

Fig. 7. Load voltage and current waveforms for the fuzzy logic based MPPT.

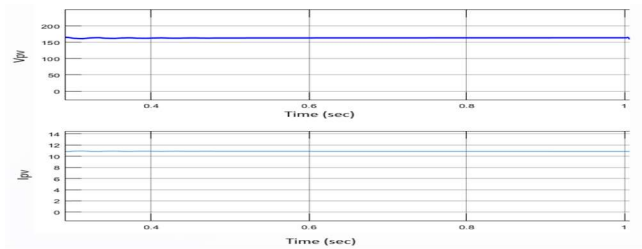


Fig. 8. PV voltage and current waveforms for the fuzzy logic based MPPT.

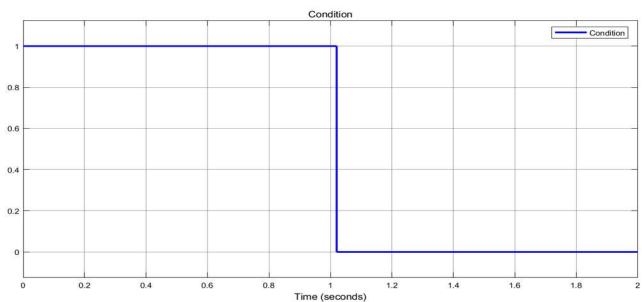


Fig. 9. Control signal for the STS switch within 2 seconds.

## VI. REFERENCES

1. A. Askarzadeh and L. Coelho, "A novel framework for optimization of a grid independent hybrid renewable energy system: A case study of Iran," *Solar Energy*, vol. 112, pp. 383–396, Feb. 2015.
2. M. Elgendy, B. Zahawi, and D. Atkinson, "Assessment of the incremental conductance maximum power point tracking algorithm," *IEEE Trans. Sustain. Energy*, vol. 4, no. 1, pp. 108–117, Jan. 2013.
3. P. Kushwaha and C. Bhende, "Single-phase rooftop photovoltaic based grid-interactive electricity system," in *Proc. IEEE Annu. India Conf.*, 2016, pp. 1–6.
4. N. Kim and B. Parkhideh, "Control and operating range analysis of an AC-stacked PV inverter architecture integrated with a battery," *IEEE Trans. Power Electron.*, vol. 33, no. 12, pp. 10032–10037, Dec. 2018.
5. H. Trabelsi, "MPPT controllers for PV array panel connected to Grid," in *Proc. 18th Int. Conf. Sci. Techn. Autom. Control Comput. Eng.*, 2017, pp. 505–510.
6. S. Choudhury, "Adaptive Fuzzy Logic Based MPPT Control for PV System under Partial Shading Condition," in *INTERNATIONAL JOURNAL of RENEWABLE ENERGY RESEARCH et al.*, Vol.5, No.4, 2015.
7. K. A. Qaid, "Modelling and Sizing a Grid-connected PV-Battery System Using DIGSILENT for Powering UTeM Main Campus," *INTERNATIONAL JOURNAL of RENEWABLE ENERGY RESEARCH et al.*, Vol.13, No.3, September, 2023.
8. H. Li, Z. Wu, and F. Lui, "A novel variable step size adaptive harmonic detecting algorithm applied to active power filter," in *Proc. IEEE Int. Conf. Ind. Technol.*, 2016, pp. 574–578.
9. L. Patel, S. Kumar, B. Singh, and A. Vyas, "Self-adjustable step-based control algorithm for multifunctional PV system under sag-swell conditions," in *Proc. IEEE Int. Conf. Power Electron. Drives Energy Syst.*, Chennai, India, 2018, pp. 1–6.
10. S. Kumar and B. Singh, "A Multipurpose PV System Integrated to a Three-Phase Distribution System Using an LWDF-Based Approach," *IEEE Trans. Power Electron.*, vol. 33, no. 1, pp. 739–748, Jan. 2018.
11. K. Givaki, D. Chen, L. Xu, "Current Error Based Compensations for VSC Current Control in Weak Grid for Wind Farm Applications" *IEEE Transactions on Sustainable Energy*, Early Access, 2018.
12. Z. Yao, L. Xiao, and Y. Yan, "Seamless Transfer of Single-Phase Grid Interactive Inverters between Grid-Connected and Stand-Alone Modes," *IEEE Transactions on Power Electronics*, vol. 25, no. 6, pp. 1597–1603, Jun. 2010.