

ENTREPRENEUR, ELECTRICAL ENGINEER, INVENTOR, FOUNDER, BUSINESS OWNER, 3D PRINTING SPECIALIST, 3D PRINTING PROFICIENT, MACHINERY EXPERT, WEB DESIGNER, WEB DEVELOPER, GRAPHIC DESIGNER, AUTHOR, RESEARCHER, BLOGGER, INVESTOR, BUSINESSMAN.

Email ihussain.bee18seecs@seecs.edu.pk

LinkedIn linkedin.com/in/iqbal-hussain-

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Mobile 0092 348 9596 194

Portfolio https://www.websolz.net/iqbal Address Bara Bandai, Swat, KPK, Pakistan.

19201

SCNIC 15602-9341843-3

## CAREER PROFILE

## **Electrical Engineering & 3D Printing**

A talented Electrical Engineer with a Bachelor's from the esteemed School of Electrical Engineering and Computer Science (SEECS) at National University of Sciences and Technology (NUST) in Islamabad, Pakistan, boasting 5+ years of experience in the exciting world of 3D Printing and Manufacturing. 3D Printers Design and Development, Expert in Filament Extrusion Plant manufacturing, 3D Modeling, CNC, Machining, Extruders, and Extrusion, as well as skilled in Laser Engraving and Laser Engravers. An asset to any organization in this cutting-edge industry.

## **Graphic Design & Web Design**

With 12+ years of experience and expertise in graphic design, web design and development, this highly skilled professional has honed their craft through a combination of innovative design techniques and leading tools such as Wordpress, Elementor, ACF, Divi, Canva, Adobe XD, Photoshop, Illustrator, After Effects. As an accomplished designer with a strong portfolio, he has successfully served clients globally through their Australian-based digital services and products company Envato, with a record of 1400+ sales of digital items on top marketplaces such as Envato Market, Graphic River, and Theme Forest. With a proven track record of delivering 100+ successful projects on Envato Studio, this talented individual is equipped to handle even the most complex design challenges and bring your vision to life.

### **BASIC INFO**

Name Iqbal Hussain
Gender Male
Date of Birth 07th February, 1999
Nationality Pakistan
National Identity Number 15602-9341843-3

## CONTACT

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## **EDUCATION**

SEECS, NUST, Pakistan BE in Electrical Engineering Islamia College Peshawar FSc in Pre Engineering Al Razi Public School Kanju Swat SSC in (Science)

## **ACHIEVEMENTS**

3rd Position in BISE Swat in SSC Best Adjudged Industry Project, NUST Featured Author at Envato Market Handpicked Freelancer at Envato Studio

### COMMUNITY SERVICE

Online Examination System for Entrance Examinations of Pakistani Universities

## **EXPERIENCE - ENTREPRENEURIAL**

### 3D Printers | Electrical Engineer | CEO | Mach Solz | NICHE, NUST

Entrepreneurship - Startup - Founder

August, 2018 - Present

Leveraging 5+ years of experience in 3D printing and related technologies, I have successfully designed and prototyped a cutting-edge 3D printer. My passion for innovation and expertise in filament extrusion, CNC machining, and laser engraving has driven me to pursue the commercialization of my prototype by establishing a firm dedicated to 3D printing solutions. I am highly motivated to bring my innovative ideas to market and make a lasting impact in the industry.

### 3D Printing | Electrical Engineer | CEO | Mach Solz | SEECS, NUST

Entrepreneurship - Startup - Founder

August, 2018 - Present

Experienced 3D Printing Professional with extensive knowledge of leading software such as Autocad, Solid Works, Tinkercad, Cura, and Pronterface. Adept in designing, prototyping, finishing, painting, managing orders, shipping, maintenance, calibrating, repairing, and testing. Skilled in executing all aspects of 3D printing to deliver high-quality, finished products to clients.

## CNC & Laser Engraving | Electrical Engineer | CEO| Mach Solz | IAEC, NUST

Entrepreneurship - Startup - Founder

August, 2018 - Present

With extensive experience in both CNC machining and laser engraving, I have honed my skills in operating CNC machines, designing and creating detailed CNC models, and using laser engraving to produce precise and intricate designs. I am well-versed in various CAD/CAM software, including Fusion 360, Inkscape, and CorelDraw, and have a deep understanding of the technical aspects of CNC machining and laser engraving, including speed and power control, material selection, and tool paths. My ability to design and develop CNC Machines, Laser Engravers, and its operation, troubleshooting, and maintainance, combined with my creativity and attention to detail, have made me a valuable asset in these areas.

