(12) PATENT APPLICATION PUBLICATION
(19) INDIA
(22) Date of filing of Application :06/08/2025
(21) Application No.202541074794 A
(43) Publication Date : 22/08/2025

(54) Title of the invention : AI-Driven Synthetic Biology designing Novel Organisms for Environmental Remediation

(51) International classification :G06N0020000000, C12N0001200000, C02F0003340000, B09C0001100000, G16B0040200000
(86) International Application No :NA
Filing Date :NA
(87) International Publication No : NA
(61) Patent of Addition to Application Number :NA
Filing Date :NA
(62) Divisional to Application Number :NA
Filing Date :NA

(71)**Name of Applicant :**
1)Sanskrithi school of Engineering
Address of Applicant :Beedupalli Knowledgepark, Behind SSSIHMS, Puttaparthi, Sri Sathya Sai District, AP - 515134. Puttaparthi ---------- ----------
Name of Applicant : NA
Address of Applicant : NA
(72)**Name of Inventor :**
1)DR.KETHINENI VINOD KUMAR
Address of Applicant :Associate professor in the department of CSE, Sanskrithi school of Engineering, Puttaparthi. Puttaparthi ---------- ----------
2)THAMMISETTI GOVARDHAN
Address of Applicant :Mentor, RGUKT- RK VALLEY Kadapa ---------- ----------
3)K.PAVAN KUMAR
Address of Applicant :Assistant professor in the department of CSE, Sanskrithi school of Engineering, Puttaparthi. Puttaparthi ---------- ----------
4)M.VINITHA
Address of Applicant :Assistant professor Department of CSM, St.Peters Engineering College. Hyderabad ---------- ----------
5)GANNERA ESWAR
Address of Applicant :Assistant professor in the department of CSE, Sanskrithi school of Engineering, Puttaparthi Puttaparthi ---------- ----------
6)A UDAYA SREE
Address of Applicant :Assistant professor, Sreenivasa institute of technology and management studies, Chittoor Chittoor ---------- ----------
7)S.L. HEMANTH CHANDRA
Address of Applicant :Assistant Professor in the Department of CSE, Narsimha Reddy Engineering College, Autonomous, Hyderabad Hyderabad ---------- ----------
8)VADDAMANI JAGADEESWARA REDDY
Address of Applicant :Assistant professor in the dept of Computer science and Engineering, Annamacharya Institute of Technology and Sciences, Kadapa. Kadapa ---------- ----------
9)DR.D.RAGHUNATH KUMAR BABU
Address of Applicant :Assistant professor in the dept of Computer science and Engineering, Rajeev Gandhi Memorial College of Engineering and Technology, Nerawada, X' Roads, Nandyala, Andhra Pradesh 518501 Kurnool ---------- ----------

(57) Abstract :
The escalating environmental crises, including pollution, climate change, and resource depletion, demand innovative solutions that can address these challenges at scale. AI-driven synthetic biology has emerged as a transformative approach to engineer novel organisms tailored for environmental remediation. This invention explores the integration of advanced artificial intelligence (AI) techniques such as machine learning, generative models, and bioinformatics with synthetic biology to design microorganisms capable of degrading pollutants, sequestering carbon, and restoring ecosystems. By leveraging AI's capacity to analyze vast genomic and environmental datasets, we can predict and optimize metabolic pathways, enabling the creation of synthetic organisms with enhanced bioremediation capabilities. These organisms can target specific contaminants, such as heavy metals, plastics, or organic pollutants, with unprecedented efficiency and specificity. Furthermore, AI-driven design facilitates rapid prototyping and iterative optimization, reducing development time and costs while ensuring safety and ecological compatibility. The methodologies, including CRISPR-based gene editing and AI-guided protein engineering, and discusses the potential of these organisms to remediate contaminated soils, water systems, and atmospheric carbon. Ethical considerations, biosafety protocols, and ecological impact assessments are also addressed to ensure responsible deployment. The synergy of AI and synthetic biology not only accelerates the development of novel organisms but also paves the way for scalable, sustainable solutions to global environmental challenges, offering a paradigm shift in bioremediation strategies.

No. of Pages : 9 No. of Claims : 6