



**International Journal of
Multidisciplinary Conference Proceedings**

✉ editor@ijmcp.com 🌐 <https://www.ijmcp.com>

Design and Mathematical Modelling of Solar Powered Cardiac Pacemaker

1st Ailiya Munawar, 2nd M.Ismael & 3rd Arsalan Ansari

1st, 2nd, 3rd Dawood University of Engineering and Technology, Pakistan

KEYWORDS	ABSTRACT
Mathematical Modelling, Cardiac Pacemaker, Sensor Block	Least physical activity and unhealthy lifestyle resulted in increased cardiac issues in past decade but the advancements in bioengineering addressed the cause by introducing photo-voltaic cells in medical industry. Hence, the battery less pacemakers evolved making the pacemakers cost effective (no battery replacement after ten years). In this paper a comprehensive mathematical modelling of a system including Heart beat block, the sensor block, the pace maker block and the circulatory system block is done. And their outputs on scope is analyzed for adjusting the parameters of mathematical equations designed with generalized equations. The resulting waveform of the system is then compared to the standard QRS wave of a human heart's ECG. Our proposed cardiac solar pacemaker, uses solar power as source for charging the battery of pacemaker, hence eliminating the procedure of battery replacement and re-surgery after five to ten years. We started the mathematical modelling by deriving transfer functions of the blocks designed in Simulink, evaluating the characteristic equations in Laplace domain and frequency domains. The constants of transfer functions are retrieved via mathematical techniques and then the resulting system response is analyzed by the fractional analysis of the transfer functions.
ARTICLE HISTORY	
Date of Publication: 16-04-2025	
Conference Organizer(s)	
Research Consultancy on Social & Management Development & University of Karachi DHA Suffa University	
Corresponding Email	Aliyaali34@gmail.com
Volume-Issue-Page Number	2(1) 43
Citation	Munawar, A., Ismael, M., & Ansari, A. (2025). Design and Mathematical Modelling of Solar Powered Cardiac Pacemaker. <i>Proceedings of the 1st International Conference on Innovation and Sustainability in Management and Social Sciences, *International Journal of Multidisciplinary Conference Proceedings</i> , 2(1).