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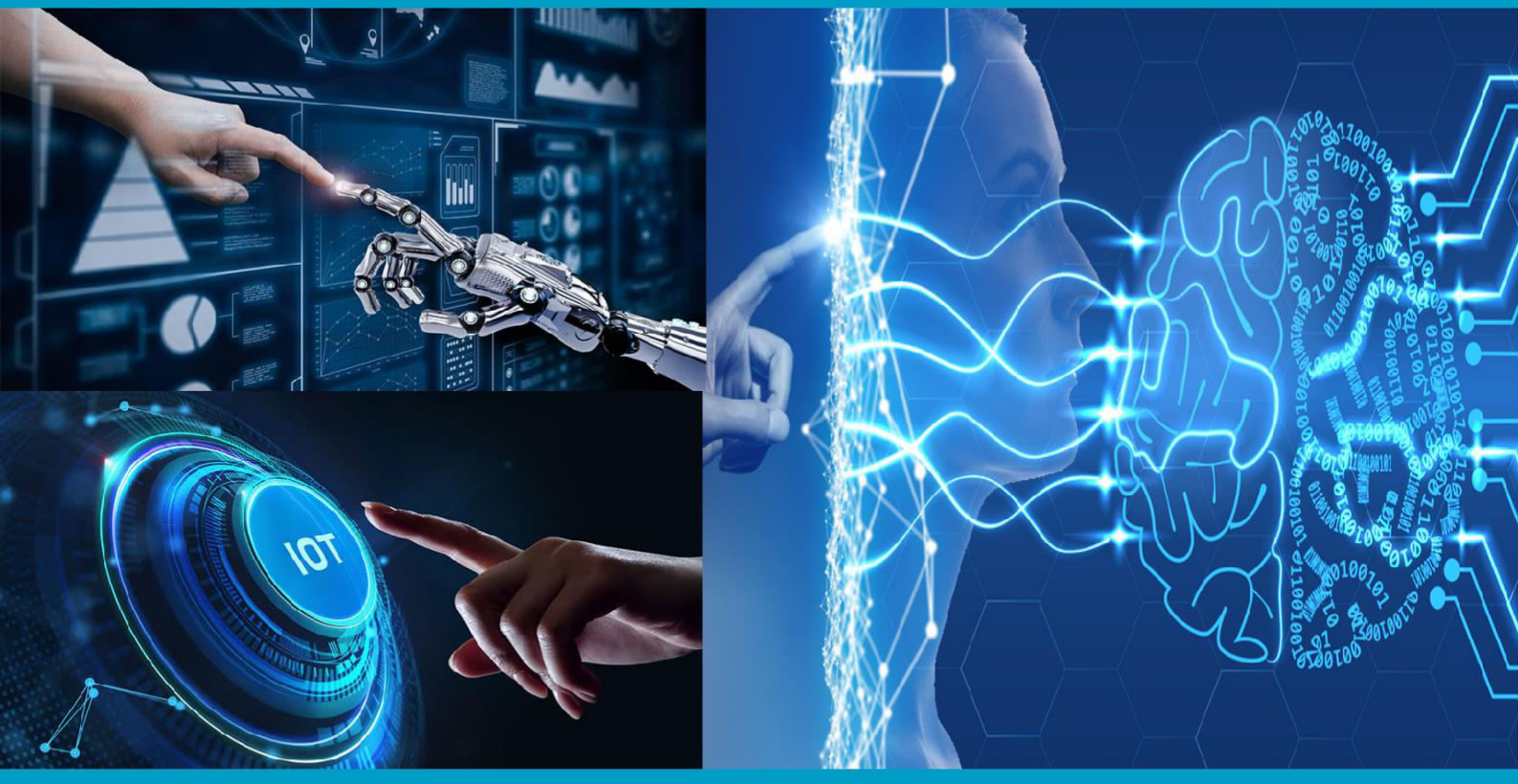

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Fabrication of 3D Printer and Composing 3D Printed RC Car

