

LAMPIRAN

Tabel data penelitian lengkap:

Time (s)	Top (lux)	Left (lux)	Middle (lux)	Bottom (lux)	Right (lux)	Current (A)	Voltage (V)	Power (W)	panel power (W)	power efficiency (%)	solar efficiency (%)
8:15:00 AM	581	581	628	679	549	0.46	2.5851	1.189146	8.28	14.3616667	0.58681786
8:30:00 AM	580	580	628	679	549	0.51	2.59435	1.3231185	9.18	14.41305556	0.65060241
8:45:00 AM	577	577	628	679	548	0.56	2.6036	1.458016	10.08	14.46444444	0.71438696
9:00:00 AM	575	575	628	679	548	0.46	2.5851	1.189146	8.28	14.3616667	0.58681786
9:15:00 AM	572	572	628	679	548	0.42	2.5777	1.082634	7.56	14.32055556	0.53579022
9:30:00 AM	572	570	628	679	549	0.42	2.5777	1.082634	7.56	14.32055556	0.53579022
9:45:00 AM	569	569	629	679	550	0.61	2.61285	1.5938385	10.98	14.51583333	0.77817151
10:00:00 AM	567	567	629	679	549	0.56	2.6036	1.458016	10.08	14.46444444	0.71438696
10:15:00 AM	565	565	628	680	548	0.61	2.61285	1.5938385	10.98	14.51583333	0.77817151
10:30:00 AM	565	564	628	679	549	0.56	2.6036	1.458016	10.08	14.46444444	0.71438696
10:45:00 AM	563	563	628	679	548	0.66	2.6221	1.730586	11.88	14.56722222	0.84195606
11:00:00 AM	562	562	628	679	546	0.56	2.6036	1.458016	10.08	14.46444444	0.71438696
11:15:00 AM	562	562	628	679	546	0.42	2.5777	1.082634	7.56	14.32055556	0.53579022
11:30:00 AM	563	563	628	679	547	0.61	2.61285	1.5938385	10.98	14.51583333	0.77817151
11:45:00 AM	563	563	628	679	547	0.37	2.56845	0.9503265	6.66	14.26916667	0.47200567
12:00:00 PM	570	571	643	693	559	0.51	2.59435	1.3231185	9.18	14.41305556	0.65060241
12:15:00 PM	563	563	629	679	548	0.61	2.61285	1.5938385	10.98	14.51583333	0.77817151
12:30:00 PM	612	612	640	681	597	0.76	2.6406	2.006856	13.68	14.67	0.969525159
12:45:00 PM	612	612	639	680	597	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
1:00:00 PM	622	622	650	692	608	0.66	2.6221	1.730586	11.88	14.56722222	0.84195606
1:15:00 PM	612	612	639	680	598	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
1:30:00 PM	612	612	640	681	598	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
1:45:00 PM	612	612	639	680	598	0.56	2.6036	1.458016	10.08	14.46444444	0.71438696
2:00:00 PM	612	612	639	680	598	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:15:00 PM	612	612	640	680	598	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
2:30:00 PM	612	612	639	680	598	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
2:45:00 PM	612	613	640	681	599	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
3:00:00 PM	613	612	639	680	599	0.61	2.61285	1.5938385	10.98	14.51583333	0.77817151
3:15:00 PM	612	612	639	680	598	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:30:00 PM	612	612	639	680	599	0.66	2.6221	1.730586	11.88	14.56722222	0.84195606
3:45:00 PM	614	612	640	680	599	0.61	2.61285	1.5938385	10.98	14.51583333	0.77817151
4:00:00 PM	612	612	640	681	599	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
4:15:00 PM	615	612	639	680	599	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
4:30:00 PM	612	612	639	681	599	0.61	2.61285	1.5938385	10.98	14.51583333	0.77817151
4:45:00 PM	612	612	640	680	599	0.66	2.6221	1.730586	11.88	14.56722222	0.84195606

5:00:00 PM	626	626	654	696	613	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
5:15:00 PM	613	612	640	681	599	0.61	2.6128 5	1.593838 5	10.98	14.515833 33	0.7781715 1
5:30:00 PM	624	624	652	693	609	0.61	2.6128 5	1.593838 5	10.98	14.515833 33	0.7781715 1
5:45:00 PM	612	612	640	680	598	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
6:00:00 PM	613	613	640	681	598	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
6:15:00 PM	613	612	640	680	598	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
6:30:00 PM	612	612	640	680	598	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
6:45:00 PM	612	612	640	680	598	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
7:00:00 PM	613	613	640	680	599	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
7:15:00 PM	613	614	640	681	599	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
7:30:00 PM	613	612	640	680	600	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
7:45:00 PM	612	612	640	680	599	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
8:00:00 PM	612	612	640	680	599	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
8:15:00 PM	612	612	640	680	599	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
8:30:00 PM	612	612	640	680	599	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
8:45:00 PM	613	613	640	680	599	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
9:00:00 PM	613	613	640	680	600	0.56	2.6036	1.458016	10.08	14.464444 44	0.7143869 6
9:15:00 PM	613	613	640	681	600	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
9:30:00 PM	623	624	651	692	610	0.56	2.6036	1.458016	10.08	14.464444 44	0.7143869 6
9:45:00 PM	613	613	640	680	600	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
10:00:00 PM	613	614	640	680	601	0.51	2.5943 5	1.323118 5	9.18	14.413055 56	0.6506024 1
10:15:00 PM	613	613	640	680	600	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
10:30:00 PM	613	613	640	680	600	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
10:45:00 PM	613	613	640	680	600	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
11:00:00 PM	613	613	640	680	601	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
11:15:00 PM	613	613	640	681	601	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
11:30:00 PM	613	613	640	680	601	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
11:45:00 PM	612	613	640	680	601	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
12:00:00 AM	613	613	640	680	601	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
12:15:00 AM	613	613	640	681	601	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
12:30:00 AM	614	614	640	681	604	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
12:45:00 AM	614	614	640	680	604	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
1:00:00 AM	613	614	641	681	604	0.56	2.6036	1.458016	10.08	14.464444 44	0.7143869 6
1:15:00 AM	613	613	640	680	604	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
1:30:00 AM	613	614	640	681	604	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
1:45:00 AM	613	612	640	680	604	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
2:00:00 AM	621	621	653	694	616	0.56	2.6036	1.458016	10.08	14.464444 44	0.7143869 6
2:15:00 AM	621	621	655	696	618	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09

