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Is Space R&D Truly Fostering A Better World For Our Future? (2)

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LEVERAGING SPACE R&D TO DRIVE SOCIETAL BENEFITS THROUGH AI AND ESG
TECHNOLOGY CASES

Abstract

Space research in recent times has led to transformative technological innovations that bring drastic societal benefits beyond their original space applications. This paper explores the profound societal impact of transformative technological innovations originating in space research. Specifically, it delves into the revolutionary applications of Artificial Intelligence (AI) and Environmental, Social, and Governance (ESG) technologies that were initially pioneered through space Research and Development (RD) efforts. A critical aspect of the paper centers around initiatives by space organizations that utilize open innovation platforms and public-private partnerships to disseminate Intellectual Property (IP) generated from space RD. This collaborative approach ensures widespread use of space-derived technologies across industries. Market analysis shows that the adoption of AI technologies in the space is poised for significant growth, with a forecasted compound annual growth rate of 20% from 2023 to 2032. Our analysis highlights new business applications affecting AI and other sophisticated technologies combined to deliver advanced space for application performance. The case study focuses on how the space ecosystem will be drastically altered by the premeditated and methodical deployment of AI with ESG applications, whether for spacecraft autonomy, launch vehicles, orbit control, or terrestrial systems. The paper illustrates the use of competitive AI with its enablement in driving predictive maintenance, observability, real-time production monitoring, and environmental impact measurement tools for sustainability involved in space manufacturing. The architecture of Augmented reality and IoT for enhanced computer vision for fault diagnosis is also developed to advocate the Industry 4.0 knowledge transition required for local operators and researchers. This paper investigates cases where space organizations' knowledge sharing and technology transfer have brought such innovations from the lab to commercial use. The paper argues that the immense potential of emerging organizations with an indication of market and strategy growth scenarios to address terrestrial challenges in AI, ESG, and predictive analytics merits ongoing investments. As technology transfer from space RD continues to drive innovation, the paper encourages a commitment to ongoing investments in this field to unlock further transformative applications and advancements for the benefit of humanity.