

LAMPIRAN

Lampiran 1. Proseses Pemasangan Komponen



Lampiran 2. Proses pengambilan data





Lampiran 3. Data pengambilan beban solder

Solder						
created_at	entry_id	Tegangan	Arus	Daya	KWh	Tarif
2019-04-24 12:33:34 WIB	1	0	0	0	0	0
2019-04-24 12:33:54 WIB	2	0	0	0	0	0
2019-04-24 12:34:15 WIB	3	217.26	0.13	28.1	0.59	0.76
2019-04-24 12:34:36 WIB	4	216.97	0.2	43.72	0.95	1.24
2019-04-24 12:34:56 WIB	5	216.97	0.11	23.71	1.15	1.49
2019-04-24 12:35:17 WIB	6	216.97	0.16	35.17	1.53	1.99
2019-04-24 12:35:37 WIB	7	216.97	0.18	38.24	1.85	2.4
2019-04-24 12:35:58 WIB	8	217.26	0.15	31.86	2.11	2.75
2019-04-24 12:36:18 WIB	9	216.97	0	0	2.47	3.21
2019-04-24 12:36:39 WIB	10	217.26	0.15	31.86	2.73	3.55
2019-04-24 12:36:59 WIB	11	216.97	0.22	47.43	3.13	4.07
2019-04-24 12:37:20 WIB	12	216.97	0	0	3.3	4.3
2019-04-24 12:37:40 WIB	13	216.97	0.07	15	3.43	4.46
2019-04-24 12:38:00 WIB	14	216.97	0.07	15	3.55	4.62
2019-04-24 12:38:21 WIB	15	216.97	0.22	47.43	4.34	5.65
2019-04-24 12:38:42 WIB	16	217.26	0.2	42.48	4.7	6.11
2019-04-24 12:39:02 WIB	17	216.97	0.08	18.37	4.85	6.31
2019-04-24 12:39:23 WIB	18	216.97	0.12	25.98	5.24	6.82
Rata-rata		217.0425	0.121176	26.13824		

Lampiran 4. Data pengambilan beban kipas angin

Kipas Angin						
created_at	entry_id	Tegangan	Arus	Daya	KWh	Tarif
2019-04-24 11:06:59 WIB	1	0	0	0	0	0
2019-04-24 11:07:30 WIB	2	0	0	0	0	0
2019-04-24 11:07:50 WIB	3	213.24	0.15	31.27	0.26	0.34
2019-04-24 11:08:10 WIB	4	213.53	0.05	10.44	0.35	0.45
2019-04-24 11:08:31 WIB	5	213.24	0.07	14.74	1.07	1.39
2019-04-24 11:08:51 WIB	6	213.24	0.18	39	1.39	1.81
2019-04-24 11:09:11 WIB	7	213.24	0.28	58.96	1.88	2.45
2019-04-24 11:09:32 WIB	8	213.24	0	0	1.97	2.56
2019-04-24 11:09:52 WIB	9	213.24	0.23	48.89	2.38	3.09
2019-04-24 11:10:12 WIB	10	213.24	0.2	41.69	2.72	3.54
2019-04-24 11:10:32 WIB	11	213.24	0.05	10.42	2.81	3.65
2019-04-24 11:10:53 WIB	12	213.24	0.42	89.66	3.91	5.08
2019-04-24 11:11:13 WIB	13	213.53	0.05	10.44	3.99	5.19
2019-04-24 11:11:34 WIB	14	213.24	0.25	54.16	4.44	5.78
2019-04-24 11:11:51 WIB	15	213.24	0.23	49.98	4.86	6.32
2019-04-24 11:12:11 WIB	16	213.24	0.08	18.05	5.44	7.08
2019-04-24 11:12:31 WIB	17	213.24	0.15	31.27	5.7	7.42
2019-04-24 11:12:52 WIB	18	214.67	0.05	10.49	5.79	7.53
2019-04-24 11:13:12 WIB	19	213.81	0.34	73.15	6.55	8.52
2019-04-24 11:13:32 WIB	20	213.24	0.23	48.89	6.96	9.05
2019-04-24 11:13:52 WIB	21	213.24	0.08	18.05	7.11	9.24
2019-04-24 11:14:13 WIB	22	212.38	0.15	31.14	7.91	10.28
2019-04-24 11:14:33 WIB	23	213.24	0.07	14.74	8.03	10.44
2019-04-24 11:14:54 WIB	24	213.53	0.07	14.76	8.15	10.6
2019-04-24 11:15:15 WIB	25	213.24	0.25	54.16	8.73	11.34
2019-04-24 11:15:36 WIB	26	212.38	0.47	100.1	9.56	12.43
2019-04-24 11:15:57 WIB	27	212.38	0.45	95.7	11.14	14.49
2019-04-24 11:16:17 WIB	28	213.24	0.47	101.05	11.99	15.58
2019-04-24 11:16:38 WIB	29	212.38	0.44	93.42	12.77	16.6
Rata-rata		213.2189	0.202222	43.13407		

