



SPARRO

SERIES OF WORKSHOPS
FOR ARCHITECTS &
DESIGNERS

V5.0

// HOW DO GREAT IDEAS EVOLVE?

What inspires the culmination of great plans and proposals?

The human brain facilitates the formation of thoughts, imagination and logic. The ideas it generates are often the foundation of notable innovations. These ideas shape the very way we live and evolve. Often, the creative processes involved behind an innovative design, is the seed for the evolution of great interdisciplinary ideas of the future. Think about it! A fashion designer working in line with a biologist to develop a product together or a biotechnology scientist critically analysing a product designer's work.

Tickled your brain enough?

Classroom competitions are a part of this initiative and is meant for all the designers who want to explore their way with hands on experience to gain skills and create real world projects. Under this series you participate in workshops at one of these Micro-studio and get awarded.

In association with **UNI**, we are now expanding our vision of creating these micro-studios globally with a fusion of online design community and offline classrooms. This fusion will help us in combining different ideologies and diverse methodologies, to create a continuum which links ideas such as exploration, debate and collaboration at a global level to understand and create '**Architecture of Everything**'

At **SPARRO**, we aspire to create a community of designers in order to establish a platform where varied knowledge domains of art, design and engineering can co-exist. It aims at providing a platform for innovative solutions and unconventionally creative thoughts to thrive, thus stimulating the design field even further in order to generate profound ideas and create significant products.

The **Educational Workshop Series for Architects & Designers** is a step forward in this direction and is meant for all the designers who want to explore their way to above mentioned fields. Here we intend to explore the new technologies in the field of architecture.



SPARRO



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FAB

FORMATIONS

ALGORITHMS AND PARAMETRIC
FABRICATION IN DESIGN

SAT-SUNDAY //
JULY 6-7

v5.01

IMAGE CREDITS :
SERPENTINE WALL
BY BIG ARCHITECTS

Are you interested in gaining Parametric competency to push your design skills to the next level?

Are you ready to learn a very exciting and powerful tool that will take your ideas and concepts to a whole new realm?

**COURSE DESCRIPTION \ **

The two-day introductory workshop to parametric design with digital fabrication in the field of Design, integrated within the algorithmic modelling. It will allow to investigate new formal solutions optimized for the architecture and design. It will also include a lecture and presentations on the subject of complexity in our design methodology and how to incorporate it as a design tool. The recent development of sophisticated computational design tools has instigated new ways of integrating computation in the design process; both within architecture and engineering disciplines. The new set of digital tools has infiltrated a bottom up system to open the design space towards a high level of complexity. The integration of these tools allowed the architect to generate and control complex information derived from a manifold of sources. Consequently, a more complex architectural order emerged as a reflection of sophisticated adaptive structures. The workshop will explore algorithmic strategies and the main techniques of form finding using the basic and intermediate level tools in Rhinoceros. The techniques will be applied at different scales, from architecture (surface modelling) to product level design. The model will further explore the fabrication methodologies in architecture and design.

**STRUCTURE \ **

Program has been structured to teach participants the use of Rhino and associated plugins that help in achieving parametric fabrications, with a real design exercise. Participants will learn how to build and manage parametric data structures (from basic simple lists to complex data Structures) and to develop data driven geometry and envelopes. This will help them in understanding and taking the data visualization to next level. The workshop technical tutorials will include:

DAY 1 SATURDAY (8 HOURS)

- 1. USER INTERFACE**
- 2. COMPONENTS OF RHINOCEROS**
- 3. NURBS AND POLYGON MESHES, POLYGONAL MODELLING IN RHINOCEROS**
- 4. BASIC EXERCISE OF SURFACE CREATION, SUBDIVISION AND MODELLING TECHNIQUES.**
- 5. GEOMETRY TESSELLATION**
- 6. VRAY BASICS**

DAY 2 SUNDAY (8 HOURS)

