ARC REACTOR – PUBLIC DISCLOSURE DOCUMENT

By Utkarsh Kumar

Email: utkarshk616@gmail.com

ABSTRACT

The Compact Fusion Arc Reactor is a proposed clean energy generation device designed to harness nuclear fusion within a compact, portable format. Inspired by magnetic confinement fusion systems such as Tokamaks and Stellarators, the proposed system integrates high-field superconducting magnets, AI-assisted plasma control, and high-efficiency direct energy conversion. This document details the conceptual design, key components, and potential implementation roadmap under both current college-level capabilities and future industrial-scale funding scenarios.

TECHNICAL DESCRIPTION

Core Components:

1. Superconducting Magnetic Confinement System – to stabilize high-energy plasma.
2. Vacuum Chamber – ultra-high vacuum (10■■ mbar range) for plasma isolation.
3. Plasma Heating – RF/Microwave and magnetic induction.
4. Fuel – Deuterium and Helium-3 mix for optimal reaction rate.
5. Embedded Control System – STM32 microcontroller with AI-driven PID loops.
6. Direct Energy Conversion – Magnetohydrodynamic (MHD) or thermoelectric systems.

Control Architecture: The reactor’s magnetic confinement and plasma parameters will be regulated through a real-time embedded system, integrated with high-precision sensors for field strength, plasma density, and temperature monitoring.

FUTURE DEVELOPMENT ROADMAP

Phase 1 – College Level (1 Year): Build & validate plasma confinement demonstrator with simulation & lab testing.
Phase 2 – Advanced Lab Scale (2–4 Years): Achieve detectable fusion events using superconducting magnets & regulated fuel sources.
Phase 3 – Industrial Scale (5–12 Years): Develop compact net-positive fusion reactor leveraging breakthroughs in superconductors & plasma stability.
Phase 4 – Commercialization (12+ Years): Mass-produce portable clean energy reactors for industrial, urban, and remote applications.

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