Lampiran 5. Data pengambilan beban Lampu Pijar

Lamp Pijar						
created_at	entry_id	Tegangan	Arus	Daya	Kwh	Tarif
2019-05-13 15:37:35 WIB	1	217.65	0.05	10.64	0.61	0.79
2019-05-13 15:37:55 WIB	2	158.53	0.05	7.75	0.8	1.04
2019-05-13 15:38:17 WIB	3	219.12	0.41	90.87	1.65	2.14
2019-05-13 15:38:38 WIB	4	219.41	0.34	75.07	2.9	3.77
2019-05-13 15:38:58 WIB	5	219.12	0.11	23.95	3.35	4.35
2019-05-13 15:39:19 WIB	6	219.41	0.1	21.45	4.12	5.36
2019-05-13 15:39:39 WIB	7	219.41	0.05	10.72	4.34	5.64
2019-05-13 15:40:00 WIB	8	219.41	0.36	78.07	5.7	7.41
2019-05-13 15:40:21 WIB	9	219.41	0.16	35.57	6.76	8.78
2019-05-13 15:40:42 WIB	10	219.41	0.32	69.5	8.1	10.54
2019-05-13 15:41:02 WIB	11	219.71	0.21	46.81	8.83	11.48
2019-05-13 15:41:23 WIB	12	218.24	0.24	53.33	9.93	12.91
2019-05-13 15:41:44 WIB	13	220	0.35	76.79	11.06	14.38
2019-05-13 15:42:05 WIB	14	219.12	0.26	56.67	11.53	15
2019-05-13 15:42:25 WIB	15	219.12	0.34	74.97	12.92	16.79
2019-05-13 15:42:46 WIB	16	217.94	0.32	70.66	13.59	17.67
2019-05-13 15:43:07 WIB	17	219.41	0.39	85.79	14.95	19.44
2019-05-13 15:43:28 WIB	18	220.29	0.24	53.84	15.99	20.79
2019-05-13 15:43:48 WIB	19	219.41	0.2	42.9	16.75	21.77
2019-05-13 15:44:09 WIB	20	219.71	0.15	33.96	17.21	22.37
2019-05-13 15:44:30 WIB	21	219.12	0.29	64.26	17.87	23.23
2019-05-13 15:44:51 WIB	22	217.94	0.17	36.9	18.67	24.27
2019-05-13 15:45:11 WIB	23	219.41	0	0	19.22	24.98
2019-05-13 15:45:32 WIB	24	220	0.24	53.76	20.49	26.64
2019-05-13 15:45:52 WIB	25	219.41	0.15	32.17	21.35	27.76
2019-05-13 15:46:13 WIB	26	219.41	0.31	66.97	22.09	28.72
2019-05-13 15:46:34 WIB	27	219.41	0.32	69.5	23.21	30.17
2019-05-13 15:46:56 WIB	28	220.59	0.15	34.09	23.49	30.54
2019-05-13 15:47:17 WIB	29	219.41	0.24	53.62	24.29	31.58
2019-05-13 15:47:37 WIB	30	220.29	0.41	91.36	25.48	33.13
2019-05-13 15:47:58 WIB	31	219.12	0.34	74.97	26.11	33.94
2019-05-13 15:48:19 WIB	32	218.24	0.24	53.33	27.09	35.22
2019-05-13 15:48:40 WIB	33	219.71	0.05	10.74	27.18	35.33
2019-05-13 15:49:01 WIB	34	223.24	0.05	10.91	27.27	35.45
Rata-rata		217.6215	0.223824	49.17324		

