UNIVERSITAS
MUHAMMADIYAH
SIDOARJO

UMSIDA
DARI SINI PENCERAHAN BERSEMI

Sistem Monitoring Energy Mobil Listrik Terintegrasi IoT : Studi Kasus IMEI TEAM UMSIDA

Oleh:

Muchammad Aliffudin

Dosen Pembimbing : Indah Sulistiyowati

Progam Studi

Universitas Muhammadiyah Sidoarjo

Agustus, 2024

Pendahuluan

Perkembangan teknologi yang semakin cepat disertai konsumsi bahan bakar fosil yang terus meningkat menimbulkan dampak negatif bagi kelestarian lingkungan serta memberikan tantangan terkait inovasi mengenai permasalahan tersebut, Kendaraan berbahan bakar listrik menjadi salah satu inovasi yang relevan untuk mengurangi polusi udara dan menimbulakan emisi gas buang kendaraan berbahan bakar fosil terhadap pemanasan global

Pertanyaan Penelitian (Rumusan Masalah)

1. Mengetahui konsumsi energy kendaraan keadaan real time ?
2. Mencari solusi yang tepat untuk mengemudi yang lebih efisien ?

Langkah Penelitian

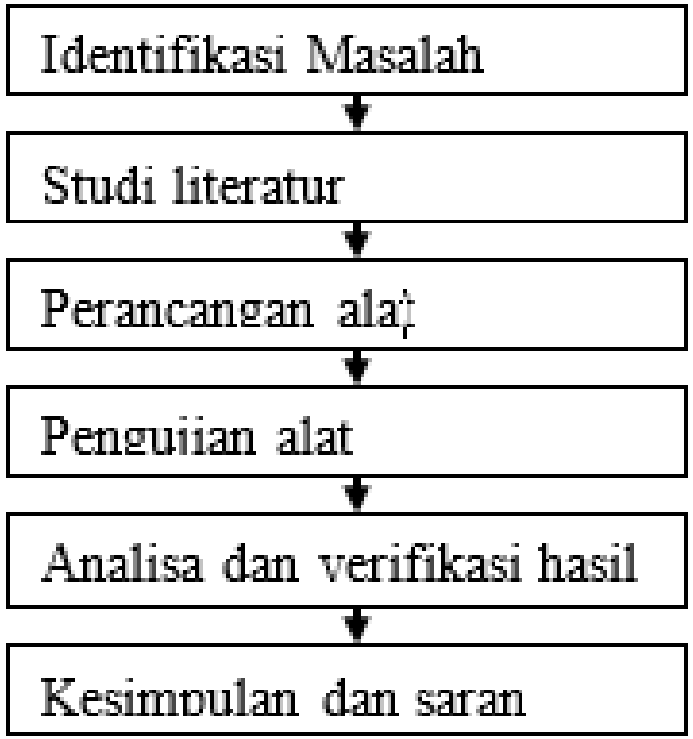
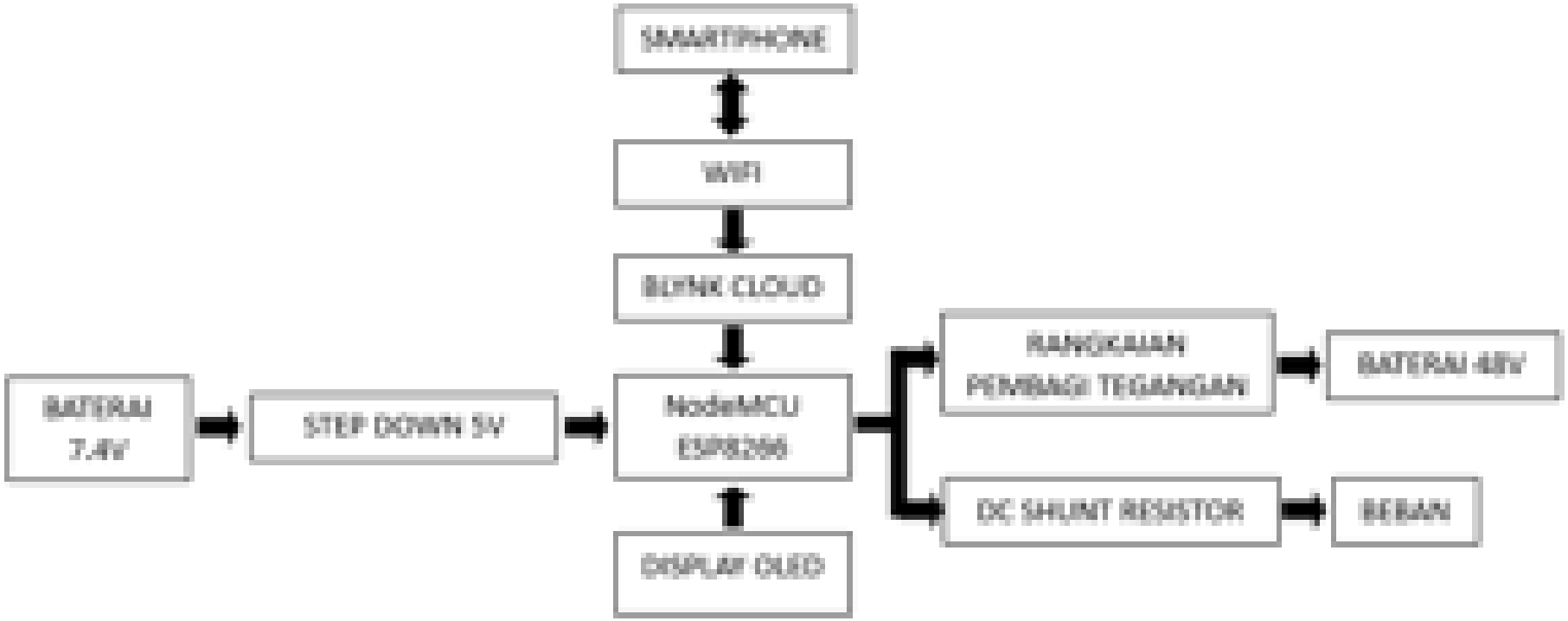
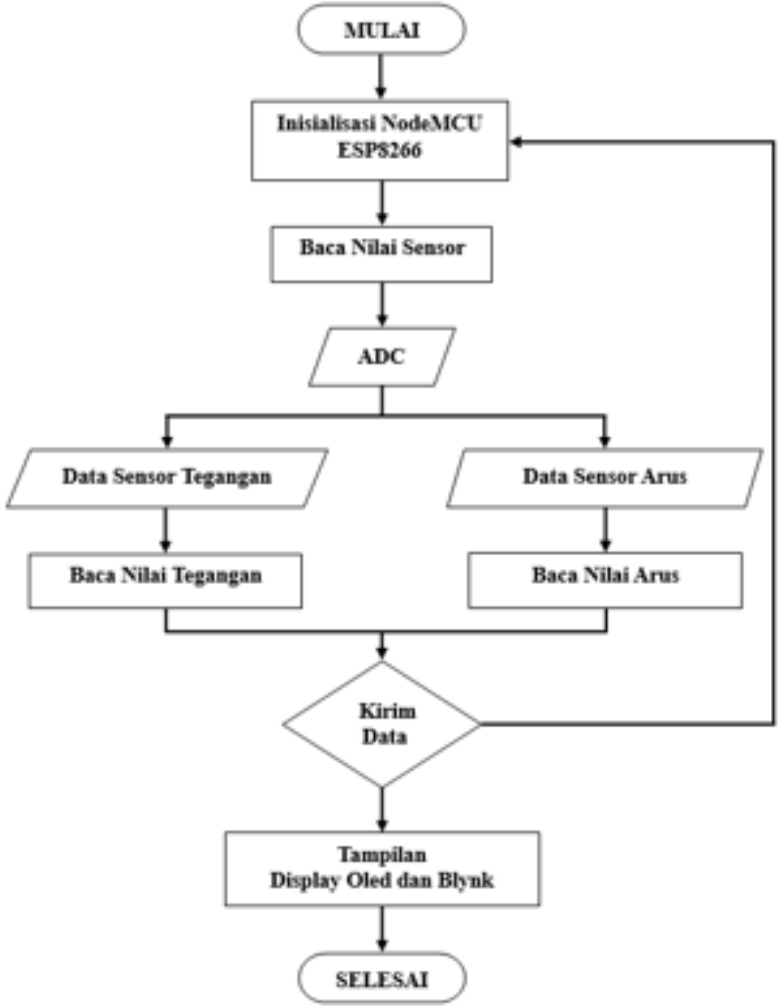


