

# **Online Interdisciplinary Bootcamp and Hackathon**

on

## **Product Design and Prototyping with STEM enabling Real-Time Innovations Powered by Virtual Innovation Labs**

**For the following engineering branches**

- **Computer Science Engineering / Information Technology**
  - **Electronics and Communication**
  - **Electricals and Electronics**
    - **Mechanical**
    - **Civil**
  - **Instrumentation**

Powered by

**EDGEFX**  
TECHNOLOGIES

# **Bootcamp and Hackathon** **on** **Product Design and Hardware Prototyping enabling Real-Time Innovations** **Powered by Virtual Innovation Labs**

## **EdgeFX Technologies Profile**

EdgeFX is an Edtech company having 25 years of experience in the education and training industry with our prime focus on skill building. We are Govt. of India recognized startup and have won many awards and recognition in the area of technology innovation including 'Spirit of manufacturing award' and 'Woman entrepreneur of the year award'. We have also been appointed as a mentor of change for Tinkering and innovation by the Govt of India. Today we manufacture 600+ products and sell our products to 50 countries worldwide.

EdgeFX specializes in establishing Hi-Tech innovation, Design and Prototyping, Entrepreneurship Labs in Universities and Colleges.

EdgeFX along with its partners is India's largest Innovation and upskilling company and has conducted more than 150 bootcamps and hackathons in emerging technologies with leading corporates, colleges, universities and state governments.

## **Objective**

Multidisciplinary Bootcamp and Hackathon on Product Design and Prototyping from Conceptualization to Finalization Stage powered by virtual labs enabling complete Innovation Life Cycle from Ideation to Design Thinking to Computational Thinking to Physical Computing to a Final Minimum Viable Product. Create Industry-Institute Interaction for solving real-life problems and Enable experiential learning for the participants.

## **Virtual Labs used for Bootcamps and Hackathons**

- DIY STEM Tinkering Lab for Electronics Design and Prototyping
- DIY STEM Tinkering Lab for Arduino Programming, Design and Prototyping
- DIY STEM Tinkering Lab For Robotics Design and Prototyping
- Industry 4.0
- Innovation life cycle

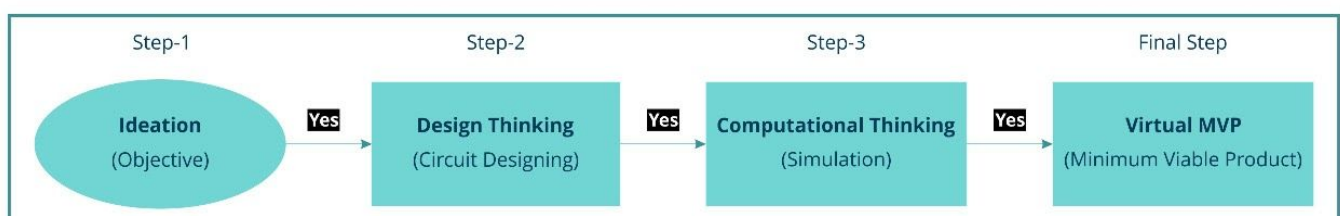
## **Bootcamp and Hackathon Schedule: Step By Step Process**

### **Inaugural Session**

### **Technical Summary**

- Bootcamp and Hackathon Introduction
- Understanding Virtual Innovation Lab Platform for Bootcamp and Hackathon
- Understanding the Industry centric Guided and Open Innovation Flow.
- Understanding Basic Electronics and STEM Concepts, Building Blocks, Circuit Building.
- Understanding Circuit and Project Live Simulation
- Conceptualization/Thinking/Simplifying the complexity. The project is first conceptualized keeping in

## **Idea to Prototyping Flow Chart**



mind the real time implementation.

