Synopsis

Project reference number: **46S_BE_0072**

Title: Development of low-cost sustainable 3-D printer using waste plastic

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Keywords: 3D-printer, additive manufacturing, 3D models, filament, affordable, cost effective.

Introduction:

The advent of 3D printing technology has brought about a revolution in the manufacturing industry, allowing for the creation of complex shapes and structures that would have been difficult or impossible to produce using traditional methods. However, the high cost of commercial 3D printers has limited their accessibility, particularly for small businesses and hobbyists. This project aims to design and develop a cost-effective 3D printer that can provide the benefits of this technology without the high price tag. By carefully selecting components and optimizing the system design, the goal is to create a 3D printer that can produce high-quality prints while minimizing the overall cost. The resulting printer can be used for a wide range of applications, including product development, prototyping, and educational purposes. This project will contribute to the advancement

of 3D printing technology and make it more accessible to a wider range of people.

Objectives:

To design and implement 3D printer with cost-effective parts and to eliminate the complexities of existing 3D printing technologies.

To program the Arduino, simulate the 3D models in Blender and printing them using Pronterface.

Research and implementation of different methods of producing filaments through reusable plastic for the purpose of 3D printing.

Selection of low-cost components for designing and developing a 3D Printer.

Determining the overall size of the printer based on the selected components and checking its feasibility.

Interfacing the hardware components with the help of programming through an IDE code.

Learning the design process of 3D models and their implementation into physical models by the aid of modern tools such as Blender, AutoCAD Maya, and Pronterface.

To make 3D printing affordable for every person around the globe.

Methodology:

To combine both hardware components and software tools (Arduino IDE, Blender, Pronterface).

Construction of support pillars and base of the 3D printer using wood to implement the X, Y and Z stepper motors.

To rig up the logic block (Arduino, Ramps1.4, A4988 drivers) along with extruder and hot-end modules.

Placing the logic block on the rear end of the Z-stepper motor and hot bed on the X-stepper motor.

Installing the Hot-End module onto the Y-stepper motor board by means of acrylic sheets.

Connecting the Extruder to the Hot-End module using a plastic pipe and passing the filament through it.

Connecting the X, Y and Z stepper motors to the logic block.

Programming the Arduino with the help of an IDE based on the specifications of the 3D printer.

Designing the 3D model using Blender and printing the same using Pronterface.

To research and determine alternatives to produce filaments using reusable plastic.

Future Scope:

The future scope of 3D printers is incredibly promising and holds vast potential across various industries. As technology continues to advance, 3D printing is poised to revolutionize manufacturing, healthcare, architecture, and even space exploration. With the ability to create complex objects with precision and efficiency, 3D printers can streamline production processes, reduce costs, and enable customization on a whole new level. In healthcare, 3D printers have the potential to revolutionize medical device manufacturing, prosthetics, and even organ transplantation. Furthermore, the integration of 3D printing with sustainable materials can contribute to the development of eco-friendly solutions. As research and innovation in this field continue to flourish, the future of 3D printers is bound to bring remarkable advancements and transformative changes to numerous industries.