2:30:00 AM	617	617	653	694	617	0.61	2.6128 5	1.593838 5	10.98	14.515833 33	0.7781715 1
2:45:00 AM	614	614	652	692	616	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
3:00:00 AM	602	602	640	680	605	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
3:15:00 AM	600	600	640	681	605	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
3:30:00 AM	597	597	640	680	605	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
3:45:00 AM	595	595	640	680	606	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
4:00:00 AM	593	593	640	681	606	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
4:15:00 AM	590	589	639	680	607	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
4:30:00 AM	588	587	638	679	606	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
4:45:00 AM	585	584	638	678	605	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
5:00:00 AM	582	582	637	677	605	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
5:15:00 AM	580	580	637	677	604	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
5:30:00 AM	577	577	636	677	604	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
5:45:00 AM	575	575	636	677	603	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
6:00:00 AM	572	572	636	677	602	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
6:15:00 AM	570	570	635	676	601	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
6:30:00 AM	567	567	635	676	601	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
6:45:00 AM	565	565	634	675	600	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
7:00:00 AM	562	562	634	675	600	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
7:15:00 AM	560	560	634	675	599	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
7:30:00 AM	557	557	633	674	598	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
7:45:00 AM	555	555	633	674	598	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
8:00:00 AM	552	552	632	674	597	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
8:15:00 AM	550	550	632	673	597	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
8:30:00 AM	547	547	632	673	596	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
8:45:00 AM	545	545	631	672	595	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
9:00:00 AM	542	542	631	672	595	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
9:15:00 AM	540	540	630	672	594	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
9:30:00 AM	537	537	630	671	593	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
9:45:00 AM	535	535	630	671	593	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
10:00:00 AM	532	532	629	670	592	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
10:15:00 AM	530	530	629	670	592	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
10:30:00 AM	527	527	629	670	591	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
10:45:00 AM	525	525	628	669	590	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
11:00:00 AM	522	522	628	669	590	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
11:15:00 AM	520	520	628	669	589	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
11:30:00 AM	517	517	627	668	588	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
11:45:00 AM	515	515	627	668	588	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59

12:00:00 PM	512	512	627	668	587	0.76	2.6406	2.006856	13.68	14.67	0.969525159
12:15:00 PM	510	510	626	667	586	0.76	2.6406	2.006856	13.68	14.67	0.969525159
12:30:00 PM	507	507	626	667	586	0.76	2.6406	2.006856	13.68	14.67	0.969525159
12:45:00 PM	505	505	625	666	585	0.76	2.6406	2.006856	13.68	14.67	0.969525159
1:00:00 PM	502	502	625	666	585	0.76	2.6406	2.006856	13.68	14.67	0.969525159
1:15:00 PM	500	500	625	666	584	0.76	2.6406	2.006856	13.68	14.67	0.969525159
1:30:00 PM	497	497	624	665	583	0.76	2.6406	2.006856	13.68	14.67	0.969525159
1:45:00 PM	495	495	624	665	583	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:00:00 PM	492	492	623	665	582	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:15:00 PM	490	490	623	664	581	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:30:00 PM	487	487	623	664	581	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:45:00 PM	485	485	622	664	580	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:00:00 PM	482	482	622	663	579	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:15:00 PM	480	480	622	663	579	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:30:00 PM	477	477	621	663	578	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:45:00 PM	475	475	621	662	577	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:00:00 PM	472	472	621	662	577	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:15:00 PM	470	470	620	661	576	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:30:00 PM	467	467	620	661	575	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:45:00 PM	465	465	620	661	575	0.76	2.6406	2.006856	13.68	14.67	0.969525159
5:00:00 PM	462	462	619	660	574	0.76	2.6406	2.006856	13.68	14.67	0.969525159
5:15:00 PM	460	460	619	660	574	0.76	2.6406	2.006856	13.68	14.67	0.969525159
5:30:00 PM	457	457	619	660	573	0.76	2.6406	2.006856	13.68	14.67	0.969525159
5:45:00 PM	455	455	618	659	572	0.76	2.6406	2.006856	13.68	14.67	0.969525159
6:00:00 PM	452	452	618	659	572	0.76	2.6406	2.006856	13.68	14.67	0.969525159
6:15:00 PM	450	450	618	659	571	0.76	2.6406	2.006856	13.68	14.67	0.969525159
6:30:00 PM	447	447	617	658	570	0.76	2.6406	2.006856	13.68	14.67	0.969525159
6:45:00 PM	445	445	617	658	570	0.76	2.6406	2.006856	13.68	14.67	0.969525159
7:00:00 PM	442	442	617	658	569	0.76	2.6406	2.006856	13.68	14.67	0.969525159
7:15:00 PM	440	440	616	657	568	0.76	2.6406	2.006856	13.68	14.67	0.969525159
7:30:00 PM	437	437	616	657	568	0.76	2.6406	2.006856	13.68	14.67	0.969525159
7:45:00 PM	435	435	616	657	567	0.76	2.6406	2.006856	13.68	14.67	0.969525159
8:00:00 PM	432	432	615	656	566	0.76	2.6406	2.006856	13.68	14.67	0.969525159
8:15:00 PM	430	430	615	656	566	0.76	2.6406	2.006856	13.68	14.67	0.969525159
8:30:00 PM	427	427	615	656	565	0.76	2.6406	2.006856	13.68	14.67	0.969525159
8:45:00 PM	425	425	614	655	564	0.76	2.6406	2.006856	13.68	14.67	0.969525159
9:00:00 PM	422	422	614	655	564	0.76	2.6406	2.006856	13.68	14.67	0.969525159
9:15:00 PM	420	420	614	655	563	0.76	2.6406	2.006856	13.68	14.67	0.969525159