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ABSTRACT: Advancing 3D printing technology through the formulation of a precision-engineered 3D printer with the detailed exploration of design parameters, material selection, and manufacturing processes, excluding the technical issues involved in creating a strong printing platform. The subsequent phase goes into the technical compilations of utilizing this formulated 3D printer to compose RC car. From layering techniques to structural optimization, the abstract provides an in-depth analysis of the technical aspects governing the production of intricately designed and functionally superior RC car components. This study underscores the technical evolution in 3D printing, showcasing its application in pushing the boundaries of precision engineering within the realm of RC car manufacturing. Through this work, we aim to highlight how advancements in 3D printing technology are revolutionizing the manufacturing industry by making it possible to create complex designs with enhanced functionality. Overall, this study serves as an essential resource for anyone looking to understand the technical touch involved in advancing 3D printing technology.

KEYWORDS: Additive Manufacturing, Fused Deposition Modelling (FDM), Print Bed, Axis Calibration, Gantry System, Print Speed, Chassis Design, CAD Software, Slicing Software**,** Infill Density, PLA/ABS/TPU Filaments.

I. INTRODUCTION

3D printing, also known as additive manufacturing, is a revolutionary technology that has transformed the landscape of design, prototyping, and manufacturing. Unlike traditional subtractive manufacturing methods, which involve cutting or shaping materials to create objects, 3D printing builds objects layer by layer from digital designs. This process offers unparalleled flexibility, allowing for the creation of highly complex and customized objects with intricate geometries that would be difficult or impossible to achieve using conventional techniques.

Types of 3D Printing Technologies

1. Fused Deposition Modelling (FDM): FDM is one of the most popular 3D printing technologies. It works by extruding thermoplastic filaments through a heated nozzle, which deposits material layer by layer to build the object. This method is widely used for rapid prototyping, concept modelling, and low-volume production of plastic parts.

2. Stereolithography (SLA): SLA uses a vat of liquid resin and a UV laser to solidify the resin layer by layer, creating the desired object. SLA is known for its high precision and ability to produce detailed, intricate parts with smooth surface finishes.

3. Selective Laser Sintering (SLS): SLS utilizes a high-powered laser to selectively fuse powdered materials, such as nylon or metal, into solid layers. This technology is commonly used for producing functional prototypes, end-use parts, and complex geometries

4. Selective Laser Melting (SLM) / Direct Metal Laser Sintering (DMLS):SLM/DMLS employs a high-powered laser to melt and fuse metal powders together, layer by layer, to create fully dense metal parts. This method is widely utilized in aerospace, automotive, and medical industries for producing lightweight, high-strength components.

II. RELATED WORK

Initiated in the 1980s with the invention of stereolithography (SLA). In 1983, Chuck Hull filed a patent for this process, using UV light to build objects layer by layer. This marked the birth of the additive manufacturing industry and laid the foundation for future ADVANCEMENTS. The 1990s saw the development of pioneering technologies in 3D printing technology.

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The Birth of 3D Printing: 1980s and 1990s
• Hideo Kodama's 1981 development of the first functional rapid prototyping system using photopolymer materials.
• Chuck Hull's 1983 invention of stereolithography (SLA) and the University of Texas at Austin's 1986 development of selective laser sintering (SLS).

1990s: Pioneering Technologies and Commercialization
• 3D Systems, founded by Chuck Hull, commercializes SLA technology.
• Stratasys introduces fused deposition modelling (FDM) technology.
• EOS GmbH launches the EOSINT M250, the world's first commercial SLS system.
• Z Corporation introduces the Z402, the world's first commercial 3D printer.

2000s: Mainstream Adoption and Expansion
• MakerBot Industries releases the Cupcake CNC, a DIY 3D printer kit.
• Form labs launches the Form 1, a desktop SLA 3D printer.

2010s: Technological Advancements and Innovation
• Carbon unveils Continuous Liquid Interface Production (CLIP) technology.
• HP launches the HP Jet Fusion 3D Printing Solution.
• Desktop Metal launches the Studio System.
• Mark forged introduces the Metal X, a desktop metal 3D printer.

2020s and Beyond: Future Trends and Opportunities
• ICON and New Story unveil the Vulcan II, the world's first 3D-printed neighbourhood.
• Tel Aviv University successfully 3D prints a small heart with human tissue.