- 1. SUBDIVISION USING PANNELLING TOOLS.**
- 2. MORPHING**
- 3. APPLICATION OF THE LEARNED TECHNIQUES IN A PARAMETRIC DESIGN EXERCISE.**
- 4. VRAY SCENE RENDERING**
- 5. BASICS OF LASER CUTTING.**
- 6. FABRICATION TOOLS AND PLUGINS TO REALIZE YOUR PARAMETRIC DESIGNS USING THE LASER CUTTING MACHINE.**

**TAKE AWAYS \ **

- Basic understanding of the Rhino interface
- How to navigate around your scene and select objects
- Distinguishing the different Rhino objects and their use
- How to create and edit 2D and 3D geometric objects
- How to transform your objects
- How to organize your model efficiently
- Helpful tips and tricks to work fast and efficient
- How to render and prepare presentations using V-RAY Plugin for Rhino.

**REQUIREMENTS \ **

- There are no prerequisites, anyone from the design background or an enthusiast in the field of design are invited for this workshop.
- Participants should bring their own computer with above mentioned software installed. Further details will be sent to the registered participants.

TOOLS \ \

All the participants should have following tools installed on their workstations:

1. **Rhinoceros 5** SR12 or Higher ([30 day Trial version can be downloaded from https://www.rhino3d.com/download](https://www.rhino3d.com/download))
2. **PanelingTools** for Rhino (<https://wiki.mcneel.com/labs/panelingtools>)
3. **T Splines** for Rhino (<http://www.tsplines.com/latest-version>)
4. **Vray for Rhino** (<https://www.chaosgroup.com/vray/rhino>)
5. **AutoCAD**



REGISTRATION \ \

A total of **20 seats** are available for the workshop per workshop coordinator. Registration will close 3 days prior to the workshop or till the seats last.

Please follow the link to complete the registration:

1 PASS permits 1 PARTICIPANT in 1 WORKSHOP

[Refer to the eduPass Section to learn more about the Professional/Student/Group/Multiple registration.](#)

CALENDAR \ \

The workshop will be held on:

JULY 6 : 10:30 AM - 7:30 PM (SATURDAY)

JULY 7 : 10:30 AM - 7:30 PM (SUNDAY)

VENUE: Third Floor, 145/1, Shahpur Jat, New Delhi





PROGRAMMED

MORPHOLOGIES

SCRIPTING & LOGICS IN ARCHITECTURE & DESIGN

SAT-SUNDAY //
JULY 20-21

IMAGE CREDITS :
SOUMAYA MUSEUM BY
FERNANDO ROMERO

v5.02

ABOUT \ \

This course is aimed to teach the principles of parametric design using the Grasshopper plugin for Rhino. You will learn the key features of a parametric design approach and how it benefits its application on your design tasks. We will also cover in depth how does Grasshopper works, its interface and how to manage and organize information on it.

COURSE DESCRIPTION \ \

Scripting & Logic in design processes are constantly evolving and contributing to new innovative design workflows. The new digital techniques, combined with human sensibility and manual (analogue) techniques, are opening new grounds of design exploration that are directed towards seamless integration of form, material, and the applied forces. This integrated process entails a shift from traditional form-finding techniques to processes of a generative and performative nature. Two-day workshop on Scripting & Logic in Architecture & Design using Grasshopper and Python scripting. The workshop will introduce the basics of grasshopper with visual scripting. It will discuss methods of parametric design, algorithmic modelling techniques and advanced data management for the generation and control of complex shapes using python/grasshopper. Workshop will be focused to cover up several modules along with the introduction of various fractal geometries based over mathematical platforms like grasshopper for Rhinoceros. Tools like processing, Mandelbulb 3d, Apophysis, Python scripting related to generation of fractal geometries and methodology of programming will also be discussed and experimented in the module. It will cover the most important aspect of the visual programming software that will include lectures and guided practical exercises.