Lampiran 6. Data pengambilan beban heater

		Heater				
created_at	entry_id	Tegangan	Arus	Daya	KWh	Tarif
2019-04-24 10:47:05 WIB	1	212.96	1.08	228.98	11.76	15.29
2019-04-24 10:47:26 WIB	2	212.67	1.05	223.66	13.62	17.71
2019-04-24 10:47:46 WIB	3	212.96	0.46	98.74	14.44	18.78
2019-04-24 10:48:07 WIB	4	212.67	1.42	301.44	20.02	26.02
2019-04-24 10:48:28 WIB	5	213.24	1.74	371.86	23.12	30.05
2019-04-24 10:48:49 WIB	6	212.67	1.39	296.19	25.58	33.26
2019-04-24 10:49:10 WIB	7	211.24	1.37	289.08	30.44	39.57
2019-04-24 10:49:30 WIB	8	212.67	1.24	264.39	32.64	42.44
2019-04-24 10:49:51 WIB	9	212.96	0.83	176.94	34.12	44.35
2019-04-24 10:50:13 WIB	10	212.67	1.71	363.95	38.77	50.41
2019-04-24 10:50:34 WIB	11	212.67	1.4	297.29	41.25	53.63
2019-04-24 10:50:55 WIB	12	212.67	0.46	98.61	42.07	54.69
2019-04-24 10:51:15 WIB	13	212.67	0.77	163.36	45.22	58.79
2019-04-24 10:51:36 WIB	14	212.67	1.74	369.69	48.3	62.79
2019-04-24 10:51:57 WIB	15	211.52	0.99	210.1	50.05	65.07
2019-04-24 10:52:18 WIB	16	212.67	1.07	226.78	52.37	68.09
2019-04-24 10:52:42 WIB	17	212.67	1.3	275.6	54.67	71.07
2019-04-24 10:52:58 WIB	18	212.67	1.31	278.72	56.99	74.09
2019-04-24 10:53:18 WIB	19	212.96	1.34	286.18	61.36	79.76
2019-04-24 10:53:38 WIB	20	212.96	0.91	193.05	62.97	81.85
2019-04-24 10:53:58 WIB	21	212.96	1.27	270.62	65.22	84.79
2019-04-24 10:54:18 WIB	22	212.96	1.15	244.54	70.37	91.48
2019-04-24 10:54:39 WIB	23	212.96	0.32	67.45	70.93	92.21
2019-04-24 10:54:59 WIB	24	212.96	1.34	286.18	73.32	95.31
2019-04-24 10:55:19 WIB	25	212.96	1.09	231.1	75.24	97.82
2019-04-24 10:55:39 WIB	26	213.53	1.22	261.53	80.57	104.75
2019-04-24 10:55:59 WIB	27	211.52	0.57	120.12	81.58	106.05
2019-04-24 10:56:19 WIB	28	212.96	0.28	60.69	82.08	106.71
2019-04-24 10:56:40 WIB	29	212.96	1.28	272.61	85.09	110.62
2019-04-24 10:57:00 WIB	30	212.96	1.08	228.98	87	113.1
2019-04-24 10:57:20 WIB	31	212.96	0.76	160.91	88.34	114.84
2019-04-24 10:57:40 WIB	32	212.96	1.13	239.84	90.34	117.44
2019-04-24 10:58:01 WIB	33	212.96	1.36	288.82	95.52	124.17
2019-04-24 10:58:21 WIB	34	212.96	0.29	62.45	96.04	124.85
2019-04-24 10:58:41 WIB	35	212.67	0.31	65.74	96.59	125.56
Rata-rata		212.7451	1.058	225.034		