9:30:00 PM	417	417	613	654	562	0.76	2.6406	2.006856	13.68	14.67	0.969525159
9:45:00 PM	415	415	613	654	562	0.76	2.6406	2.006856	13.68	14.67	0.969525159
10:00:00 PM	412	412	613	654	561	0.76	2.6406	2.006856	13.68	14.67	0.969525159
10:15:00 PM	410	410	612	653	560	0.76	2.6406	2.006856	13.68	14.67	0.969525159
10:30:00 PM	407	407	612	653	560	0.76	2.6406	2.006856	13.68	14.67	0.969525159
10:45:00 PM	405	405	612	653	559	0.76	2.6406	2.006856	13.68	14.67	0.969525159
11:00:00 PM	402	402	611	652	558	0.76	2.6406	2.006856	13.68	14.67	0.969525159
11:15:00 PM	400	400	611	652	558	0.76	2.6406	2.006856	13.68	14.67	0.969525159
11:30:00 PM	397	397	611	652	557	0.76	2.6406	2.006856	13.68	14.67	0.969525159
11:45:00 PM	395	395	610	651	556	0.76	2.6406	2.006856	13.68	14.67	0.969525159
12:00:00 AM	392	392	610	651	556	0.76	2.6406	2.006856	13.68	14.67	0.969525159
12:15:00 AM	390	390	610	651	555	0.76	2.6406	2.006856	13.68	14.67	0.969525159
12:30:00 AM	387	387	609	650	554	0.76	2.6406	2.006856	13.68	14.67	0.969525159
12:45:00 AM	385	385	609	650	554	0.76	2.6406	2.006856	13.68	14.67	0.969525159
1:00:00 AM	382	382	609	650	553	0.76	2.6406	2.006856	13.68	14.67	0.969525159
1:15:00 AM	380	380	608	649	552	0.76	2.6406	2.006856	13.68	14.67	0.969525159
1:30:00 AM	377	377	608	649	552	0.76	2.6406	2.006856	13.68	14.67	0.969525159
1:45:00 AM	375	375	608	649	551	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:00:00 AM	372	372	607	648	550	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:15:00 AM	370	370	607	648	550	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:30:00 AM	367	367	607	648	549	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:45:00 AM	365	365	606	647	548	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:00:00 AM	362	362	606	647	548	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:15:00 AM	360	360	606	647	547	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:30:00 AM	357	357	605	646	546	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:45:00 AM	355	355	605	646	546	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:00:00 AM	352	352	605	646	545	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:15:00 AM	350	350	604	645	544	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:30:00 AM	347	347	604	645	544	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:45:00 AM	345	345	604	645	543	0.76	2.6406	2.006856	13.68	14.67	0.969525159
5:00:00 AM	342	342	603	644	542	0.76	2.6406	2.006856	13.68	14.67	0.969525159
5:15:00 AM	340	340	603	644	542	0.76	2.6406	2.006856	13.68	14.67	0.969525159
5:30:00 AM	337	337	603	644	541	0.76	2.6406	2.006856	13.68	14.67	0.969525159
5:45:00 AM	335	335	602	643	540	0.76	2.6406	2.006856	13.68	14.67	0.969525159
6:00:00 AM	332	332	602	643	540	0.76	2.6406	2.006856	13.68	14.67	0.969525159
6:15:00 AM	330	330	602	643	539	0.76	2.6406	2.006856	13.68	14.67	0.969525159
6:30:00 AM	327	327	601	642	538	0.76	2.6406	2.006856	13.68	14.67	0.969525159
6:45:00 AM	325	325	601	642	538	0.76	2.6406	2.006856	13.68	14.67	0.969525159

7:00:00 AM	322	322	601	642	537	0.76	2.6406	2.006856	13.68	14.67	0.969525159
7:15:00 AM	320	320	600	641	536	0.76	2.6406	2.006856	13.68	14.67	0.969525159
7:30:00 AM	317	317	600	641	536	0.76	2.6406	2.006856	13.68	14.67	0.969525159
7:45:00 AM	592	592	641	681	608	0.76	2.6406	2.006856	13.68	14.67	0.969525159
8:00:00 AM	597	597	641	681	608	0.76	2.6406	2.006856	13.68	14.67	0.969525159
8:15:00 AM	600	600	641	681	608	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
8:30:00 AM	603	603	641	681	608	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
8:45:00 AM	606	605	641	681	608	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
9:00:00 AM	607	607	641	681	608	0.76	2.6406	2.006856	13.68	14.67	0.969525159
9:15:00 AM	609	609	640	681	608	0.66	2.6221	1.730586	11.88	14.56722222	0.84195606
9:30:00 AM	622	622	653	693	619	0.56	2.6036	1.458016	10.08	14.46444444	0.71438696
9:45:00 AM	612	612	641	681	608	0.66	2.6221	1.730586	11.88	14.56722222	0.84195606
10:00:00 AM	613	613	641	681	608	0.76	2.6406	2.006856	13.68	14.67	0.969525159
10:15:00 AM	613	615	641	681	608	0.76	2.6406	2.006856	13.68	14.67	0.969525159
10:30:00 AM	614	614	641	681	608	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
10:45:00 AM	614	614	641	681	609	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
11:00:00 AM	615	615	641	681	609	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
11:15:00 AM	615	615	641	681	609	0.61	2.61285	1.5938385	10.98	14.51583333	0.77817151
11:30:00 AM	615	614	640	681	608	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
11:45:00 AM	615	615	641	680	609	0.76	2.6406	2.006856	13.68	14.67	0.969525159
12:00:00 PM	627	627	653	694	620	0.66	2.6221	1.730586	11.88	14.56722222	0.84195606
12:15:00 PM	615	615	641	681	609	0.76	2.6406	2.006856	13.68	14.67	0.969525159
12:30:00 PM	615	615	641	681	609	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
12:45:00 PM	615	615	641	681	609	0.76	2.6406	2.006856	13.68	14.67	0.969525159
1:00:00 PM	615	615	641	681	609	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
1:15:00 PM	615	615	641	681	609	0.76	2.6406	2.006856	13.68	14.67	0.969525159
1:30:00 PM	615	615	641	681	609	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
1:45:00 PM	615	615	641	681	610	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
2:00:00 PM	615	615	681	681	609	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
2:15:00 PM	615	615	641	681	609	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:30:00 PM	615	615	641	681	608	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
2:45:00 PM	615	615	641	681	607	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
3:00:00 PM	615	615	641	681	605	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:15:00 PM	625	625	651	692	614	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:30:00 PM	615	615	640	681	601	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
3:45:00 PM	615	615	639	681	598	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:00:00 PM	627	629	652	686	593	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
4:15:00 PM	615	615	637	681	589	1.05	2.69425	2.8289625	18.9	14.96805556	1.339475549