III. METHODOLOGY

Components od 3D printer:- DC Power Supply Overview, Mother Board, Graphical Display, Lead Crew, Extruder Motor, Hot End, Cooling Fan, Limit Switch, GT2 Belt, Flange Coupler, Eccentric Nut, Aluminium Profile
SolidWorks: A Comprehensive CAD Software• Comprehensive CAD software for creating, simulating, and documenting 3D models.• Enables design of complex mechanical components and assemblies.• Offers extensive parametric modelling capabilities for quick and efficient design iterations.• Provides advanced simulation and analysis tools for assessing structural integrity, motion behaviour, and thermal performance.• Provides comprehensive drawing and documentation tools for generating detailed engineering drawings and assembly instructions.• Facilitates collaboration by allowing multiple users to work on the same design simultaneously.• Integrates seamlessly with other software applications for smooth data exchange and interoperability.• Widely used in various industries including automotive, aerospace, consumer products, and industrial machinery.

Ulti Maker Cura: Open-Source 3D Printing Software Ulti Maker Cura is a slicing software that converts 3D models into G-code instructions for 3D printers. Features include an intuitive UI for easy import, positioning, scaling, and manipulation of 3D models, and features for adjusting print settings. It offers extensive customization options, allowing users to fine-tune print settings to balance print quality, speed, and material usage. It comes with pre-configured printing profiles for various 3D printers and materials, which can be further adjusted to suit specific needs. It supports a plugin system that extends its functionality, allowing users to install plugins for additional features. The software is regularly updated with bug fixes, performance improvements, and new features. To get started, users can download and install it, import a model, slice the model, preview and print, and transfer the G-code file to their 3D printer.

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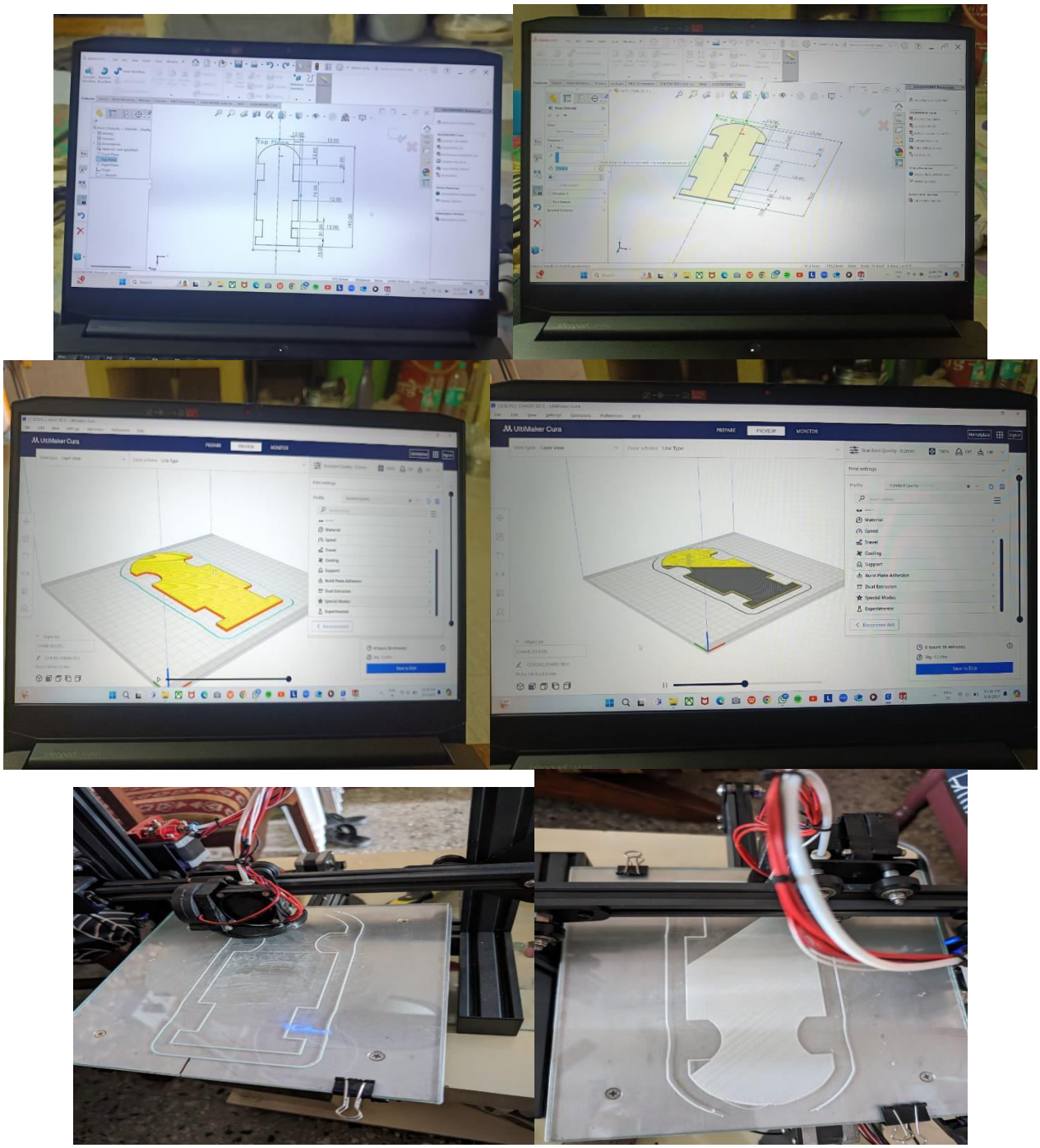
IV. EXPERIMENTAL RESULTS