### Nano-generators for Self Powered IoTs | EE | RA | RIMMS, NUST

Job - Research Assistant - Part Time

April, 2022 - October , 2022

With a strong understanding of the Internet of Things (IoT) and the role of energy generation within connected devices, I have honed my expertise in designing and testing triboelectric nanogenerators. These innovative devices hold great potential for powering IoT systems without the need for traditional batteries, and I am proud to have contributed to this field through my work. I have a deep understanding of the technical aspects of nanogenerator design, including material selection and device performance optimization, and am well-versed in utilizing CAD/CAM software such as Autocad and Solid Works to bring my ideas to life.

### Graphic Design | Graphic Designer | Envato | Graphic River

Entrepreneurship - Own Business - Self Employment - Founder

May, 2011 - Present

With a passion for design and a talent for creativity, I have established a successful career in graphics design. My portfolio showcases a variety of projects, ranging from magazines to eBooks, and demonstrates my expertise in the field. My experience in creating graphics design assets and contributing to successful projects has resulted in 1400+ sales on platforms like Graphic River, Envato Market. My combination of technical skill and artistic flair makes me a valuable asset to any graphics design project.

### Web Design | Web Designer | Envato | Themeforest

Entrepreneurship - Own Business - Self Employment - Founder

January, 2013 - Present

As a seasoned web designer, I have a proven track record of delivering successful projects. My expertise in both web design and development has led to 1400+ sales on platforms such as Theme Forest, Envato. I specialize in creating top-notch WordPress themes and Elementor template kits, and bring a keen eye for design and a deep understanding of the technical aspects of web design to every project I work on.

## Graphic & Web Design | Designer | Freelancer | Envato Studio

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### DEGREE

## **Electrical Engineering**

A highly skilled Electrical Engineer with a Bachelor's degree in Electrical Engineering from the esteemed School of Electrical Engineering and Computer Science (SEECS) at National University of Sciences and Technology (NUST) in Islamabad, Pakistan. Possessing a strong foundation in the principles of electrical systems and their applications, I have developed expertise in designing and analyzing electrical circuits and systems, as well as programming and control systems. With 5+ years of experience in the exciting world of 3D Printing and Manufacturing, I am equipped with the knowledge and expertise to tackle complex challenges in the field of Electrical Engineering.

## **COMMUNITY WORKS**

## Facebook Group | Admin

## Community Service | Volunteering | Mentoring | Coaching

As an admin of a vibrant and engaged Facebook group focused on 3D printing, printers, and filaments, I have had the privilege of providing valuable community service, volunteering, mentoring, and coaching to members from all over the world. Our group has become a hub for sharing knowledge, troubleshooting, and fostering connections in this exciting industry, and I am proud to be a part of it.

### VOLUNTEER EXPERIENCE

## Development of an Online Examination System for Pakistani University Entrance Exams

As part of my dedication to giving back to the community, I designed an online examination system for entrance exams of Pakistani universities. The system aimed to provide a convenient and accessible way for students to take their exams remotely while maintaining the integrity of the exam process. I am proud to have contributed to the improvement of the education system in Pakistan and to have promoted academic integrity through this project.

## FINAL YEAR PROJECT

### Fabrication of Economical 3D Printer

As a talented Electrical Engineer with a Bachelor's degree in Electrical Engineering from the esteemed School of Electrical Engineering and Computer Science (SEECS) at National University of Sciences and Technology (NUST) in Islamabad, Pakistan, I am proud to have completed my final year project on the "Fabrication of Economical 3D Printer". This project earned me the "Best Adjudged Industry Award" and "Best Adjudged Industry Prize" in the form of a bank cheque from a group of prominent technology companies, including BCUBE, RAPIDILICON, SPS, TRUID, and RAPIDEV, during the SEECS Open House for "Best Adjudged Industry Project". I am excited to have contributed to the advancement of 3D printing technology and look forward to pursuing further innovative projects in the future.

## **EXPERIENCE - FREELANCING**

## Web Design | Designer | Freelancer | Upwork

Entrepreneurship - Own Business - Self Employment - Founder

#### July, 2022 - Present

Experienced web designer specializing in WordPress themes, Elementor templates, and custom Elementor/Wordpress websites. Proven success on Upwork. Strong technical background, exceptional design skills, and dedication to delivering top-quality work. Ready to elevate your online presence.