Lampiran 7. Data pengambilan beban Dispenser

Dispenser						
created_at	entry_id	Tegangan	Arus	Daya	KWh	Tarif
2019-04-24 13:25:35 WIB	1	214.14	0.61	129.88	1.08	1.41
2019-04-24 13:25:55 WIB	2	214.14	1.44	308.3616	1.33	1.73
2019-04-24 13:26:15 WIB	3	214.43	1.5	321.645	2.93	3.81
2019-04-24 13:26:35 WIB	4	213.85	1.24	265.174	3.89	5.06
2019-04-24 13:26:56 WIB	5	214.14	1.5	321.21	3.98	5.18
2019-04-24 13:27:16 WIB	6	214.14	1.44	308.3616	6.47	8.41
2019-04-24 13:27:36 WIB	7	214.14	1.44	308.3616	6.47	8.41
2019-04-24 13:27:57 WIB	8	214.14	1.44	308.3616	8.56	11.12
2019-04-24 13:28:17 WIB	9	214.14	1.44	308.3616	8.68	11.29
2019-04-24 13:28:38 WIB	10	214.14	1.44	308.3616	8.68	11.29
2019-04-24 13:28:58 WIB	11	214.14	1.44	308.3616	9.21	11.97
2019-04-24 13:29:18 WIB	12	213.85	1.5	320.775	10.05	13.06
2019-04-24 13:29:38 WIB	13	213.85	1.44	307.944	10.52	13.68
2019-04-24 13:29:59 WIB	14	213.85	1.44	307.944	11.83	15.38
2019-04-24 13:30:19 WIB	15	214.14	1.44	308.3616	11.91	15.49
2019-04-24 13:30:39 WIB	16	214.14	1.44	308.3616	13.53	17.59
2019-04-24 13:31:00 WIB	17	214.14	1.44	308.3616	13.97	18.16
2019-04-24 13:31:20 WIB	18	214.14	1.44	308.3616	16.25	21.13
2019-04-24 13:31:41 WIB	19	213.28	1.44	307.1232	16.34	21.24
2019-04-24 13:32:01 WIB	20	213.85	1.44	307.944	17.45	22.69
2019-04-24 13:32:21 WIB	21	213.85	1.44	307.944	18.33	23.83
2019-04-24 13:32:42 WIB	22	213.85	1.44	307.944	18.42	23.94
Rata-rata		214.0218	1.401364	299.8866		

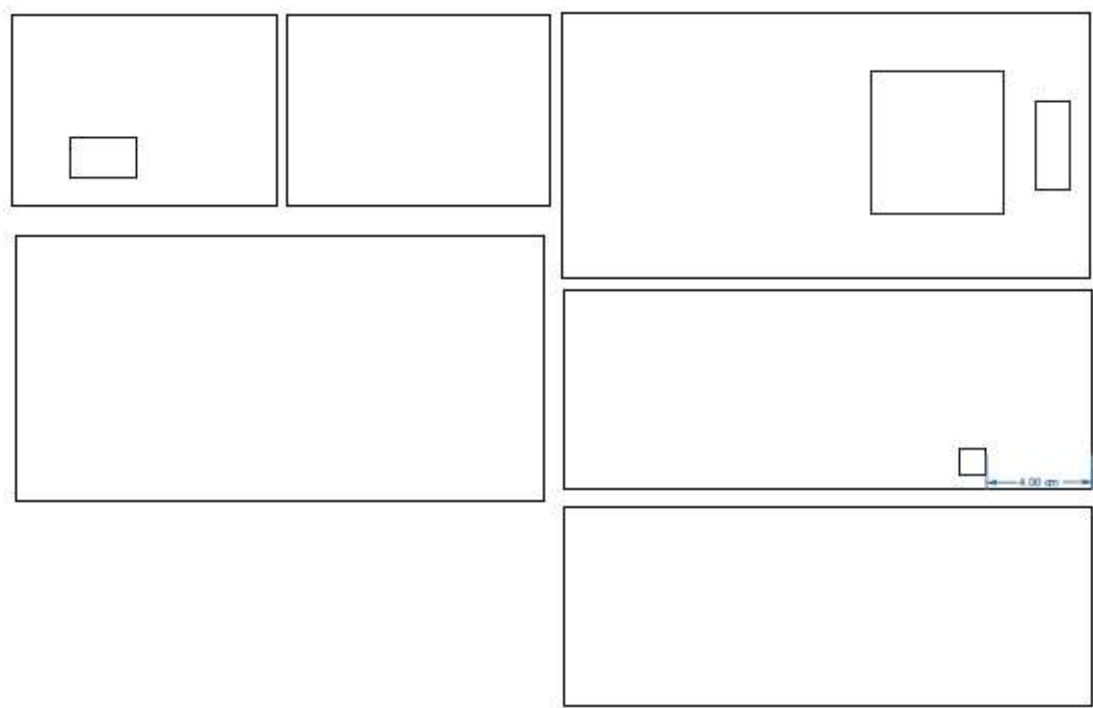
Lampiran 8. Data pengambilan beban setrika

