MULTIMAKER FOLDABLE MODUMACH

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College *: Channabasaveshwara Institute of Technology, Tumakuru*
Branch *: Department of Mechanical Engineering*
Guide(s) *: Prof. Natesh C. P*
Student(S) *: Mr. Nagendra Prasad G.*
Mr. Harish Gowda H.
Mr. Darshan G. V.
Mr. Santhosh Kumar C. M.

Keywords:
Multipurpose CNC Machine, Foldable CNC machine, Portable CNC machine, Laser Cutting, 3D Printing, Milling, 2D Plotting, Innovation.

Introduction / Background:

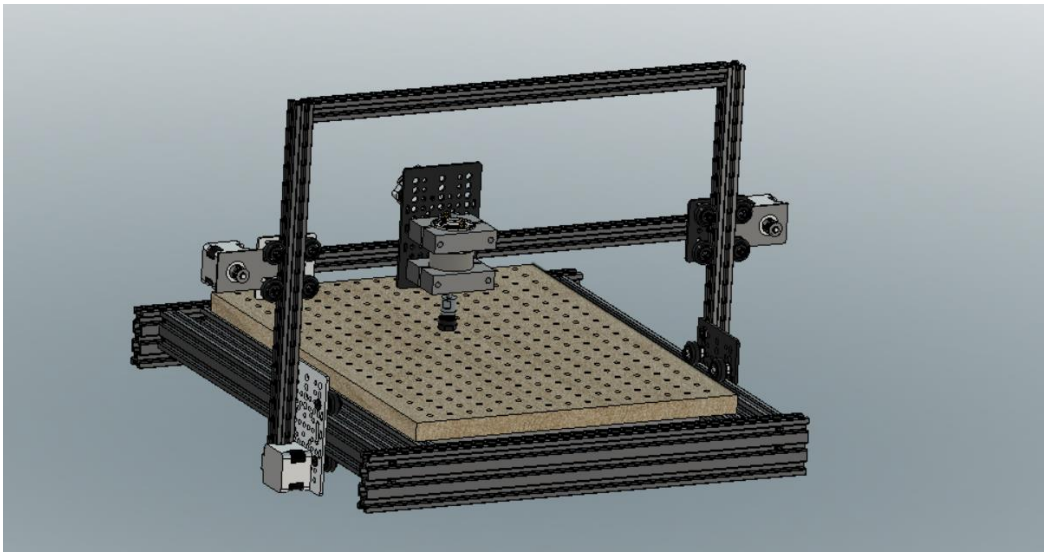


FIGURE 1: MFM_1.1(CAD MODEL)

The Multimaker Foldable Modumach is a revolutionary tool designed to bridge the gap between theoretical knowledge and practical application for students and hobbyists. In the current educational landscape, students often struggle to transform their innovative ideas into tangible projects due to a lack of practical skills, tools, and resources. This problem is exacerbated in countries like India, where access to sophisticated machinery is limited compared to developed nations. The New Education Policy (NEP) 2020 emphasizes the importance of practical skills and multidisciplinary learning, yet without the necessary tools, students' potential remains untapped.

Previous attempts to provide practical tools have been limited to single-function machines, which are not only costly but also space-consuming. The Multimaker Foldable Modumach addresses these issues by integrating multiple functionalities into a single, portable, and foldable device. This machine can perform laser cutting and engraving, 2D plotting, 3D printing, and milling, making it an all-in-one solution for

creating prototypes and projects. By continuously upgrading and adding new operations as funds become available, the Modumach ensures that users have access to the latest technology to bring their ideas to life.

Objectives:

1. To provide an affordable, multifunctional tool that enables students and hobbyists to create prototypes and projects.

2. To enhance practical learning and skill development in line with the New Education Policy 2020.

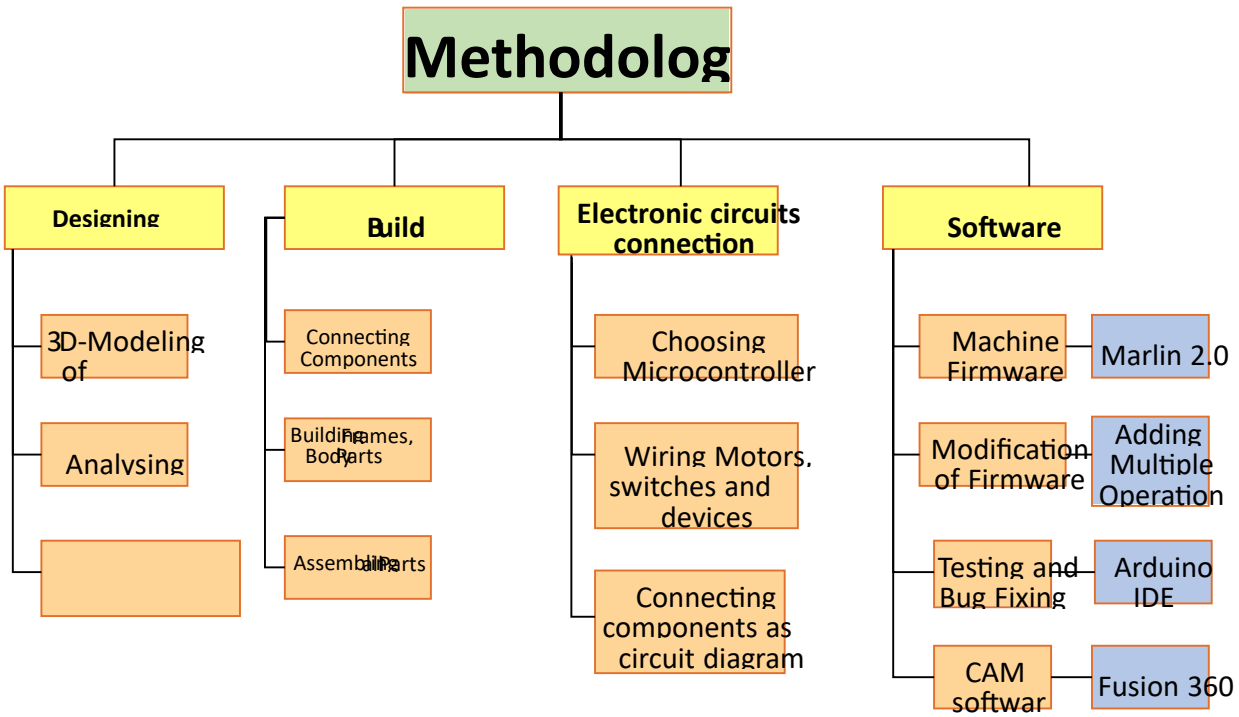
3. To reduce the dependency on multiple single-function machines, saving both space and cost.

4. To foster innovation and creativity by providing a versatile platform for experimentation.

5. To continuously upgrade the machine with new functionalities based on user feedback and technological advancements.

Methodology:

The development of the Multimaker Foldable Modumach involved several stages, from initial concept design to the final prototype. The methodology can be divided into the following steps:



Results and Conclusions:

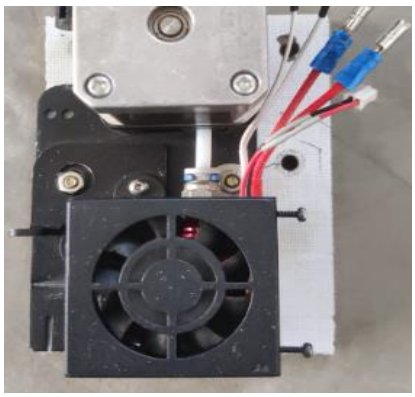
The Multimaker Foldable Modumach successfully integrates multiple manufacturing processes into a single, compact, and portable device. Initial testing has demonstrated its capability to perform laser cutting and engraving, 2D plotting, 3D printing, and milling with precision and reliability. The machine's modular design allows for easy upgrades and additions of new functionalities, ensuring it remains relevant as technology advances. The project has shown that it is possible to provide an affordable and versatile tool that can significantly enhance practical learning and innovation among students and hobbyists.

Figure 2: MFM machine

The development of the Multimaker Foldable Modumach involved a meticulous design process, integrating cutting-edge technologies and user-centric principles. Through a combination of drilling, milling, 2D plotting, laser cutting and engraving, and 3D printing functionalities, the Modumach offers unparalleled versatility and adaptability. Its foldable and portable design ensures accessibility and convenience, empowering users to bring their ideas to life anytime, anywhere.