## STARTUPS - FOUNDER

# Mach Solz | Startup | Founder | 3D Printers & Filaments | Company Entrepreneurship - Startup - Own Business - Self Employment - Founder

As the founder of Mach Solz, a startup specializing in 3D printers and filaments, I possess a wealth of entrepreneurship experience. With the ability to successfully run a startup and manage my own business, I have gained valuable skills in self-employment. Mach Solz is a reflection of my passion and dedication as a founder, and I am proud to have established a thriving company in the 3D printing industry.

# Web Solz | Startup | Founder | Web Design & Development | Agency Entrepreneurship - Startup - Own Business - Self Employment - Founder

As the founder of Web Solz, a startup web design and development agency, I have demonstrated my entrepreneurship skills and ability to run a successful business. Owning and operating my own agency has provided me with the invaluable experience of self-employment, while contributing to the growth of the web design and development industry.

## **ACQUISITION - STARTUPS**

# Invatu | Startup | Founder | Education & Tech Solutions | Company Entrepreneurship - Startup - Own Business - Self Employment - Founder

As the Founder of Invatu, a startup specializing in education and tech solutions, I have gained valuable experience in entrepreneurship, successfully running and owning my own business. Invatu has provided me with self-employment and the opportunity to make a positive impact on the education sector through innovative solutions. Invatu's success as a startup in the education and tech solutions category was quickly acknowledged, and several years ago, it was acquired by a prominent international company. This acquisition attested to the high value of Invatu's offerings and the impact of my entrepreneurial efforts as its founder.

## RESEARCH - RESEARCHER - ARTICLES

### Researcher | Articsles | Research Gate | 3D Printers, 3D Printing, Filaments Researcher - Publications - Expertise - Knowledge - Experience

As a dedicated researcher and expert in the field of 3D printing, I have published 50+ research papers on Research Gate, focused on 3D printing technology, 3D printers, and 3D printer filaments. This experience has allowed me to gain extensive knowledge and expertise in the field of 3D printing and filaments, which has contributed to the continued advancement of this innovative technology.

## **BOOKS - AUTHOR**

# Books | Author | 3D Printers, 3D Printing, Filaments | Amazon KDP Author - Books - Expertise - Knowledge - Experience

As an accomplished author and expert in the field of 3D printing, I have published 10+ books on Amazon KDP related to 3D printers, 3D printing, and 3D printer filaments. These publications showcase my extensive knowledge and experience in the industry and have been well received by readers worldwide.



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## **INDUSTRY AWARD**

### **Fabrication of Economical 3D Printer**

This project was recognized as the "Best Adjudged Industry Project" at the SEECS Open House, and was awarded the "Best Adjudged Industry Award" by prominent technology companies, including BCUBE, RAPIDILICON, SPS, TRUID, and RAPIDEV. These accolades are a testament to your exceptional work and dedication to the field of Electrical Engineering and 3D Printing.

## **INDUSTRY PRIZE**

### **Fabrication of Economical 3D Printer**

This project was recognized as the "Best Adjudged Industry Project" at the SEECS Open House, and was honored the "Best Adjudged Industry Prize" by prominent technology companies, including BCUBE, RAPIDILICON, SPS, TRUID, and RAPIDEV. These accolades are a testament to your exceptional work and dedication to the field of Electrical Engineering and 3D Printing.

## INNOVATION CONTEST

### SEECS OPEN HOUSE - 3rD Ranked Winner

I am thrilled to have been awarded the "Best Adjudged Industry Award" and "Best Adjudged Industry Prize" at the SEECS Open House competition for my final year project on the "Fabrication of Economical 3D Printer". This achievement, bestowed upon me by prominent technology companies, including BCUBE, RAPIDILICON, SPS, TRUID, and RAPIDEV, is a testament to my passion for innovation and dedication to advancing 3D printing technology. I am proud to be an Electrical Engineer with a Bachelor's degree from the prestigious School of Electrical Engineering and Computer Science at NUST and look forward to contributing to groundbreaking projects in the future.

## **TECH COMPETITION**

# **Computer Hardware Projects Exhibition and Competition**

As a dedicated innovator and tech enthusiast, I was thrilled to participate in the Computer Hardware Projects Exhibition and Competition at SZABIST University Islamabad, Pakistan. This competition provided a valuable opportunity to showcase my skills in computer hardware and demonstrate my innovative 3D printer project.