STRUCTURE \ \

Participants will learn to generate their form with polygonal modelling technique in Rhino. This form will be taken into Grasshopper environment where it will be used to analyse and to develop their design. The workflow will be demonstrated through exercises that deal with different design challenges, interrogating the aesthetic potential of Topological Optimization. Each topic will be presented with both theoretical introduction and practical application. In the afternoon of the second day, participants will split into groups to develop their own projects, with direct supervision from tutor, and towards their last day evening presentation. The workshop technical tutorial has been structured as follows:

DAY 1 SATURDAY (8 HOURS)

1. **UNDERSTANDING GENERATIVE ALGORITHMS FOR FRACTAL USING MADLEBULB3D & APOPHYSIS**
2. **GRASSHOPPER VISUAL INTERFACE**
3. **GRASSHOPPER COMPONENTS**
4. **DATA AND LIST MANAGEMENT IN GRASSHOPPER**
5. **PYTHON SCRIPTING BASICS WITH RHINOCEROS**
6. **DESIGN PROJECT ASSIGNMENT**

DAY 2 SUNDAY (8 HOURS)

1. **VECTORIAL FIELDS**
2. **MESH TESSELLATION AND SUBDIVISION TOOLS [DELAUNAY, SUBSTRATE, VORONOI, OCTREE, LUNCHBOX & PANELLING TOOL]**
3. **LISTS & DATA MANAGEMENT, MANIPULATION, VISUALIZATION**
4. **APPLICATION OF THE LEARNED TECHNIQUES IN A PARAMETRIC DESIGN EXERCISE.**
5. **BASICS OF LASER CUTTING**
6. **FABRICATION TOOLS AND PLUGINS TO REALIZE YOUR PARAMETRIC DESIGNS USING THE LASER CUTTING MACHINE.**

TAKE AWAYS \ \

- Understanding Parametric Design main characteristics
- How the Grasshopper Interface works
- How information is organized and managed in Grasshopper
- How to create parametric models
- Take home with you your own parametrically designed hand-on model.

TOOLS \ \

All the participants should have following tools installed on their workstations:

1. **Rhinceros SR12** or Higher (30-day Trial version can be downloaded from <https://www.rhino3d.com/download>)
2. **PanellingTools** for Grasshopper (<https://wiki.mcneel.com/labs/panelingtools>)
3. **Lunchbox for Grasshopper** (<http://www.food4rhino.com/app/lunchbox>)
4. **MadleBulb3D** and **Apophysis**
5. **Python** (Framework can be installed before workshop)
6. **AutoCAD**
7. **Adobe Suite**



REGISTRATION \ \

A total of **20 seats** are available for the workshop per workshop coordinator. Registration will close 3 days prior to the workshop or till the seats last.

Please follow the link to complete the registration:

1 PASS permits 1 PARTICIPANT in 1 WORKSHOP

[Refer to the eduPass Section to learn more about the Professional/Student/Group/Multiple registration.](#)

CALENDER \ \

The workshop will be held on:

JULY 20 : 10:30 AM - 7:30 PM (SATURDAY)

JULY 21 : 10:30 AM - 7:30 PM (SUNDAY)

VENUE: Third Floor, 145/1, Shahpur Jat, New Delhi

REQUIREMENTS \ \

- Anyone from the design background or an enthusiast in the field of design are invited for this workshop with basic knowledge of 3-D modelling acquired on Rhino should be there).
- If you wish to gain expertise in Rhinceros Join our workshop Algorithms and Parametric Fabrication in Design V 5.01
- Participants should bring their own computer with above mentioned software installed. More details will be sent to the registered participants.





INTERACTIVE

SURFACES

**SENSING & INTERACTIVE TECHNOLOGIES
IN ARCHITECTURE & DESIGN**

**SAT-SUNDAY //
AUGUST 03-04**

v5.03

COURSE DESCRIPTION \ \

The workshop is oriented towards exploring the possibilities of the way we think about materials and design. Here we will design a form or material that is reactive as well as responsive in nature. It will explore the notions of adaptability and interactivity in architecture & design and aims to expand beyond the use of the computer and digital fabrication into robotics, electronics and physical computing platforms. Sensing and Interactive technologies in architecture and design aims to highlight process of design and through that what can be achieved with the help of integration of technologies in it. The workshop goes into establishing physical and digital connections leveraging operational flexibility and fluidity using Grasshopper. The workshop will strive to highlight intelligence in systems and pose the problem of multiple contradicting parameters in digital design. The workshop will focus in creating physical interactive prototypes responding to certain parameters or information. Grasshopper and plugin Firefly paired with Arduino Board's computing platform will be introduced to participants as possible tools for experimentation.