TOOLS FOR DIFFERENT OPERATIONS

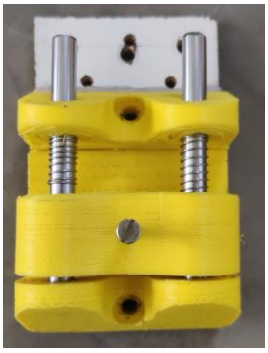
1. **3D Printing**



2. **Laser engraving and cutting**

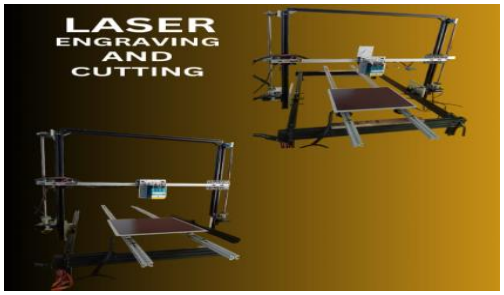
3. Drilling **4. Milling** **5. 2D-plotting**

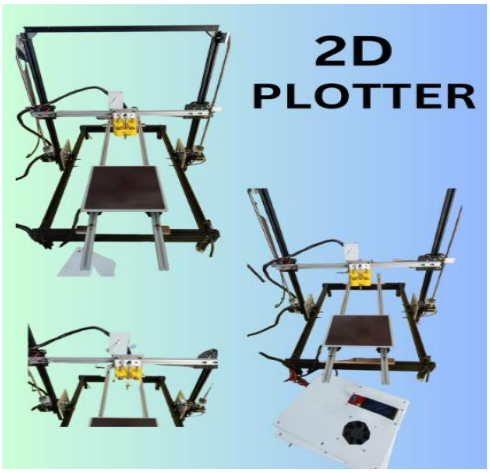




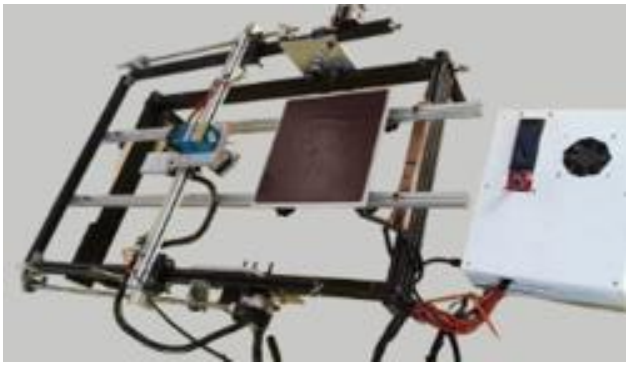
The methodology employed in this project focused on iterative prototyping and user feedback, ensuring that the Modumach meets the diverse needs of its users. Real-world examples illustrate the Modumach's ability to facilitate project-based learning, foster creativity, and drive innovation. Whether in educational settings, small-scale production environments, or individual maker spaces, the Modumach serves as a catalyst for exploration and experimentation.

Operations Performed in this machine





MACHINE UNFOLDED FOR WORKING



MACHINE FOLDED FOR STORING AND PORTABLE PURPOSE

Conclusion:

In conclusion, the Multimaker Foldable Modumach represents more than just a machine; it embodies a vision for a future where creativity knows no bounds. By providing individuals with the tools, they need to realize their ideas, the Modumach fosters a culture of innovation and empowers the next generation of creators and inventors. As we continue to refine and expand the capabilities of the Modumach, we remain committed to driving positive change and shaping a brighter future through technology.

Through its innovative design and user-centric approach, the Modumach paves the way for a new era of exploration and discovery.

What is the Innovation in the Project?

The primary innovation in the Multimaker Foldable Modumach lies in its multifunctional and foldable design, which consolidates several manufacturing processes into one machine. This not only saves space and reduces costs but also makes advanced manufacturing tools accessible to a broader audience. Additionally, the machine's modular design and open-source software platform allow for continuous upgrades and customization, fostering a community of innovators who can contribute to its development.

Scope for Future Work:

The future scope of the Multimaker Foldable Modumach includes several areas for enhancement and expansion:

1. Adding More Functionalities:

- Incorporate additional operations such as CNC routing, and pick-and-place for electronic components.
- Develop attachments for tasks like painting, welding, and soldering.

2. Improving Portability and Ease of Use:

- Refine the foldable design to make it even more compact and lightweight.
- Enhance the user interface for easier operation and better user experience.

3. Expanding Educational Outreach:

- Collaborate with educational institutions to integrate the Modumach into their curriculum.
- Develop specialized training programs and workshops to help users maximize the machine's potential.

4. Exploring Commercial Applications:

- Identify potential commercial uses for the Modumach in small businesses and startups.
- Develop partnerships with industries to explore new market opportunities.

5. Enhancing Software Capabilities:

- Implement advanced features like automatic tool change and real-time monitoring.
- Develop a cloud-based platform for remote operation and data analysis.

With continuous improvements and community contributions, the Multimaker Foldable Modumach aims to become the go-to tool for innovation and creativity in various fields.