Setrika						
created_at	entry_id	Tegangan	Arus	Daya	KWh	Tarif
2019-04-24 11:58:19 WIB	1	212.86	0.59	125.5874	2.33	3.03
2019-04-24 11:58:40 WIB	2	213.14	1.85	394.309	9.33	12.13
2019-04-24 11:59:00 WIB	3	213.14	2.13	453.9882	13.12	17.06
2019-04-24 11:59:20 WIB	4	212	1.27	269.24	19.05	19.97
2019-04-24 11:59:40 WIB	5	213.14	1.86	396.4404	24.445	27.1
2019-04-24 12:00:01 WIB	6	213.14	1.12	238.7168	29.84	32.652
2019-04-24 12:00:22 WIB	7	213.14	1.96	417.7544	35.235	38.25
2019-04-24 12:00:42 WIB	8	212	1.56	330.72	40.63	43.848
2019-04-24 12:01:03 WIB	9	213.14	0.93	198.2202	46.025	49.446
2019-04-24 12:01:23 WIB	10	213.14	1.12	238.7168	51.42	55.044
2019-04-24 12:01:43 WIB	11	213.14	1.12	238.7168	56.815	60.642
2019-04-24 12:02:04 WIB	12	213.14	0.93	198.2202	62.21	66.24
2019-04-24 12:02:24 WIB	13	213.14	0.93	198.2202	67.605	71.838
2019-04-24 12:02:44 WIB	14	213.14	1.85	394.309	73	77.436
2019-04-24 12:03:05 WIB	15	212.86	1.85	393.791	78.395	83.034
2019-04-24 12:03:25 WIB	16	213.14	0.93	198.2202	83.79	88.632
2019-04-24 12:03:45 WIB	17	212	0.93	197.16	89.185	94.23
2019-04-24 12:04:06 WIB	18	213.14	1.56	332.4984	94.58	99.828
2019-04-24 12:04:27 WIB	19	213.14	2.02	430.5428	99.975	105.426
2019-04-24 12:04:47 WIB	20	213.14	1.25	266.425	105.37	111.024
2019-04-24 12:05:07 WIB	21	213.14	2.01	428.4114	110.765	116.622
2019-04-24 12:05:28 WIB	22	213.14	1.71	364.4694	116.16	122.22
Rata-rata		212.9591	1.430909	304.7251		

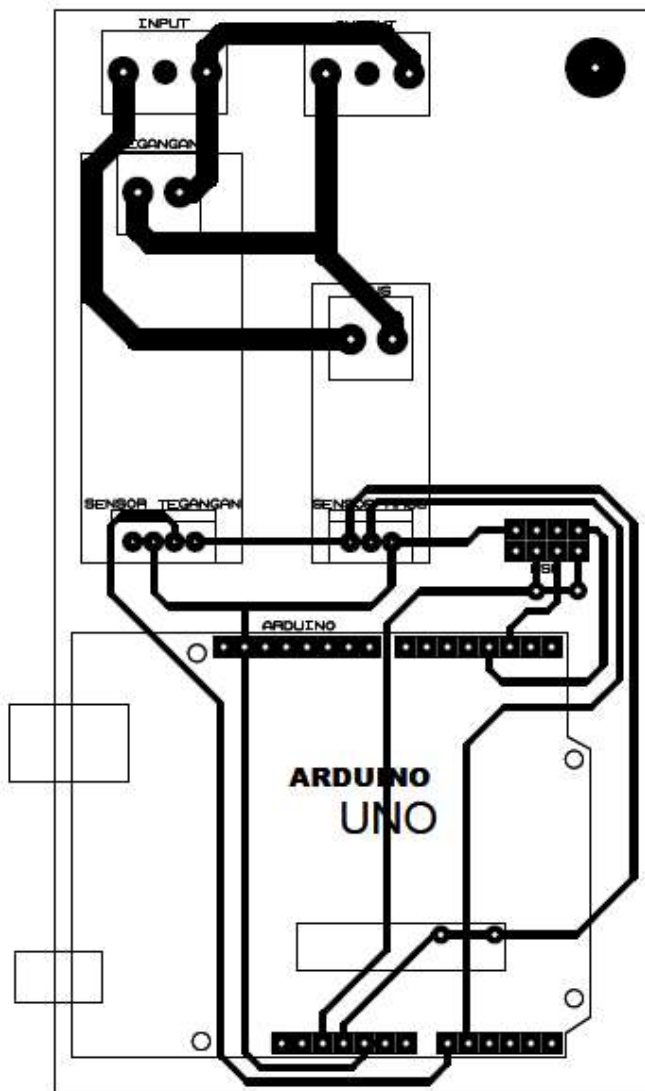
Lampiran 9. Data pengambilan beban Rice Cooker