- Drawing circuit schematic in the virtual Lab.
- LIVE Simulation before prototyping. LIVE Simulation before prototyping is the best way for design validation. The program is then invariably subjected to test and validation by appropriate simulation software.
- The Final Virtual prototype. The final assembly of the bread boards is carried out in accordance with the circuit frozen.
- Demonstration of MVP

### **Hackathon Introduction**

#### **Ideation Workshop**

- Ideation Presentation

#### **Prototyping**

- Technical Mentoring
- Development of Product
- Prototype Verification

#### **Checkpoint**

- Prototype Presentation

#### **Pitch Workshop**

- Pitch Presentation
- Sample Presentation
- Creating Presentations

#### **Internal Jury**

- Team Pitches to Internal Jury
- Shortlisting Top Ideas
- Top Idea Team Pitches
- Internal Jury Feedback

#### **Valedictory**

- Speeches by Dignitaries and Students
- Announcement of Top Ideas
- Vote of Thanks
- Testimonials by Dignitaries and Students
- Feedback by Students

#### **Prize Distributions**

- For Top 3 Students (I,II,III prizes)

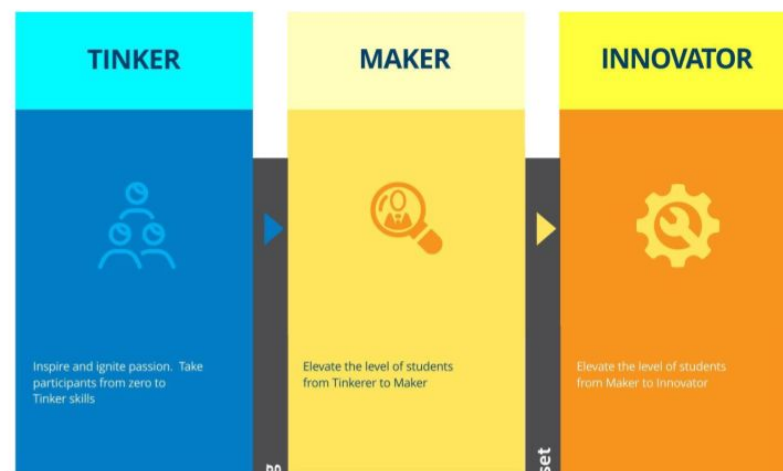
#### **Learning Outcome**

- a. Meet the TEQIP Objective of 'Improving employability in engineering institutions'.
- b. Develop Concept, fundamentals of product design and hardware prototyping.
- c. Building technical competencies towards Design Thinking, Simulation, Circuit Schematics,

- Computational Thinking, Simulation, Building Final Prototype.
- d. Enable experiential learning, intended to kindle the spirit of innovation and entrepreneurship.
  - e. Hardware Design and Prototyping of real-time products.
  - f. Help student participation in National / International competitions.
  - g. Enables experiential learning, intended to kindle the spirit of innovation and entrepreneurship among the participants.
  - h. Develop 21st century skills like problem solving, innovation, collaboration, leadership and practical skills.
  - i. Improve Entrepreneurial skills, Leadership Skills, Team working skills.
  - j. Virtual Labs enable abstract, block diagram, circuit building and simulation through CAD software, Simulating a working prototype.

### EdgeFX Innovation Development Kit Learning Outcomes

Elevates the level of a student from a  
Tinkerer → Maker → Innovator



#### Innovation Use Cases - Broad Categories

- Industrial Automation
- Smart Devices
- Home Automation
- Energy Saving
- Robotics
- Renewable energy
- Health Management
- Transportation and Communication
- Security Management
- Concepts and Fundamentals

#### Experience of Industry Mentors

One of the biggest strengths of EdgeFX is the broad range of Industry mentors across various technology and functional domains. Average experience of the mentors is 20 years in leading MNC organizations.

These Industry mentors have vast experience product development, startups and mentoring and grooming participants across various verticals.

#### **Industry Expert: UC Patnaik**

- M. Tech (Electronics); B. Tech (Electrical), NIT Rourkela (Formerly REC)
- 45 years of Industry experience in the Manufacturing, R&D sector including Philips India.
- Skills and Expertise
- Rendering System Design and Simulation, Industrial solutions and products in several high technology areas like Power Electronics, Electrical System, Embedded System, IOT, Robotics, Solar, Wireless Communication etc. to Defense, Railways and Telecommunications and education field
- Pilot projects development for Industries while designing and documenting the processes, systems and designs strategy for the same.
- Design and Development of state-of-the-art Research and Development Laboratories to facilitate research work and innovation for various organizations including Engineering Colleges.
- Competencies in design and development of Embedded Systems, Architectural System
- Design and Analysis, High performance circuit board design, Networking & Communications.
- Most searched author on 'YouTube' for practical electronics
- Provide Training expertise on design of electronic circuits, PCB design software and prototype development of any circuit on general purpose PCB.

