TRIGGER_PIN, LOW);
  delayMicroseconds(2);

  digitalWrite(TRIGGER_PIN, HIGH);
  delayMicroseconds(10);
  digitalWrite(TRIGGER_PIN, LOW);

  duration = pulseIn(ECHO_PIN, HIGH);
  distance = (182.00 - (duration*0.0343/2));

  lcd.setCursor(0,0);
  lcd.print("Tinggi=");
  lcd.setCursor(7,0);
  lcd.print(distance);
  lcd.setCursor(13,0);
  lcd.print("cm");
  delay(100);
  ThingSpeak.writeField(myChannelNumber, 1, distance, myWriteAPIKey);
  delay(10);
  if(distance >= 130){
    lcd.setCursor(0,1);
    lcd.print("BAHAYA");
    digitalWrite(D7, HIGH);
    delay(100);
    lcd.clear();
  }
  if(distance < 130 && distance >= 100){
    lcd.setCursor(0,1);
    lcd.print("SIAGA");
  }
}

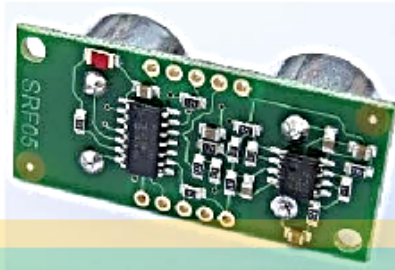
```

```
digitalWrite(D7, HIGH);  
delay(10);  
lcd.clear();  
}  
if(distance<100&&distance>=70){  
  lcd.setCursor(0,1);  
  lcd.print("WASPADA");  
  lcd.clear();  
  digitalWrite(D7, LOW);  
}  
if(distance<70){  
  lcd.setCursor(0,1);  
  lcd.print("NORMAL");  
  lcd.clear();  
  digitalWrite(D7, LOW);  
}
```



Lampiran Kedelapan Data Sheet Modul Sensor Ultrasonik HY SRF05

SRF05 - Ultra-Sonic Ranger Technical Specification

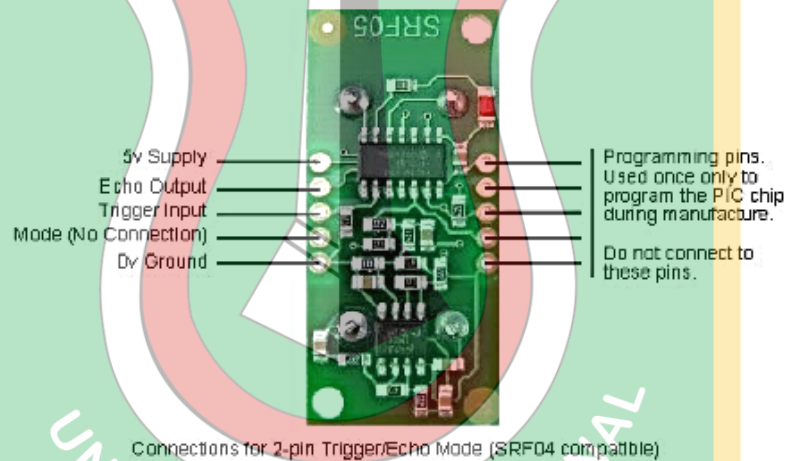


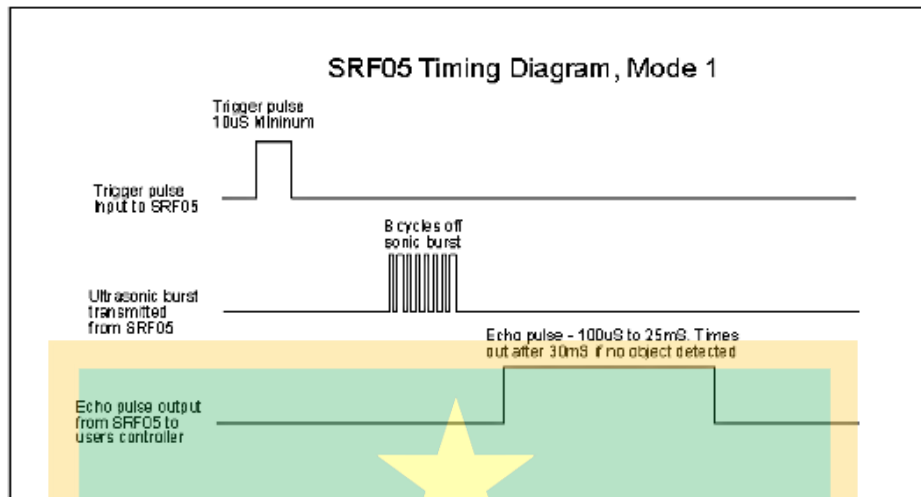
Introduction

The SRF05 is an evolutionary step from the SRF04, and has been designed to increase flexibility, increase range, and to reduce costs still further. As such, the SRF05 is fully compatible with the SRF04. Range is increased from 3 meters to 4 meters. A new