4:30:00 PM	615	615	635	680	584	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
4:45:00 PM	615	615	633	681	579	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
5:00:00 PM	627	627	642	694	585	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
5:15:00 PM	615	615	627	681	568	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
5:30:00 PM	615	615	623	681	564	1.05	2.6942 5	2.828962 5	18.9	14.968055 56	1.3394755 49
5:45:00 PM	615	615	619	681	560	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
6:00:00 PM	615	615	615	681	557	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
6:15:00 PM	615	615	611	681	556	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
6:30:00 PM	615	615	607	681	556	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
6:45:00 PM	615	615	603	681	556	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
7:00:00 PM	615	615	601	681	556	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
7:15:00 PM	615	615	599	681	556	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
7:30:00 PM	615	615	599	681	557	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
7:45:00 PM	615	615	598	681	557	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
8:00:00 PM	615	615	598	681	557	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
8:15:00 PM	615	615	598	681	557	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
8:30:00 PM	615	615	598	681	558	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
8:45:00 PM	615	615	598	681	558	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
9:00:00 PM	615	615	598	681	558	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
9:15:00 PM	615	615	598	681	559	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
9:30:00 PM	615	615	598	681	559	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
9:45:00 PM	615	615	599	681	561	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
10:00:00 PM	615	615	598	681	561	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
10:15:00 PM	615	615	598	681	562	1	2.685	2.685	18	14.916666 67	1.2756909 99
10:30:00 PM	615	615	599	681	565	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
10:45:00 PM	625	625	610	692	577	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
11:00:00 PM	615	615	607	681	580	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
11:15:00 PM	615	615	610	681	585	0.56	2.6036	1.458016	10.08	14.464444 44	0.7143869 6
11:30:00 PM	615	615	614	681	590	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
11:45:00 PM	614	614	618	681	594	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
12:00:00 AM	626	626	634	694	609	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
12:15:00 AM	614	615	626	681	603	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
12:30:00 AM	614	615	635	681	611	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
12:45:00 AM	615	615	637	681	612	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
1:00:00 AM	615	615	638	681	613	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
1:15:00 AM	615	615	641	687	621	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
1:30:00 AM	615	615	640	681	613	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
1:45:00 AM	615	615	641	681	613	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59

2:00:00 AM	615	615	641	681	613	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
2:15:00 AM	615	615	641	681	613	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
2:30:00 AM	614	614	641	681	613	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
2:45:00 AM	614	614	641	681	613	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
3:00:00 AM	615	614	641	681	613	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
3:15:00 AM	614	615	641	681	614	0.32	2.5592	0.818944	5.76	14.217777 78	0.4082211 2
3:30:00 AM	615	615	641	681	610	0.27	2.5499 5	0.688486 5	4.86	14.166388 89	0.3444365 7
3:45:00 AM	627	627	654	694	622	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
4:00:00 AM	615	615	641	681	610	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
4:15:00 AM	615	615	641	681	610	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
4:30:00 AM	615	615	641	681	610	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
4:45:00 AM	615	615	641	681	610	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
5:00:00 AM	615	615	641	681	610	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
5:15:00 AM	615	615	641	681	611	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
5:30:00 AM	629	621	644	682	610	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
5:45:00 AM	615	615	641	681	610	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
6:00:00 AM	615	615	642	681	610	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
6:15:00 AM	615	615	641	681	610	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
6:30:00 AM	615	615	642	681	610	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
6:45:00 AM	615	615	641	681	610	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
7:00:00 AM	615	615	641	681	610	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
7:15:00 AM	615	615	641	681	610	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
7:30:00 AM	625	625	652	693	620	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
7:45:00 AM	614	614	641	681	609	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
8:00:00 AM	614	614	641	681	610	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
8:15:00 AM	615	615	641	681	610	1	2.685	2.685	18	14.916666 67	1.2756909 99
8:30:00 AM	615	615	641	681	610	1	2.685	2.685	18	14.916666 67	1.2756909 99
8:45:00 AM	615	615	641	681	610	1	2.685	2.685	18	14.916666 67	1.2756909 99
9:00:00 AM	615	615	641	681	610	1.05	2.6942 5	2.828962 5	18.9	14.968055 56	1.3394755 49
9:15:00 AM	615	614	641	681	610	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
9:30:00 AM	614	615	641	681	610	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
9:45:00 AM	615	615	641	681	610	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
10:00:00 AM	615	615	641	681	611	1	2.685	2.685	18	14.916666 67	1.2756909 99
10:15:00 AM	615	615	641	681	611	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
10:30:00 AM	615	615	641	681	611	1.05	2.6942 5	2.828962 5	18.9	14.968055 56	1.3394755 49
10:45:00 AM	615	615	641	681	610	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
11:00:00 AM	615	615	641	681	611	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
11:15:00 AM	615	615	641	681	610	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49