#### **Industry Expert: Arvind Kulkarni**

- M. Tech; B. Tech
- Leadership Development in mass immunization at Regional Workshop of Polio Pulse coordinator at Tirupati 1996 June
- Trainer for strategic planning and institution development at Hyderabad,
- Learning skill development under ISTE-CIIP Trained by Canadian faculty
- Associate consultant for system Development of Animal Husbandry Dept.of GOAP-Samaj Vikas 2004
- ICFAI university National College/S.B.College of Management, Gulbarga
- AICTE assisted faculty development programs at AIT Bangalore/BVVSP Bagalkot/ GPT Davangere/GPT Hubli
- Worked as expert selection committee for, Engineers and Consultants by the HDMC
- Consultant for the traffic survey on NH63, NH16
- Visiting faculty for Oxford MBA college Hubli 2007 - 20008

#### **Other Advantages**

EdgeFX provides the following unique advantages:

#### **Hands-On Approach**

Our training programs are practical hands-on application oriented (Learning by doing) approaches delivered to cover the theory and hands-on sessions.

#### **Well Researched Content**

Well researched extensive content that reflects the latest trends, work, and innovations, giving the best content to the learners!.

#### **Team of experts**

A team of experts from the industry/certified professionals conducts the workshops/training. When the practitioners of technology themselves conduct these bootcamps, they bring a lot of practical insight.

1. Mirza Mubeen Baig B.Tech (EEE), 15yrs of working experience in Power Electronics, Electrical System , Embedded System, IOT, Robotics, Solar
2. Bakhtiyar Ahmed B.Tech (ECE), 7 yrs of working experience in Power Electronics,Embedded System, IOT, Robotics, Solar
3. Neesu Bala Rajendra (M. Tech), 8yrs of working experience Embedded systems, Robotics, Solar, IOT.
4. Aijaz Baig B.Tech (ECE), 6 yrs of working experience in Embedded System, IOT, Robotics, Solar
5. Mahesh A (Team), 20 yrs of experience in technical training & support
6. Satish B (Team), 8 yrs of experience in technical training
7. Niranjan (Team), 10 yrs of experience in technical training
8. Srikanth (Team), 6 yrs of experience in technical training
9. Jagdish Lolugu, 20 yrs of experience in technical training & support

### **Product Development**

The selected teams shall be supported for developing their prototypes into full-fledged products after the completion of training. Complete support and mentoring will be provided by EdgeFX.

### **e-Certification**

All participants get industry-recognized certification from EdgeFX .

### **Terms**

- Duration: 2 full days@8 hours per day
- Strength: Maximum 60-100 students.
- Participants: Students from I Year till IV Year Engineering.
- Purchase order with final date and 100% of amount to be paid at least One week in advance.

**Annexure 1: List of Possible Innovations with training attached.**

**Annexure 2: Possible Real-Life Case Studies for Hackathon.**

For EdgeFX Technologies Pvt. Ltd.

Tarun Agarwal  
Authorised Signatory

### **Annexure 1: List of Possible Innovations/Problem Statements/Challenges**

#### **Guided and Open Innovation List**

#### **STEM Electronics Inventions List**

- To demonstrate the concept of open and closed circuits.
- To demonstrate the Push Button Switch, Buzzer function and how electricity is used to generate sound.
- To demonstrate the LED function and how electricity is used to light up an LED.
- To demonstrate how LED's like one-way valves let electricity flow only in one direction.
- To demonstrate conductor and insulator of electricity.
- To demonstrate the use of fuse to make electrical circuits safer.
- To demonstrate the function of a Resistor in series with a Buzzer.
- To demonstrate how a series Resistor is used to protect an LED.