My participation in this competition not only allowed me to showcase my technical abilities, but also helped me to develop my project further and learn from the work of other talented individuals in the field. Overall, this experience was a testament to my passion for technology and my commitment to pursuing excellence in all of my endeavors.

## **BLOGS - BLOGGER**

## Blogs | Blogger | 3D Printers, 3D Printing, Filaments | Mach Solz Blog Blogger - Blogs - Expertise - Knowledge - Experience

As an accomplished writer and expert in the field of 3D printing technology, I have published 1000+ insightful and informative blog articles on Mach Solz Blog. Through my in-depth knowledge and experience, I have provided valuable insights and analysis on topics related to 3D printers, 3D printing, and 3D printer filaments. My dedication to staying up-to-date with the latest trends and advancements in the field has helped me to provide readers with valuable and relevant information.

## EXPERIENCE LETTER - ENVATO - AUSTRALIA

## Designer | Web Design & Development | Graphic Design | Envato Studio Service Letter, Experience Letter, Reference Letter, Recommendation Letter Freelancer - Designer - Web - Graphics - Expertise - Knowledge - Experience

As a skilled freelancer in web design and development and graphic design, I have completed over 100 successful projects on Envato Studio with 10+ years of experience. I am proud to have received an Experience Letter and Service Letter from Envato, recognizing my expertise,

received an Experience Letter and Service Letter from Envato, recognizing my expertise, knowledge, and exceptional work in delivering top-notch digital services. This acknowledgement is a testament to my ability to achieve outstanding results and deliver high-quality work in the freelance market.

## **EXPERIENCE LETTER - CKY MEDIA - AUSTRALIA**

## Designer | Web Design & Development | Graphic Design | CKY Media

Service Letter, Experience Letter, Reference Letter, Recommendation Letter Freelancer - Designer - Web - Graphics - Expertise - Knowledge - Experience

As a highly skilled and experienced freelancer, I have been fortunate to work with CKY Media, an esteemed website design and development company in Australia. I am pleased to include a service letter, experience letter, reference letter, and recommendation letter from CKY Media in my portfolio. Through my work with CKY Media, I have provided exceptional web design and development services, including custom WordPress development, theme set-ups, and debugging. I am proud to have received praise for my strong communication skills, fast turnaround times, and ability to find innovative solutions to unique development requests. The letters from CKY Media are a testament to my expertise, knowledge, and experience in the field of web and graphic design.

## **INNOVATIONS**

### 3D Printer | 3D Printing

### Inventor - Fabrication of Economical 3D Printer

I successfully designed and fabricated a custom economical 3D printer from scratch, which offers a cost-effective alternative to commercial 3D printers. This project showcases my ability to design and fabricate complex mechanical systems, as well as my knowledge of 3D printing technology. The custom 3D printer boasts a large build volume, a reliable and precise extruder system, and a user-friendly interface, making it an ideal choice for hobbyists, educators, and professionals. It demonstrates my commitment to innovation and my passion for creating accessible and affordable technology.

### 3D Printer Filaments Manufacturing Plant | 3D Printing

### Inventor - Fabrication of Economical 3D Printer Filament Manufacturing Extruder Plant

Invented an economical filament extrusion plant for high-quality 3D printer filament production. Increased accessibility and affordability of 3D printing technology for a wider range of users and opened new opportunities for small and medium-sized businesses. Successfully designed and fabricated with state-of-the-art technology, the plant has received positive feedback from users and businesses, helping to increase the adoption of 3D printing technology in various industries and applications.



# OBAL HUSSAIN

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Mobile

3D Printers & 3D Printing

3D Printer Operation and Maintenance

3D Printing Quality Control and Testing

3D Printer Filament Plant Manufacturing

3D Printer Assembly and Disassembly

3D Printer Software Configuration and

Custom 3D Printer Manufacturing

3D Printer Calibration and Troubleshooting

CAD Software Knowledge for 3D Modeling

3D Printing Process Optimization

3D Printing Materials Knowledge

3D Printer Filament Manufacturing

3D Modeling for 3D Printing

**Technical** 

15602-9341843-3 **SCNIC** 

## **SKILLS**

## **Technical**

- Circuit design and analysis

- Analog and digital electronics
- Micro-controller programming
- Power distribution and transmission
- Electrical safety and code compliance
- Control system design
- Automation and control systems
- Renewable energy systems
- Electric power generation
- Industrial Process Control
- Communication Protocols