11:30:00 AM	615	615	641	681	610	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
11:45:00 AM	615	615	641	681	611	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
12:00:00 PM	615	615	641	681	611	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
12:15:00 PM	615	615	641	681	611	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
12:30:00 PM	615	615	641	681	611	0.76	2.6406	2.006856	13.68	14.67	0.969525159
12:45:00 PM	616	616	641	681	612	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
1:00:00 PM	616	616	642	682	612	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
1:15:00 PM	616	616	641	681	613	0.76	2.6406	2.006856	13.68	14.67	0.969525159
1:30:00 PM	615	615	641	681	612	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
1:45:00 PM	615	615	641	681	611	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
2:00:00 PM	616	616	641	681	612	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
2:15:00 PM	627	627	653	693	623	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
2:30:00 PM	616	616	642	681	613	1.05	2.69425	2.8289625	18.9	14.96805556	1.339475549
2:45:00 PM	616	616	642	681	613	1	2.685	2.685	18	14.91666667	1.275690999
3:00:00 PM	616	616	642	682	613	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
3:15:00 PM	616	616	642	681	613	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
3:30:00 PM	616	616	642	681	613	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:45:00 PM	616	616	642	681	613	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
4:00:00 PM	616	616	642	681	613	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
4:15:00 PM	616	616	642	681	613	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
4:30:00 PM	616	616	642	681	614	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
4:45:00 PM	616	616	642	682	613	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
5:00:00 PM	616	617	641	681	613	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
5:15:00 PM	616	618	648	690	626	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
5:30:00 PM	617	616	642	681	613	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
5:45:00 PM	617	616	642	681	614	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
6:00:00 PM	617	619	644	682	614	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
6:15:00 PM	616	616	642	681	614	1.05	2.69425	2.8289625	18.9	14.96805556	1.339475549
6:30:00 PM	617	617	644	681	614	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
6:45:00 PM	617	617	642	680	615	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
7:00:00 PM	616	616	642	680	614	1	2.685	2.685	18	14.91666667	1.275690999
7:15:00 PM	616	616	642	680	614	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
7:30:00 PM	616	616	642	680	614	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
7:45:00 PM	616	616	642	680	614	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
8:00:00 PM	616	616	642	680	613	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
8:15:00 PM	616	616	642	680	614	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
8:30:00 PM	616	616	642	680	627	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
8:45:00 PM	617	617	642	680	615	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259

9:00:00 PM	617	617	642	680	615	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
9:15:00 PM	617	616	642	680	615	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
9:30:00 PM	616	616	641	680	614	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
9:45:00 PM	616	616	641	680	614	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
10:00:00 PM	627	627	653	692	626	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
10:15:00 PM	616	616	642	681	614	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
10:30:00 PM	616	616	642	680	614	1.05	2.6942 5	2.828962 5	18.9	14.968055 56	1.3394755 49
10:45:00 PM	628	628	654	693	627	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
11:00:00 PM	629	629	655	693	627	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
11:15:00 PM	616	616	642	680	615	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
11:30:00 PM	615	616	641	680	615	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
11:45:00 PM	615	616	641	680	615	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
12:00:00 AM	616	616	641	681	615	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
12:15:00 AM	616	617	642	680	616	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
12:30:00 AM	617	617	642	680	617	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
12:45:00 AM	617	617	643	680	616	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
1:00:00 AM	617	617	642	679	616	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
1:15:00 AM	632	625	646	682	616	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
1:30:00 AM	618	617	642	679	616	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
1:45:00 AM	618	618	643	679	616	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
2:00:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
2:15:00 AM	618	618	643	679	616	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
2:30:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
2:45:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
3:00:00 AM	618	618	643	679	616	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
3:15:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
3:30:00 AM	618	618	643	679	616	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
3:45:00 AM	618	618	643	679	616	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
4:00:00 AM	618	618	643	679	616	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
4:15:00 AM	618	618	643	679	616	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
4:30:00 AM	618	618	643	679	616	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
4:45:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
5:00:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
5:15:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
5:30:00 AM	618	618	643	679	616	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
5:45:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
6:00:00 AM	618	618	643	679	616	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
6:15:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59

1:30:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
1:45:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:00:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:15:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:30:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
2:45:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:00:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:15:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:30:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
3:45:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:00:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:15:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:30:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:45:00 AM	618	618	643	679	616	0.76	2.6406	2.006856	13.68	14.67	0.969525159
5:00:00 AM	618	618	642	680	620	0.95	2.67575	2.5419625	17.1	14.8652778	1.211906449
5:15:00 AM	618	618	642	680	620	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
5:30:00 AM	617	617	642	680	620	0.86	2.6591	2.286826	15.48	14.7727778	1.097094259
5:45:00 AM	617	617	642	680	619	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
6:00:00 AM	617	617	642	680	619	1	2.685	2.685	18	14.91666667	1.275690999
6:15:00 AM	617	617	642	680	619	0.86	2.6591	2.286826	15.48	14.7727778	1.097094259
6:30:00 AM	632	622	641	679	619	0.76	2.6406	2.006856	13.68	14.67	0.969525159
6:45:00 AM	617	617	642	680	619	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
7:00:00 AM	617	617	642	680	619	1	2.685	2.685	18	14.91666667	1.275690999
7:15:00 AM	617	617	642	680	620	0.95	2.67575	2.5419625	17.1	14.8652778	1.211906449
7:30:00 AM	617	617	642	680	619	0.95	2.67575	2.5419625	17.1	14.8652778	1.211906449
7:45:00 AM	617	617	642	680	619	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
8:00:00 AM	617	617	642	680	619	0.86	2.6591	2.286826	15.48	14.7727778	1.097094259
8:15:00 AM	617	617	642	680	619	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
8:30:00 AM	617	617	642	680	619	0.86	2.6591	2.286826	15.48	14.7727778	1.097094259
8:45:00 AM	617	617	642	680	620	0.76	2.6406	2.006856	13.68	14.67	0.969525159
9:00:00 AM	617	617	642	680	620	0.86	2.6591	2.286826	15.48	14.7727778	1.097094259
9:15:00 AM	617	617	642	680	619	0.95	2.67575	2.5419625	17.1	14.8652778	1.211906449
9:30:00 AM	617	617	642	680	620	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
9:45:00 AM	617	617	642	680	619	0.95	2.67575	2.5419625	17.1	14.8652778	1.211906449
10:00:00 AM	629	628	654	693	632	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
10:15:00 AM	617	617	642	681	619	0.86	2.6591	2.286826	15.48	14.7727778	1.097094259
10:30:00 AM	618	616	642	680	619	0.86	2.6591	2.286826	15.48	14.7727778	1.097094259
10:45:00 AM	617	617	642	680	620	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899