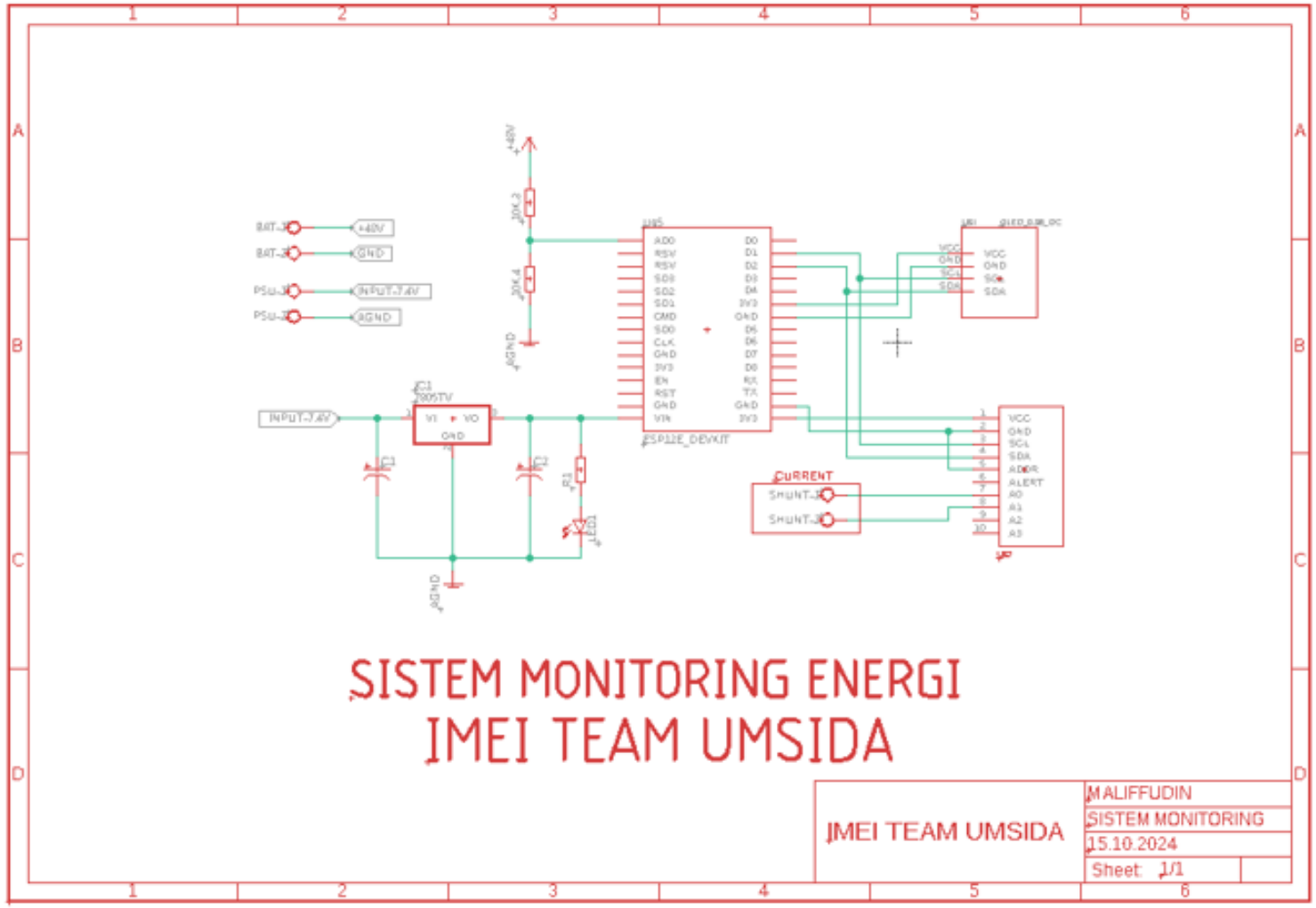
Diagram Blok



Flowchart


MULAI
Inisialisasi NodeMCU ESP8266
Baca Nilai Sensor
ADC
Data Sensor Tegangan
Data Sensor Arus
Baca Nilai Tegangan
Baca Nilai Arus
Kirim Data
Tampilan Display Oled dan Blynk
SELESAI

Wiring Diagram



Hasil

```
//============================================== Daya
  Daya=VOLT*Ampere;
//============================================== Energi
  sample = sample + 1;
  msec = millis();
  Time = (float) msec / 1000.0;
  totalCharge = totalCharge + Ampere;
  averageAmps = totalCharge / sample;
  ampSeconds = averageAmps*Time;
  ampHours = ampSeconds/3600;
  Energi = VOLT * ampHours;
```

Pembahasan

Alat ini mampu memonitoring Konsumsi energy dan Voltage baterai secara real time sehingga memudahkan anggota tim mobil listrik untuk menentukan strategi yang tepat untuk mengemudikan mobil apakah menggunakan strategi gas lepas atau gas konstan.