- Signal Processing and Data Analysis

## Proteus

MATLAB

**Software** 

- **PSpice**
- Simulink CircuitMaker
- AutoCAD Electrical
- **LTSpice**
- SolidWorks Electrical
- EAGLE PCB Design
- LabVIEW
- ETAP
- **PSCAD**
- CYME
- Atmel Studio
- PowerWorld Simulator
- EasyPower
- Siemens PLC
- Arduino

- **CNC Machine Operation** 

  - **CNC Machine Calibration**
  - **CNC Lathe Operation**

  - **CNC Machine Tool Path Generation**
  - **CNC Machine Tool Selection**

## **Software**

- AutoCAD
- SolidWorks
- Fusion 360
- PrusaSlicer
- OctoPrint
- Ultimaker Cura
- TinkerCAD
- Blender
- Simplify3D
- Slic3r
- Marlin
- Pronterface

**Software** 

AutoCAD

SolidWorks

Fusion 360

SolidCAM

Autodesk

DeskProto

LinuxCNC

G-code

Inkscape

**GRBL** 

Aruino

## **Mechanical Engineering**

- Mechatronics Design and Development
- Motor and Generator Design
- PLC Programming and SCADA Systems
- Drive Systems and Motor Control
- Thermodynamics and Heat Transfer
- Electric Vehicle and Hybrid Systems
- Mechanical System Design and Integration
- Prototype Design and Testing
- **Electrical Motor Control**
- Electromechanical System Design & Integration •
- Mechatronic System Testing and Evaluation
- Sensors and Actuators

## **Software**

- AutoCAD
- SolidWorks
- PLC WorkShop Suite
- Siemens TIA Portal
- Allen-Bradley PLC
- **RSLogix**
- PLC Simulator Pro
- PLC Wiring Design
- AutoDesk
- Simulink
- **Tinkercad** Fusion 360
- Blender
- SolidCAM

## **CNC & Machining Technical**

CNC Machining

Management

- **CNC Programming**
- **CNC Machine Maintenance**
- **CNC Machine Setup and Configuration**
- **CNC Milling Machine Operation CNC Router Operation**

# **Laser Engraver & Laser Engraving**

- **Technical** Laser Engraving
- Laser Engraver Manufacturing
- Laser Engraving Machine Operation and Maintenance
- Laser Engraving Process Optimization
- Laser Engraving Material Knowledge
- CAD Software Knowledge for Laser Engraving
- Laser Engraver Calibration and Troubleshooting •
- Laser Engraver Assembly and Disassembly
- Laser Engraver Software Configuration and Management
- Laser Engraving Design and Artwork Creation

## Marlin

- **Software** CorelDRAW
- Adobe Illustrator
- Inkscape
- AutoCAD
- **SolidWorks**
- Fusion 360
- **GRBL**
- G-code Marlin
- LightBurn
- **RDWorks** LaserWeb

### Web Design & Development **Technical**

- Responsive Web Design
- Content Management Systems
- Web Accessibility and User Inclusion
- Web Hosting and Server Management
- Web Analytics and User Tracking
- Interaction Design and User Interface Design
- Prototyping and Wireframing
- Web Security and Data Protection
- Database Integration and Management
- Dynamic Website Development
- Elementor Template Kits Design & Development •

## **Software**

- Sketch
- InVision
- WordPress
- WooCommerce
- Elementor
- **ACF**

- Data Encryption
- Google Analytics

· Presentation Design

# **Electrical Engineering**

- Electrical power system design
- Power electronics

- Electric machinery and drives
- Project management
- Arduino & Embedded C
- Communication Network Design
- **Technical**
- Robotics and Automation
- CAD and CAM

- **Software Engineering Technical**
- C, C++, HTML, CSS, JS **Object-Oriented Programming**

Debugging & troubleshooting

- Network programming
- Web development basics Responsive web design
- Cross-browser compatibility UI/UX design
- Database management Server-side programming
- **Graphic Design Technical**

Branding and Identity Design

- Print Design Publication Design Advertising Design
- Package Design Photo Retouching **Vector Graphics**
- **Motion Graphics** UI/UX Design