11:00:00 AM	617	617	642	681	620	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
11:15:00 AM	617	617	642	681	620	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
11:30:00 AM	617	617	642	681	620	0.76	2.6406	2.006856	13.68	14.67	0.969525159
11:45:00 AM	617	617	642	681	620	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
12:00:00 PM	617	617	642	681	619	1	2.685	2.685	18	14.91666667	1.275690999
12:15:00 PM	616	616	642	681	620	0.76	2.6406	2.006856	13.68	14.67	0.969525159
12:30:00 PM	616	616	642	681	619	1	2.685	2.685	18	14.91666667	1.275690999
12:45:00 PM	616	616	641	681	619	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
1:00:00 PM	616	616	641	681	619	1	2.685	2.685	18	14.91666667	1.275690999
1:15:00 PM	616	616	642	681	619	1	2.685	2.685	18	14.91666667	1.275690999
1:30:00 PM	617	617	642	681	620	1.05	2.69425	2.8289625	18.9	14.96805556	1.339475549
1:45:00 PM	617	617	642	681	620	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
2:00:00 PM	617	617	642	681	620	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
2:15:00 PM	617	617	642	681	620	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
2:30:00 PM	616	616	642	681	620	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
2:45:00 PM	616	616	642	681	620	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
3:00:00 PM	617	617	642	681	620	1.1	2.7035	2.97385	19.8	15.01944444	1.403260099
3:15:00 PM	617	617	642	681	620	1	2.685	2.685	18	14.91666667	1.275690999
3:30:00 PM	617	617	642	682	620	1	2.685	2.685	18	14.91666667	1.275690999
3:45:00 PM	617	617	642	681	620	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
4:00:00 PM	616	616	642	681	619	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
4:15:00 PM	617	616	642	681	618	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
4:30:00 PM	617	617	642	681	619	0.76	2.6406	2.006856	13.68	14.67	0.969525159
4:45:00 PM	617	617	642	681	618	1.05	2.69425	2.8289625	18.9	14.96805556	1.339475549
5:00:00 PM	617	617	642	681	618	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
5:15:00 PM	617	618	642	681	618	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
5:30:00 PM	618	618	642	681	617	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
5:45:00 PM	618	618	642	681	616	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
6:00:00 PM	618	618	643	682	614	1.05	2.69425	2.8289625	18.9	14.96805556	1.339475549
6:15:00 PM	618	618	642	681	612	1	2.685	2.685	18	14.91666667	1.275690999
6:30:00 PM	618	618	642	681	611	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
6:45:00 PM	618	618	642	681	608	1	2.685	2.685	18	14.91666667	1.275690999
7:00:00 PM	618	617	642	681	606	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
7:15:00 PM	618	618	643	682	603	1	2.685	2.685	18	14.91666667	1.275690999
7:30:00 PM	618	618	642	681	600	1.05	2.69425	2.8289625	18.9	14.96805556	1.339475549
7:45:00 PM	630	630	655	695	609	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
8:00:00 PM	617	617	642	681	581	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
8:15:00 PM	617	617	642	681	577	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449

8:30:00 PM	617	617	642	681	573	0.76	2.6406	2.006856	13.68	14.67	0.969525159
8:45:00 PM	617	617	642	681	569	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
9:00:00 PM	617	617	642	682	565	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
9:15:00 PM	617	617	642	681	562	0.71	2.63135	1.8682585	12.78	14.61861111	0.905740609
9:30:00 PM	617	617	642	682	560	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
9:45:00 PM	617	617	641	681	558	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
10:00:00 PM	617	617	641	681	557	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
10:15:00 PM	617	617	641	682	556	0.76	2.6406	2.006856	13.68	14.67	0.969525159
10:30:00 PM	617	617	640	681	556	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
10:45:00 PM	617	617	640	682	556	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
11:00:00 PM	618	618	640	682	555	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
11:15:00 PM	618	618	640	682	555	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
11:30:00 PM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
11:45:00 PM	618	618	640	682	555	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
12:00:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
12:15:00 AM	618	618	640	682	555	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
12:30:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
12:45:00 AM	618	618	640	682	555	0.81	2.64985	2.1463785	14.58	14.72138889	1.033309709
1:00:00 AM	618	618	640	682	555	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
1:15:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
1:30:00 AM	618	618	640	682	555	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
1:45:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
2:00:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
2:15:00 AM	618	618	640	682	555	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
2:30:00 AM	618	618	640	682	555	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
2:45:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
3:00:00 AM	618	618	640	682	555	0.86	2.6591	2.286826	15.48	14.77277778	1.097094259
3:15:00 AM	618	618	640	682	555	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
3:30:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
3:45:00 AM	618	618	640	682	555	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
4:00:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
4:15:00 AM	618	618	640	682	555	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
4:30:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
4:45:00 AM	618	618	640	682	555	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
5:00:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
5:15:00 AM	618	618	640	682	555	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449
5:30:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.81388889	1.148121899
5:45:00 AM	618	618	640	682	555	0.95	2.67575	2.5419625	17.1	14.86527778	1.211906449

[illegible]