operating mode (tying the mode pin to ground) allows the SRF05 to use a single pin for both trigger and echo, thereby saving valuable pins on your controller. When the mode pin is left unconnected, the SRF05 operates with separate trigger and echo pins, like the SRF04. The SRF05 includes a small delay before the echo pulse to give slower controllers such as the Basic Stamp and Picaxe time to execute their pulse in commands.

Mode 1 - SRF04 compatible - Separate Trigger and Echo

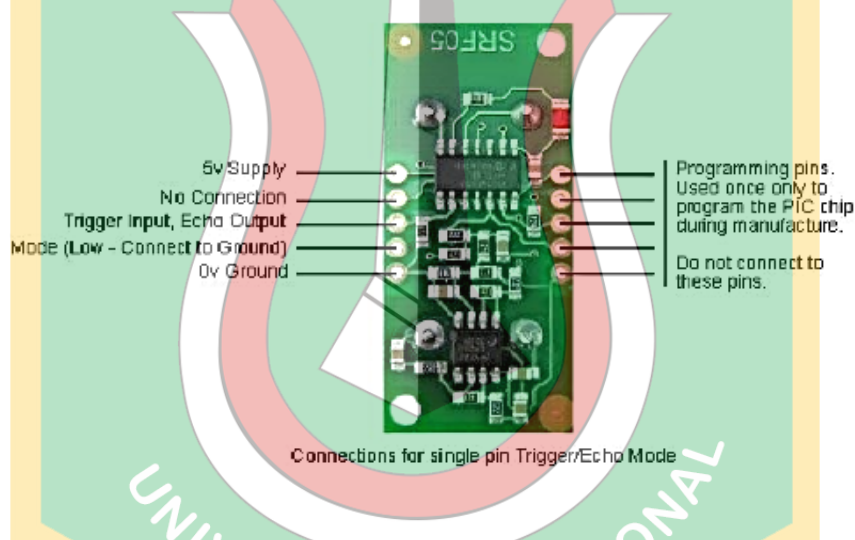
This mode uses separate trigger and echo pins, and is the simplest mode to use. All code examples for the SRF04 will work for the SRF05 in this mode. To use this mode, just leave the mode pin unconnected - the SRF05 has an internal pull up resistor on this pin.

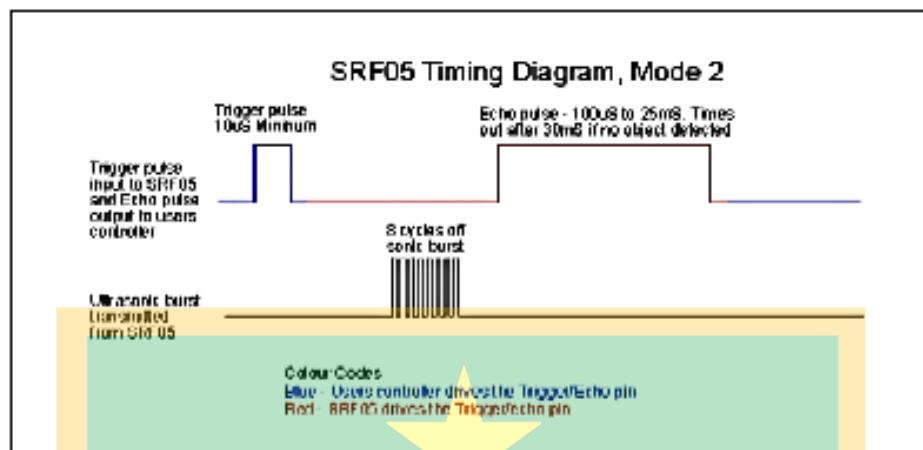




Mode 2 - Single pin for both Trigger and Echo

This mode uses a single pin for both Trigger and Echo signals, and is designed to save valuable pins on embedded controllers. To use this mode, connect the mode pin to the 0v Ground pin. The echo signal will appear on the same pin as the trigger signal. The SRF05 will not raise the echo line until 700µs after the end of the trigger signal. You have that long to turn the trigger pin around and make it an input and to have your pulse measuring code ready. The PULSIN command found on many popular controllers does this automatically.





To use mode 2 with the Basic Stamp BS2, you simply use PULSOUT and PULSIN on the same pin, like this:

```
SRF05 PIN 15      ' use any pin for both trigger and echo
Range VAR Word   ' define the 16 bit range variable

SRF05 = 0        ' start with pin low
PULSOUT SRF05, 5 ' issue 10µs trigger pulse (5 x 2µs)
PULSIN SRF05, 1, Range ' measure echo time
Range = Range/29 ' convert to cm (divide by 74 for inches)
```

Calculating the Distance

The SRF05 Timing diagrams are shown above for each mode. You only need to supply a short 10µs pulse to the trigger input to start the ranging. The SRF05 will send out an 8 cycle burst of ultrasound at 40kHz and raise its echo line high (or trigger line in mode 2). It then listens for an echo, and as soon as it detects one it lowers the echo line again. The echo line is therefore a pulse whose width is proportional to the distance to the object. By timing the pulse it is possible to calculate the range in inches/centimeters or anything else. If nothing is detected then the SRF05 will lower its echo line anyway after about 30ms.

The SRF04 provides an echo pulse proportional to distance. If the width of the pulse is measured in µs, then dividing by 58 will give you the distance in cm, or dividing by 148 will give the distance in inches. $\mu\text{s} / 58 = \text{cm}$ or $\mu\text{s} / 148 = \text{inches}$.

The SRF05 can be triggered as fast as every 30ms, or 20 times each second. You should wait 50ms before the next trigger, even if the SRF05 detects a close object and the echo pulse is shorter. This is to ensure the ultrasonic "beep" has faded away and will not cause a false echo on the next ranging.

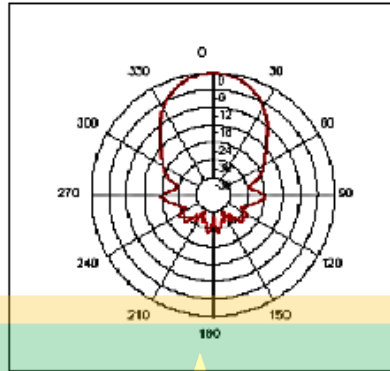
The other set of 5 pins

The 5 pins marked "programming pins" are used once only during manufacture to program the Flash memory on the PIC16F630 chip. The PIC16F630's programming pins are also used for other functions on the SRF05, so make sure you don't connect anything to these pins, or you will disrupt the modules operation.

Changing beam pattern and beam width

You can't! This is a question which crops up regularly, however there is no easy way to reduce or change the beam width that I'm aware of. The beam pattern of the SRF05 is conical with the width of the beam being a function of the surface area of the transducers and is fixed. The beam pattern of the transducers used on the SRF05, taken from the

manufacturers data sheet, is shown below.



There is more information in the [sonar faq](#)...



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