- **Software** Visual Studio Code

Code::Blocks

Sublime Text

Turbo C++

- Dev-C++
- Clion Adobe Dreamweaver
- Atom XAMPP WAMP
- **Software**
- Adobe Photoshop Adobe Illustrator
- Adobe XD
- Canva
- CorelDraw
- Figma
- Adobe InDesign
- After Effects
- Sketch Blender

- Web Design and User Experience
- E-commerce Development
- Search Engine Optimization

- WordPress Theme Design & Development
- Elementor Websites Design & Development

- Figma Adobe XD
- Shopify
- MySQL
- SSL Certificates

- Divi
- cPanel
- Firewall Configuration



ENTREPRENEUR, ELECTRICAL ENGINEER, INVENTOR, FOUNDER, BUSINESS OWNER, 3D PRINTING SPECIALIST. 3D PRINTING PROFICIENT, MACHINERY EXPERT, WEB DESIGNER, WEB DEVELOPER, GRAPHIC DESIGNER, AUTHOR, RESEARCHER, BLOGGER, INVESTOR, RUSINESSMAN

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## **PROJECTS**

## Fabrication of Economical 3D Printer

### **Project Overview**

- In this project, I successfully designed and fabricated a custom economical 3D printer from scratch.
- My aim was to create a high-performance 3D printer that would meet the needs of both hobbyists and professionals, while being affordable and accessible to a wider audience.

#### **Design & Fabrication**

- I utilized my expertise in mechanical engineering and my knowledge of 3D printing technology to design and build the custom 3D printer from the ground up.
- The printer was designed to be highly customizable, allowing users to upgrade and modify it as needed.
- I used a combination of off-the-shelf components and custom-made parts to build the printer, ensuring that it was both reliable and cost-effective.

#### **Features & Capabilities**

- The custom 3D printer boasts a large build volume, making it suitable for a wide range of applications.
- It features a reliable and precise extruder system, enabling users to print with a variety of filaments.
- The printer also includes a user-friendly interface, making it easy to operate and monitor the printing process.















### **Importance**

- This project showcases my ability to design and fabricate complex mechanical systems, as well as my knowledge of 3D printing technology.
- The custom 3D printer I built offers a cost-effective alternative to commercial 3D printers, making it an ideal choice for hobbyists, educators, and professionals.

#### Outcome

- · The custom economical 3D printer was well received by the community, and I received positive feedback from users who were able to successfully print a variety of objects with it.
- I am proud of the work I did on this project, and I believe it demonstrates my commitment to innovation and my passion for creating accessible and affordable technology.

### Fabrication of Economical Filament Extrusion Plant for Economical Production of 3D Printers Filament

### **Project Overview**

- The goal of this project was to design and fabricate a cost-effective filament extrusion plant for the production of high-quality 3D printer filament.
- This project aimed to provide an economical solution for the manufacture of 3D printer filament, making it more accessible to users and businesses alike.
- The project involved the design and construction of an economical filament extrusion plant that can produce high-quality 3D printer filament at a lower cost.

## **Design and Fabrication**

- The design of the filament extrusion plant was based on an analysis of the most cost-effective materials and components available.
- fabrication process involved precision The engineering techniques to ensure the highest level of quality in the final product.
- The machine was designed and fabricated to be user-friendly and easy to operate, making it suitable for a wide range of users.

### **Features and Capabilities**

- The filament extrusion plant was designed to produce 3D printer filament of various types, including ABS, PLA, PET, Nylon, and more.
- The machine was equipped with state-of-the-art technology to ensure the production of high-quality filament, with consistent diameter and roundness.
- The filament extrusion plant was designed to be scalable, making it possible to increase production capacity as needed.



## **Importance**

- · The development of an economical filament extrusion plant was important as it made the production of 3D printer filament more accessible and affordable.
- By reducing the cost of 3D printer filament, it became possible for more people to use 3D printing technology, leading to a wider range of applications.
- The economical filament extrusion plant also opened up new opportunities for small and medium-sized businesses to enter the 3D printing market.

#### Outcomes

- · The filament extrusion plant was successfully designed and fabricated, and has been producing high-quality 3D printer filament at a lower cost.
- The successful outcome of this project has helped to increase the accessibility of 3D printing technology, making it more affordable and available to a wider range of users.
- · The filament extrusion plant has received positive feedback from users and businesses, and has helped to increase the adoption of 3D printing technology in various industries and applications.