Pembahasan

No	Voltage on Calibrator (AVO Meter)	Voltage on Microcontroller (Oled Display)	Error (%)
1	50.46	50.43	0.06 %
2	50.45	50.44	0.02 %
3	50.42	50.39	0.06 %
4	50.46	50.45	0.02 %
5	50.41	50.38	0.06 %
6	50.44	50.4	0.08 %
7	50.38	50.35	0.06 %
8	50.42	50.4	0.04 %
9	50.4	50.36	0.08 %
10	50.45	50.41	0.08 %

No	Current on Calibrator (AVO Meter)	Current on Microcontroller (Oled Display)	Error (%)
1	0	0	0 %
2	0.26	0.23	0.13 %
3	0.38	0.33	0.15 %
4	0.49	0.45	0.09 %
5	0.59	0.54	0.09 %
6	0.67	0.61	0.10 %
7	0.77	0.72	0.07 %
8	0.88	0.81	0.09 %
9	0.98	0.91	0.08 %
10	1.22	1.15	0.06 %

Manfaat Penelitian

Berdasarkan pengujian yang telah dilakukan, penelitian ini berfokus pada pemantauan konsumsi energi mobil listrik secara *real time* saat mobil berada di lintasan dengan menggunakan komunikasi berbasis iot yang memanfaatkan jaringan internet sebagai pengubung antara user, sistem perangkat keras, dan sistem perangkat lunak. Dalam penelitian ini sistem alat yang dirancang hanya berfungsi sebagai sistem pemantuan konsumsi energi mobil listrik saat berada di lintasan, tanpa ada pengendalian terkait konsumsi energi yang dihasilkan. Keberhasilan implementasi sistem monitoring energi mobil listrik terintegrasi iot yang diimplementasikan pada mobil listrik imei team umsida dapat dilihat dari hasil pengujian yang telah dilakukan. Hasil pengujian menunjukkan bahwa sensor tegangan dan sensor arus yang digunakan mampu mendeteksi perubahan tegangan serta arus listrik pada mobil llistrik. Pada skema ini, tingkat error pembacaan sensor tegangan yang dihasilkan kurang dari 0.1% dan tingkat error pembacaan sensor arus kurang dari 0.2%. Dengan adanya alat ini dapat membantu mempermudah analisa dalam menentukan strategi yang tepat untuk digunakan, sehingga performa mobil dapat lebih efisien.

Referensi

- [1] I. Sulistiyowati, J. Jamaaluddin, and I. Anshory, "Power Performance Evaluation of Standalone Renewable Energy Source Energy Management Using Pass Filter," *PROtek : Jurnal Ilmiah Teknik Elektro*, vol. 10, no. 3, pp. 158–163, Sep. 2023, doi: 10.33387/protk.v10i3.6082.
- [2] I. Sulistiyowati, Jamaaludin, and I. Anshory, "Characteristics of Direct-Coupling Fuel Cell Injection in Renewable Energy Hybrid Power Generation Electrical Systems: Karakteristik Injeksi Fuel Cell Secara Direct-Coupling Pada Sistem Kelistrikan Pembangkit Hibrida Energi Terbarukan," *Procedia of Social Sciences and Humanities*, vol. 3, pp. 748–756, Jul. 2022, doi: 10.21070/pssh.v3i.110.
- [3] D. Maamria, K. Gillet, G. Colin, Y. Chamaillard, and C. Nouillant, "Optimal Predictive Eco-Driving Cycles for Conventional, Electric, and Hybrid Electric Cars," *IEEE Trans Veh Technol*, vol. 68, no. 7, pp. 6320–6330, 2019, doi: 10.1109/TVT.2019.2914256.
- [4] "SHELL ECO-MARATHON ASIA PACIFIC AND THE MIDDLE EAST 2023 OFFICIAL RULES, CHAPTER II 2 CONTENTS."
- [5] D. oleh *et al.*, "PEDOMAN KONTES MOBIL HEMAT ENERGI TAHUN 2023."
- [6] M. S. Maulana and I. Sulistiyowati, "Sistem Telemetri Mobil Listrik IMEI TEAM UMSIDA Berbasis Iot Dan Ublox Gps Neo-6m".
- [7] J. Guo, W. Li, J. Wang, Y. Luo, and K. Li, "Safe and Energy-Efficient Car-Following Control Strategy for Intelligent Electric Vehicles Considering Regenerative Braking," *IEEE Transactions on Intelligent Transportation Systems*, vol. 23, no. 7, pp. 7070–7081, 2022, doi: 10.1109/TITS.2021.3066611.
- [8] N. Kammuang-lue and J. Boonjun, "Simulation and Comparison on Energy Consumption between Electric and Diesel Buses: Feasibility Study on Electric Rubber-Tire Bus Potential in Chiang Mai," in *2019 IEEE 10th International Conference on Mechanical and Aerospace Engineering (ICMAE)*, 2019, pp. 490–496. doi: 10.1109/ICMAE.2019.8880940.
- [9] I. Sulistiyowati, "System Telemetry for Mobile Devices Using the GPS Neo-6M and DHT11 Modules A Case Study by IMEI Team." [Online]. Available: https://www.jurnal.unmer.ac.id/index.php/jeemecs/rt/printerFriendly/9945/0
- [10] Q. A. Sias, M. R. Andriansyah, A. P. Wibawa, Apriharta, and L. Hernandez, "Energy Consumption of Electric Vehicle System Under Various Speed and Voltage Levels," in *2019 International Conference on Electrical, Electronics and Information Engineering (ICEEIE)*, 2019, pp. 346–349. doi: 10.1109/ICEEIE47180.2019.8981457.