- To demonstrate how electric circuits can be built to turn on multiple loads at a time without affecting the performance of the other load.
- To demonstrate the use of electronically controlled switches like Transistors using Push Button Switch for Input and Buzzer for Output.
- To demonstrate how a transistor as a switch can control an LED output.
- Get creative with circuits, demonstration of Push Button Switch in reverse function with Buzzer for Output.
- To try and see for yourself if the switch in reverse function works for an LED output.
- To demonstrate if the human body is a good conductor of electricity using human touch as Input and Buzzer as Output.
- To demonstrate the amplification of current via darlington Transistor with LED as Output.
- To demonstrate the function of a DC Motor and how electrical energy is converted into mechanical energy using a DC Motor.
- To demonstrate the use of fuse to make electrical circuits safer with a Motor Output.
- To demonstrate how electricity is converted into Sound, Light and Mechanical energy at the same time.
- To demonstrate the characteristics of voltage, current, and resistance in a parallel circuit.
- To demonstrate the characteristics of voltage, current, and resistance in a parallel circuit.
- To demonstrate the use of a free wheeling diode alongside the DC Motor in the DC Motor Block LU4.
- To demonstrate the use of a capacitor alongside the DC Motor in the DC Motor Block LU4.
- To demonstrate This OR That logic using Inputs as Push Button Switches and Output as Buzzer.
- To demonstrate This OR That logic using Inputs as Push Button Switches and Output as DC Motor.
- To demonstrate This OR That logic using Inputs as Push Button Switches and Output as LED.
- To demonstrate This AND That logic using Inputs as Push Button Switches and Output as Buzzer.
- To demonstrate This AND That logic using Inputs as Push Button Switches and Output as DC Motor.
- To demonstrate This AND That logic using Inputs as Push Button Switches and Output as LED.
- To demonstrate the Dual LED function.
- To demonstrate the RGB LED function.
- To demonstrate the concept of open and closed circuits.
- To reiterate the Darlington Transistor concept with DC Motor as Output.
- To demonstrate the amplification of current via darlington Transistor with Flashing LED as Output.
- To demonstrate the function of Resistor 1K with a Dual LED Output.
- To demonstrate the working of a Reed Sensor with Buzzer Output.
- To demonstrate the working of a Reed Sensor with DC Motor Output.
- To demonstrate the working of a Reed Sensor Z9 with an LED Output.
- To demonstrate the working of a Reed Sensor Z9 with a Flashing LED Output.
- To demonstrate the working of a Reed Sensor Z9 with a Dual LED Output.
- To demonstrate the working of an LDR Sensor, Resistor 10K and Transistor BC 557.
- To demonstrate the working of an LDR Sensor with a Fan Output.
- To demonstrate the working of an LDR Sensor with an LED Output.
- To demonstrate the working of an LDR Sensor with a Flashing LED.
- To demonstrate the working of an LDR Sensor with Dual LED.
- To demonstrate the function of a Slide Switch.
- To demonstrate how electric energy is converted into mechanical energy with the use of another Input Block.
- To demonstrate how electric energy is converted into sound energy with the use of another Input Block.
- To study different LED Outputs.
- To demonstrate the Output using a Dual LED, when there is a change in the Input.
- To demonstrate the Output using an RGB LED, when there is a change in the Input.
- To demonstrate the use of electronically controlled switches like Transistors using Push Button Switch for Input and Flashing LED for Output.