			Rice Cooker			
created_at	entry_id	Tegangan	Arus	Daya	KWh	Tarif
2019-04-24 13:45:08 WIB	1	212.7	1.37	291.399	3.56	4.63
2019-04-24 13:45:29 WIB	2	214.14	1.97	421.8558	10.39	13.5
2019-04-24 13:45:49 WIB	3	214.14	0.86	184.1604	11.92	15.49
2019-04-24 13:46:09 WIB	4	213.28	2.18	464.9504	15.79	20.53
2019-04-24 13:46:29 WIB	5	214.14	2.1	449.694	16.99	25.96
2019-04-24 13:46:49 WIB	6	214.14	2.1	449.694	21.408	30.929
2019-04-24 13:47:09 WIB	7	214.14	1.37	293.3718	24.634	35.898
2019-04-24 13:47:30 WIB	8	214.14	2.15	460.401	27.86	40.867
2019-04-24 13:47:50 WIB	9	218.17	2.1	458.157	31.086	45.836
2019-04-24 13:48:10 WIB	10	214.14	2.09	447.5526	34.312	50.805
2019-04-24 13:48:30 WIB	11	214.14	2.17	464.6838	37.538	55.774
2019-04-24 13:48:50 WIB	12	214.14	0.79	169.1706	40.764	60.743
2019-04-24 13:49:11 WIB	13	214.14	0.78	167.0292	43.99	65.712
2019-04-24 13:49:31 WIB	14	214.14	1.55	331.917	47.216	70.681
2019-04-24 13:49:51 WIB	15	214.43	1.88	403.1284	50.442	75.65
2019-04-24 13:50:12 WIB	16	215.29	1.88	404.7452	53.668	80.619
2019-04-24 13:50:32 WIB	17	214.14	2.1	449.694	56.894	85.588
2019-04-24 13:50:52 WIB	18	214.14	1.88	402.5832	60.12	90.557
2019-04-24 13:51:13 WIB	19	214.14	2.18	466.8252	63.346	95.526
2019-04-24 13:51:33 WIB	20	214.14	2.1	449.694	66.572	100.495
2019-04-24 13:51:53 WIB	21	215	2.1	451.5	69.798	105.464
2019-04-24 13:52:14 WIB	22	214.14	2.16	462.5424	73.024	110.433
2019-04-24 13:52:34 WIB	23	212.99	1.66	353.5634	76.25	115.402
2019-04-24 13:52:55 WIB	24	213.85	2.1	449.085	79.476	120.371
2019-04-24 13:53:15 WIB	25	214.14	2.03	434.7042	82.702	125.34
2019-04-24 13:53:35 WIB	26	214.14	1.13	241.9782	85.928	130.309
2019-04-24 13:53:56 WIB	27	214.14	2.14	458.2596	89.154	135.278
2019-04-24 13:54:17 WIB	28	214.14	2.13	456.1182	92.38	140.247
2019-04-24 13:54:36 WIB	29	214.14	2.1	449.694	95.606	145.216
2019-04-24 13:54:57 WIB	30	214.14	1.88	402.5832	98.832	150.185
2019-04-24 13:55:17 WIB	31	214.14	1.88	402.5832	102.058	155.154
2019-04-24 13:55:37 WIB	32	214.14	1.88	402.5832	105.284	160.123
Rata-rata		214.221	1.83719	393.622		