Referensi

- [11] J. Wang, "Research on Monitoring Strategy of New Energy Vehicle Power System Based on the Internet of Things," in *2022 2nd International Signal Processing, Communications and Engineering Management Conference (ISPCEM)*, 2022, pp. 105–108. doi: 10.1109/ISPCEM57418.2022.00027.
- [12] P. Aruna and P. V Vasan, "Review on Energy Management System of Electric Vehicles," in *2019 2nd International Conference on Power and Embedded Drive Control (ICPEDC)*, 2019, pp. 371–374. doi: 10.1109/ICPEDC47771.2019.9036689.
- [13] L. Kang, H. Shen, S. Xu, and Y. Li, "Electric Vehicle Trip Information Inference Based on Time-Series Residential Electricity Consumption," *IEEE Internet Things J*, vol. 10, no. 17, pp. 15666–15678, 2023, doi: 10.1109/JIOT.2023.3265185.
- [14] M. C. Kirca and A. McGordon, "Effect of Rider Position on the Energy Consumption of an Electric Motorcycle," in *2023 IEEE Vehicle Power and Propulsion Conference (VPPC)*, 2023, pp. 1–3. doi: 10.1109/VPPC60535.2023.10403372.
- [15] Z. Xin, M. Teng, L. Yuanzhi, and L. Jiashi, "Research of driving torque monitoring for electric vehicle," in *2021 IEEE International Conference on Emergency Science and Information Technology (ICESIT)*, 2021, pp. 31–34. doi: 10.1109/ICESIT53460.2021.9696668.
- [16] P. Aruna and P. V Vasan, "Review on Energy Management System of Electric Vehicles," in *2019 2nd International Conference on Power and Embedded Drive Control (ICPEDC)*, 2019, pp. 371–374. doi: 10.1109/ICPEDC47771.2019.9036689.
- [17] K. K. Nandini, N. S. Jayalakshmi, and V. K. Jadoun, "Energy Management System for PV Integrated Utility Grid with Electric Vehicle as Storage System," in *2022 2nd International Conference on Power Electronics & IoT Applications in Renewable Energy and its Control (PARC)*, 2022, pp. 1–6. doi: 10.1109/PARC52418.2022.9726655.
- [18] M. Novak, J. Novak, J. Morkus, and O. Sivkov, "Energy Consumption Calculation of an Electric Bus with a Variable or Fixed Gearbox," in *IECON 2019 - 45th Annual Conference of the IEEE Industrial Electronics Society*, 2019, pp. 2670–2675. doi: 10.1109/IECON.2019.8926683.
- [19] R. Feng *et al.*, "Design of Comprehensive Energy System Considering Anomaly Detection of Multi-Energy Data," in *2022 4th International Conference on Artificial Intelligence and Advanced Manufacturing (AIAM)*, 2022, pp. 350–354. doi: 10.1109/AIAM57466.2022.00073.
- [20] K. M. Peash and T. Jamal, "Optimizing Residential Energy Consumption: Exploring Demand Side Management Strategies," in *2023 10th IEEE International Conference on Power Systems (ICPS)*, 2023, pp. 1–6. doi: 10.1109/ICPS60393.2023.10428789.


UMSIDA
DARI SINI PENCERAHAN BERSEMI