- To demonstrate the use of electronically controlled switches like Transistors using Slide Switch for Input and Buzzer for Output.
- To demonstrate the use of electronically controlled switches like Transistors using Slide Switch for Input and DC Motor for Output.
- To demonstrate the use of electronically controlled switches like Transistors using Slide Switch for Input and LED for Output.
- To demonstrate the use of electronically controlled switches like Transistors using Slide Switch for Input and Flashing LED for Output.
- Demonstration of Push Button Switch in reverse function with Flashing LED for Output.
- Demonstration of Slide Switch in reverse function with Buzzer for Output.
- Demonstration of Slide Switch in reverse function with DC Motor for Output.
- Demonstration of Slide Switch in reverse function with LED for Output.
- Demonstration of Slide Switch in reverse function with Flashing LED for Output.
- To demonstrate This OR That logic using Inputs as Push Button Switches and Output as Flashing LED.
- To demonstrate This OR That logic using Inputs as Slide Switches and Output as Buzzer.
- To demonstrate This OR That logic using Inputs as Slide Switches and Output as DC Motor.
- To demonstrate This OR That logic using Inputs as Slide Switches and Output as LED.
- To demonstrate This OR That logic using Inputs as Slide Switches and Output as Flashing LED.
- To demonstrate This OR That logic using Inputs as Push Button Switch and Slide Switch and Output as Flashing LED.
- To demonstrate This AND That logic using Inputs as Push Button Switches and Output as Flashing LED.
- To demonstrate This AND That logic using Inputs as Slide Switches and Output as Buzzer.
- To demonstrate This AND That logic using Inputs as Slide Switches and Output as DC Motor.
- To demonstrate This AND That logic using Inputs as Slide Switches and Output as LED.
- To demonstrate This AND That logic using Inputs as Slide Switches and Output as Flashing LED.
- To demonstrate This AND That logic using Inputs as Push Button Switch and Slide Switch and Output as Flashing LED.
- To demonstrate a Latching circuit with Buzzer as the Output.
- To demonstrate a Latching Circuit with DC Motor as the Output.
- To demonstrate a Latching Circuit with LED as the Output.

### **STEM Arduino Inventions List**

- Power the Arduino Nano.
- To demonstrate the Push Button Switch, Buzzer and generate sound with Arduino Sketch.
- To generate Red flashing light
- To generate Green flashing light
- To generate Blue flashing light
- To generate secondary color Yellow with the sum of two primary colors Red and Green
- To generate secondary color Magenta with the sum of two primary colors Red and Blue
- To generate secondary color Cyan with the sum of two primary colors Green and Blue
- To generate White light with the sum of three primary colors Red, Green and Blue
- To generate the final output. i.e. To generate a rainbow of colors, each with a unique Buzzer Sound.

### **STEM Robotics Inventions List**

- To build a bot which moves in the Left direction on pressing the Push Button Switch.
- To build a bot which moves in the Left and Right directions on pressing the respective Push Button Switches.
- To build a bot which moves in the Left, Right and Forward directions on pressing the respective Push Button Switches.



- To build a bot which moves in the Left, Right, Forward and Reverse directions on pressing the respective Push Button Switches.
- To build a bot which moves in the Left, Right, Forward and Reverse directions on activating the respective Slide Switches, by moving the slider to your right.
- To build a bot which moves in the Left, Right, Forward and Reverse directions on activating the respective Reed Switches with a magnet.
- To build a bot which moves in the Left direction using human touch as input.
- To build a bot which moves in the Left and Right directions on holding the respective Touch points
- To build a bot which moves in the Left, Right and Forward directions on holding the respective Touch Points
- To build a bot which moves in the Left, Right, Forward and Reverse directions on holding the respective Touch Points.
- To build a bot which moves in the Left, Right, Forward and Reverse directions on activating four different inputs Reed Switch, Touch Point, Push Button Switch and Slide Switch respectively.

### **Annexure 2: Possible Real-Life Case Studies for Hackathon**

- Distance Measurement using Ultrasonic Sensor
- Obstacle Avoidance Robot
- Ultrasonic sensor based garage door control system
- Security Area Protecting Alarm
- Auto Door Opening system on Human Detection
- Human Detection under Debris
- Light Sensitive Electronic Eye
- Light Sensitive Auto Window Operation
- Light Sensitive Auto Outdoor Light
- Bike Theft Alarm
- Upside Down Indicator for Fragile Item
- Toll Gate Auto Light LED
- Cooking Gas Leakage Alarm
- Toxic Gas Exhaust
- Drunken Driving Warning Light
- BCD to 7 Segment Display
- Fire Detection Alarm
- Fire Detection Air Blower
- Fire Detection Warning Light
- Time operated Load
- Highway Lighting System
- Density based Traffic Lighting System
- Street Light on detecting vehicle movement
- TV Remote Domestic Appliance Control
- TV Remote Robotic Operation