Lampiran 10. Desain Akrilik



Lampiran 11. Desain PCB



Lampiran 12. Program Arduino Uno R3

```
#include <EEPROM.h>
#include <TimerOne.h>
#include <SoftwareSerial.h>
SoftwareSerial esp8266(2,3);
String AP = "AndroidAPI";    // CHANGE ME
String PASS = "20111998"; // CHANGE ME
String API = "RB2ZG7VBZNCYQUID"; // CHANGE ME
String HOST = "api.ThingSpeak.com";
String PORT = "80";
String field1 = "field1";
String field2 = "field2";
String field3 = "field3";
String field4 = "field4";
String field5 = "field5";
int countTrueCommand;
int countTimeCommand;
boolean found = false;
double sensorValue1=0;
double sensorValue=0;
int crosscount=0;
int climbhill=0;
double VmaxD=0;
double VeffD;
float Veff;
float WattH,P,I, Harga,a,b,n,mx=0,mn=500,vpp;//
int ss;
float fl;
int f1,f2,f3;
#include "ACS712.h"
ACS712 sensor(ACS712_20A, A1);

void setup() {

    Serial.begin(9600);
    f1=EEPROM.read(0);
    f2=EEPROM.read(1);
    f3=EEPROM.read(2);
```

```

WattH=float(f1*100)+float(f2)+float(f3)/100;

sensor.calibrate();
esp8266.begin(9600);
sendCommand("AT",5,"OK");
sendCommand("AT+CWMODE=1",5,"OK");
sendCommand("AT+CWJAP=\"" + AP +"\", \"" + PASS +"\"",20,"OK");
Timer1.initialize(1000000);
Timer1.attachInterrupt( timerIsr ); // attach the service routine here
}
void loop() {

// Upload Data
fl=1;
String getData2 =
    "GET /update?api_key="+ API +"&"+ field1 +"="+String(Veff)
    +""+"GET /update?api_key="+ API +"&"+ field2 +"="+String(I)
    +""+"GET /update?api_key="+ API +"&"+ field3 +"="+String(P)
    +""+"GET /update?api_key="+ API +"&"+ field4 +"="+String(WattH)
    +""+"GET /update?api_key="+ API +"&"+ field5 +"="+String(Harga);
sendCommand("AT+CIPMUX=1",5,"OK");
sendCommand("AT+CIPSTART=0,\"TCP\", \"" + HOST +"\", "+ PORT,15,"OK");
sendCommand("AT+CIPSEND=0," +String(getData2.length()+4),4,">");
esp8266.println(getData2);countTrueCommand++;
sendCommand("AT+CIPCLOSE=0",5,"OK");
delay(1000);
fl=0;
delay(5000);
}

void sendCommand(String command, int maxTime, char readReplay[]) {
    Serial.print(countTrueCommand);
    Serial.print(". UPLOAD DATA => ");
    Serial.print(command);
    Serial.print(" ");
    while(countTimeCommand < (maxTime*1))
    {
        esp8266.println(command);//at+cipsend
        if(esp8266.find(readReplay))//ok
        {
            found = true;

```

```

        break;
    }
    countTimeCommand++;
}

if(found == true)
{
    Serial.println("DONE");
    countTrueCommand++;
    countTimeCommand = 0;
}

if(found == false)
{
    Serial.println("FAIL");
    countTrueCommand = 0;
    countTimeCommand = 0;
}

found = false;
}

void timerIsr()
{
    ss++;//
    if(ss>29 && fl==0)/ {
        for(n=0;n<1000;n++)
        {
            a = analogRead(A0);
            if(a>mx){mx=a;} // max
            if(a<mn){mn=a;}// min
        }

        vpp =mx-mn;
        mn=1000; mx=0;
        Veff=vpp/3.4790;// kalibrasi (sensor/ multi)
        if(Veff<120){Veff=0;}
        I = sensor.getCurrentAC();
        P = I * Veff;
        WattH = WattH + (P/120);//3600/30
        Harga = WattH * 1.3;
        fl=WattH/100;
        f2=int(WattH)%100;

```

```

f3=int(Harga*100)%100;
EEPROM.write(0,f1);
EEPROM.write(1,f2);
EEPROM.write(2,f3);

Serial.println(String("V = ") + Veff + " Volt");
Serial.println(String("I = ") + I + " Ampere");
Serial.println(String("P = ") + P + " Watt");
Serial.println(String("Total KWh = ") + WattH + " wh");
Serial.println(String("Tarif = ") + Harga + " Rupiah");
ss=0;
}
}

```