Figures shows the results of assembled printer, modelling model in SolidWorks and slicing in Ulti maker cura for g.code file so that the model can be printed



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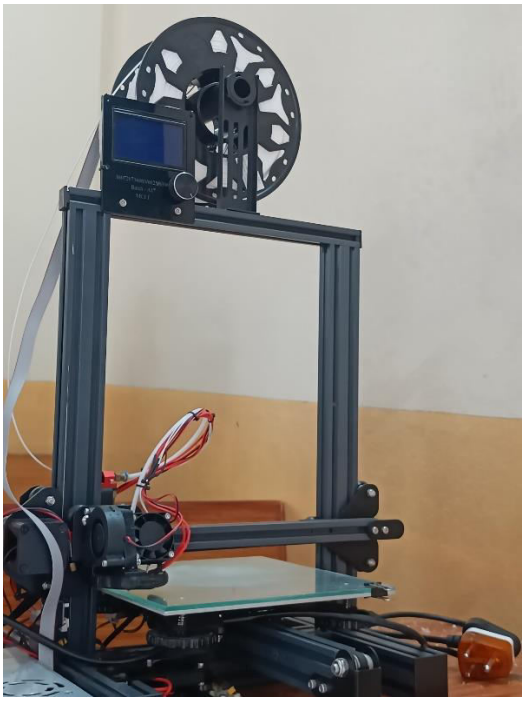

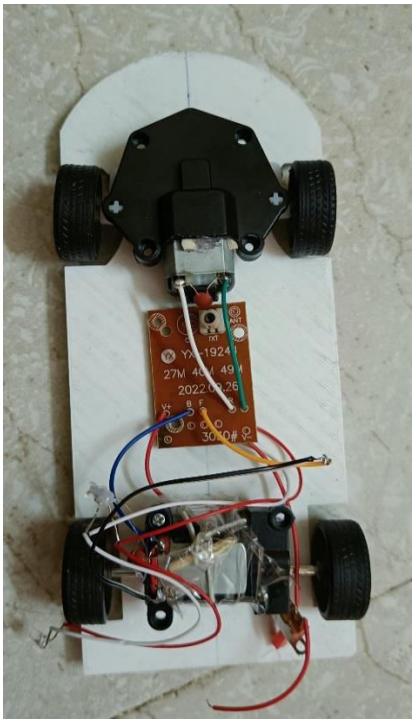

V. CONCLUSION

Successfully developed a functional 3D printer for a 3D printed RC car. Demonstrated the practical applicability of 3D printing technology in various fields, especially in the automotive industry. Benefits include rapid prototyping, cost efficiency, and the ability to create complex geometries.3D printing's flexibility and precision make it a valuable tool for innovation and customization in automobile design and production. Showcases how 3D printing can revolutionize the automotive sector by enabling faster development cycles, reducing production costs, and fostering innovation.