1:00:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
1:15:00 AM	618	618	640	682	555	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
1:30:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
1:45:00 AM	618	618	640	682	555	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
2:00:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
2:15:00 AM	618	618	640	682	555	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
2:30:00 AM	617	617	641	681	558	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
2:45:00 AM	617	617	641	681	557	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
3:00:00 AM	617	617	641	682	556	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
3:15:00 AM	617	617	640	681	556	0.95	2.6757 5	2.541962 5	17.1	14.865277 78	1.2119064 49
3:30:00 AM	617	617	640	682	556	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
3:45:00 AM	618	617	639	681	556	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
4:00:00 AM	629	629	651	695	567	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
4:15:00 AM	617	617	637	681	556	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
4:30:00 AM	617	617	636	681	556	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
4:45:00 AM	617	617	633	681	556	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
5:00:00 AM	617	617	631	681	556	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
5:15:00 AM	617	617	629	681	555	0.86	2.6591	2.286826	15.48	14.772777 78	1.0970942 59
5:30:00 AM	616	617	626	681	555	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
5:45:00 AM	617	617	624	682	555	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
6:00:00 AM	617	617	621	681	555	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
6:15:00 AM	629	629	630	695	567	0.46	2.5851	1.189146	8.28	14.361666 67	0.5868178 6
6:30:00 AM	617	617	614	681	556	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
6:45:00 AM	617	617	611	681	557	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
7:00:00 AM	617	617	608	681	556	0.56	2.6036	1.458016	10.08	14.464444 44	0.7143869 6
7:15:00 AM	617	617	605	681	556	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
7:30:00 AM	617	617	603	682	556	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
7:45:00 AM	617	617	601	681	557	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
8:00:00 AM	617	617	600	682	557	0.61	2.6128 5	1.593838 5	10.98	14.515833 33	0.7781715 1
8:15:00 AM	617	617	599	681	557	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
8:30:00 AM	617	617	598	681	558	0.56	2.6036	1.458016	10.08	14.464444 44	0.7143869 6
8:45:00 AM	617	617	598	681	558	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
9:00:00 AM	616	616	598	681	558	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
9:15:00 AM	617	617	597	682	558	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
9:30:00 AM	617	617	597	681	558	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
9:45:00 AM	617	618	597	681	558	0.76	2.6406	2.006856	13.68	14.67	0.9695251 59
10:00:00 AM	617	617	597	682	558	0.9	2.6665	2.39985	16.2	14.813888 89	1.1481218 99
10:15:00 AM	617	617	597	682	559	0.56	2.6036	1.458016	10.08	14.464444 44	0.7143869 6

10:30:00 AM	617	617	597	682	559	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
10:45:00 AM	617	617	597	682	559	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
11:00:00 AM	616	616	597	682	559	0.56	2.6036	1.458016	10.08	14.464444 44	0.7143869 6
11:15:00 AM	616	616	596	682	559	0.61	2.6128 5	1.593838 5	10.98	14.515833 33	0.7781715 1
11:30:00 AM	615	615	596	681	559	0.51	2.5943 5	1.323118 5	9.18	14.413055 56	0.6506024 1
11:45:00 AM	615	615	596	682	559	0.61	2.6128 5	1.593838 5	10.98	14.515833 33	0.7781715 1
12:00:00 PM	614	614	596	682	559	0.61	2.6128 5	1.593838 5	10.98	14.515833 33	0.7781715 1
12:15:00 PM	613	613	596	682	560	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
12:30:00 PM	613	613	596	681	560	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
12:45:00 PM	612	612	597	682	560	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
1:00:00 PM	611	611	596	681	560	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
1:15:00 PM	610	610	596	681	561	0.81	2.6498 5	2.146378 5	14.58	14.721388 89	1.0333097 09
1:30:00 PM	609	609	596	681	561	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
1:45:00 PM	607	607	596	681	563	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
2:00:00 PM	607	606	596	681	564	0.61	2.6128 5	1.593838 5	10.98	14.515833 33	0.7781715 1
2:15:00 PM	605	605	596	681	567	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
2:30:00 PM	603	603	596	681	569	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
2:45:00 PM	602	602	596	681	572	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
3:00:00 PM	600	600	595	681	576	0.51	2.5943 5	1.323118 5	9.18	14.413055 56	0.6506024 1
3:15:00 PM	599	599	595	681	581	0.51	2.5943 5	1.323118 5	9.18	14.413055 56	0.6506024 1
3:30:00 PM	597	597	595	681	584	0.51	2.5943 5	1.323118 5	9.18	14.413055 56	0.6506024 1
3:45:00 PM	597	597	596	682	587	0.56	2.6036	1.458016	10.08	14.464444 44	0.7143869 6
4:00:00 PM	595	595	595	682	591	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
4:15:00 PM	595	595	595	681	594	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
4:30:00 PM	595	595	595	681	597	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
4:45:00 PM	595	596	595	681	600	0.61	2.6128 5	1.593838 5	10.98	14.515833 33	0.7781715 1
5:00:00 PM	595	595	595	681	603	0.51	2.5943 5	1.323118 5	9.18	14.413055 56	0.6506024 1
5:15:00 PM	595	594	595	681	606	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
5:30:00 PM	595	595	595	681	608	0.51	2.5943 5	1.323118 5	9.18	14.413055 56	0.6506024 1
5:45:00 PM	599	598	596	680	610	0.56	2.6036	1.458016	10.08	14.464444 44	0.7143869 6
6:00:00 PM	595	595	595	682	612	0.56	2.6036	1.458016	10.08	14.464444 44	0.7143869 6
6:15:00 PM	594	594	595	681	614	0.71	2.6313 5	1.868258 5	12.78	14.6186111 1	0.9057406 09
6:30:00 PM	594	594	595	681	616	0.51	2.5943 5	1.323118 5	9.18	14.413055 56	0.6506024 1
6:45:00 PM	596	594	595	681	617	0.66	2.6221	1.730586	11.88	14.567222 22	0.8419560 6
7:00:00 PM	594	594	595	682	618	0.46	2.5851	1.189146	8.28	14.361666 67	0.5868178 6
7:15:00 PM	607	607	608	681	595	620	0.46	285.2	11160	2.5555555 56	0
7:30:00 PM	594	594	595	681	619	0.51	0	0	9.18	0	0.6506024 1
7:45:00 PM	594	594	595	681	618	0.61	0	0	10.98	0	0.7781715 1