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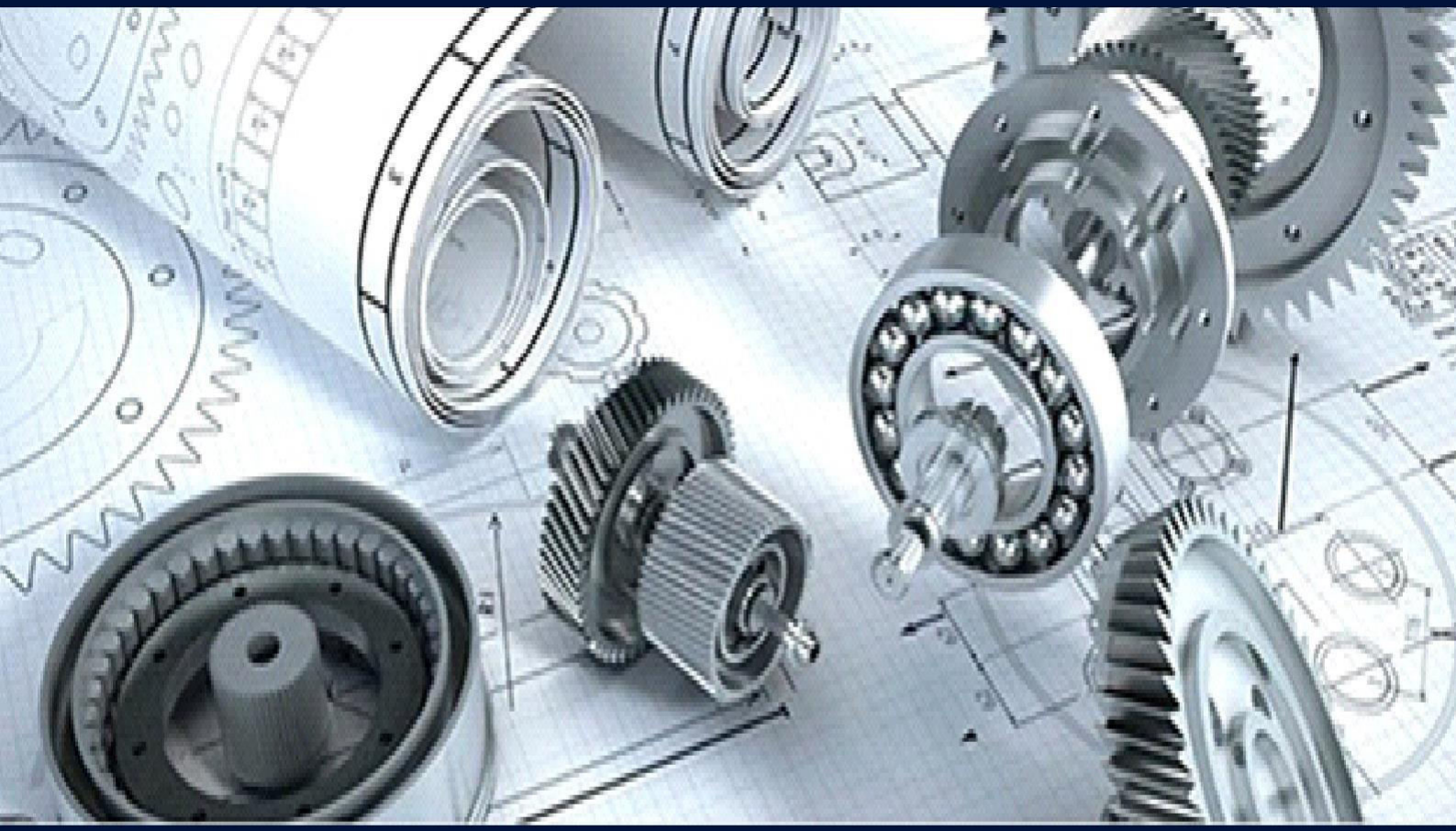

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