Kode program EDA dan Korelasi di Python:

```

eda.py > ...
1  import pandas as pd
2  import seaborn as sns
3  import matplotlib.pyplot as plt
4
5  # Load data
6  df = pd.read_csv('data_sensor_ldr.csv')
7
8  # Tampilkan ringkasan statistik
9  print("=== Statistik Deskriptif ===")
10 print(df.describe(include='all'))
11
12 # Visualisasi distribusi setiap kolom numerik
13 numeric_cols = df.select_dtypes(include=['int64', 'float64']).columns
14
15 for col in numeric_cols:
16     plt.figure(figsize=(6, 4))
17     sns.histplot(df[col], kde=True, color='skyblue')
18     plt.title(f'Distribusi: {col}')
19     plt.xlabel(col)
20     plt.ylabel("Frekuensi")
21     plt.tight_layout()
22     plt.show()
23
24 # Korelasi hanya untuk kolom numerik
25 correlation_matrix = df.corr(numeric_only=True)
26
27 # Tampilkan korelasi
28 print("=== Matriks Korelasi ===")
29 print(correlation_matrix)
30
31 # Visualisasi heatmap korelasi
32 plt.figure(figsize=(10, 8))
33 sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', linewidths=0.5)
34 plt.title('Matriks Korelasi antar Fitur')
35 plt.tight_layout()
36 plt.show()
37

```

Gambar L1. Kode Python EDA & Korelasi

Kode Program Regresi Linear di Python:

```

regresi_L.py > ...
1  # === 1. IMPORT LIBRARY ===
2  import pandas as pd
3  from sklearn.model_selection import train_test_split
4  from sklearn.linear_model import LinearRegression
5  from sklearn.metrics import mean_squared_error, r2_score, mean_absolute_error
6  import matplotlib.pyplot as plt
7  import numpy as np
8  |
9  # === 2. LOAD DATASET ===
10 df = pd.read_csv("data_sensor_ldr.csv") # Ganti path jika perlu
11
12 # === 3. PILIH FITUR (X) DAN TARGET (y) ===
13 X = df[['top', 'left', 'middle', 'bottom', 'right']] # Input dari sensor LDR
14 y = df['power'] # Target output daya
15
16 # === 4. SPLIT DATA ===
17 X_train, X_test, y_train, y_test = train_test_split(
18     X, y, test_size=0.2, random_state=42
19 )
20
21 # === 5. LATIH MODEL REGRESI LINEAR ===
22 model = LinearRegression()
23 model.fit(X_train, y_train)
24
25 # === 6. PREDIKSI DATA TEST ===
26 y_pred = model.predict(X_test)
27
28 # === 7. EVALUASI MODEL ===
29 mse = mean_squared_error(y_test, y_pred)
30 rmse = np.sqrt(mse)
31 mae = mean_absolute_error(y_test, y_pred)
32 r2 = r2_score(y_test, y_pred)
33
34 # === 8. CETAK HASIL EVALUASI ===
35 print("=== EVALUASI MODEL REGRESI LINEAR ===")
36 print(f"Koefisien Regresi      : {model.coef_}")
37 print(f"Intercept                : {model.intercept_:.4f}")
38 print(f"Mean Squared Error         : {mse:.4f}")
39 print(f"Root Mean Squared Err      : {rmse:.4f}")
40 print(f"Mean Absolute Error        : {mae:.4f}")
41 print(f"R2 Score                   : {r2:.4f}")
42
43 # === 9. VISUALISASI PREDIKSI VS AKTUAL ===
44 plt.figure(figsize=(8, 5))
45 plt.scatter(y_test, y_pred, color='blue', alpha=0.6)
46 plt.plot([y.min(), y.max()], [y.min(), y.max()], 'r--', lw=2)
47 plt.xlabel("Nilai Aktual (Power)")
48 plt.ylabel("Nilai Prediksi (Power)")
49 plt.title("Prediksi vs Aktual - Regresi Linear")
50 plt.grid(True)
51 plt.tight_layout()
52 plt.show()
53

```

RIWAYAT HIDUP PENULIS



Nama lengkap penulis Sintia Pararak, lahir pada tanggal 11 Januari 2004 di Bebo' Kecamatan Sangalla Utara, Kabupaten Tana Toraja. Penulis merupakan anak terakhir dari 5 bersaudara dari pasangan Simon Pararak dan almh Fransiska Gotti. Penulis pertama kali menempuh Pendidikan Dasar (SD) di SDN 9 Sangalla Utara, Kecamatan Sangalla Utara, Kabupaten Tana Toraja pada tahun 2009 dan dinyatakan lulus pada tahun 2015. Selanjutnya penulis melanjutkan Pendidikan Menengah (SMP) di SMP Katolik Sangalla, Kecamatan Sangalla Utara, Kabupaten Tana Toraja pada tahun 2015 dan dinyatakan lulus pada tahun 2018. Kemudian Penulis melanjutkan Pendidikan (SMA) di SMAN 4 Tana Toraja, Kecamatan Sangalla Utara, Kabupaten Tana Toraja pada tahun 2018 dan dinyatakan lulus pada tahun 2021. Pada tahun yang sama penulis melanjutkan Pendidikan ke perguruan tinggi Universitas Kristen Indonesia Toraja, penulis mengambil jurusan Teknik Elektro dan pada tahun 2025 penulis menyelesaikan studinya dengan baik. Dengan usaha yang tiada henti, kesabaran, ketekunan, dan motivasi yang tinggi akhirnya penulis dapat menyelesaikan tugas akhir ini. Semoga tugas akhir ini dapat bermanfaat untuk semua orang yang membutuhkan terutama dalam dunia Pendidikan.