STRUCTURE \ \

Participant will get to experiment upon sensors and actuators with the help of Arduino board and visual programming in Grasshopper. A 3D form created using Rhino and Grasshopper will be used to emulate the data taken from sensors. Each topic will be presented with both theoretical introduction and practical application. In the afternoon of the second day, participants will split into groups to develop their own projects, with direct supervision by the tutors, and towards their last day evening presentation. The workshop technical tutorial has been structured as follows:

DAY 1 SATURDAY (8 HOURS)

1. GRASSHOPPER VISUAL INTERFACE
2. UNDERSTANDING USE OF SENSORS IN MAKING INTERACTIVE STRUCTURES.
3. UNDERSTANDING SENSORS, ACTUATORS, MICROCONTROLLERS AND MICROPROCESSORS.
4. READING AND TRANSLATION OF DIGITAL SIGNALS USING ARDUINO
5. PROGRAMMING ARDUINO BOARDS THROUGH VISUAL PROGRAMMING
6. USE OF EMULATOR TO EMULATE ARDUINO BOARDS

DAY 2 SUNDAY (8 HOURS)

1. OPEN SOUND CONTROL (OSC) AND USER DATAGRAM PROTOCOL (UDP) TO COMMUNICATE THROUGH DEVICES.
2. EXERCISE TO CREATE AN INTERACTIVE INSTALLATION USING VISUAL PROGRAMMING IN GRASSHOPPER.

TAKE AWAYS \ \

- Understanding how sensors and microcontrollers can be used to make an interactive installation.
- How to visually programme arduino to create a working prototype.
- In order to experiment on your own Arduino kit an extra amount of **50 USD** for Arduino kit has to be paid. Your designed model along with you and some more goodies.

TOOLS \ \

All the participants should have following tools installed on their workstations:

1. **Rhinoceros SR12** or Higher (30-day Trial version can be downloaded from <https://www.rhino3d.com/download>)
2. **Grasshopper for Rhino** (<http://www.grasshopper3d.com/page/download-1>)
3. **Firefly for Grasshopper** (<http://www.food4rhino.com/app/firefly>)
4. **Arduino IDE 1.6.0** (<https://www.arduino.cc/en/Main/OldSoftwareReleases>)
5. **Lunchbox for Grasshopper** (<http://www.food4rhino.com/app/lunchbox>)
6. **AutoCAD**
7. **Adobe Suite**

REGISTRATION \ \

A total of **15 seats** are available for the workshop per workshop coordinator. Registration will close 3 days prior to the workshop or till the seats last.

Please follow the link to complete the registration:

1 PASS permits 1 PARTICIPANT in 1 WORKSHOP

[Refer to the eduPass Section to learn more about the Professional/Student/Group/Multiple registration.](#)

CALENDER \ \

The workshop will be held on:

AUGUST 03 : 10:30 AM - 7:30 PM (SATURDAY)

AUGUST 04 : 10:30 AM - 7:30 PM (SUNDAY)

VENUE: Third Floor, 145/1, Shahpur Jat, New Delhi



REQUIREMENTS \ \

- Participants should bring their own computer with above mentioned software installed. More details will be sent to the registered participants.
- Intermediate knowledge of 3D modelling acquired on Rhino. (If you wish to gain expertise in Rhinoceros Join our workshop Algorithms and Parametric Fabrication in Design V 5.01)
- Basic knowledge of Grasshopper. (If you wish to gain expertise in grasshopper Join our workshop Programmin Morphologies V 5.02)
- In order to experiment on your own Arduino kit an extra amount of **50 USD** for Arduino kit has to be paid.
- Link to the respective software for download will be sent to the registered participants separately.





DESIGN **DYNAMICS**

**PARTICLE DYNAMICS FOR ARCHITECTURAL
DESIGN & ANALYSIS**

**SAT-SUNDAY //
AUGUST 17-18**

v5.04

COURSE DESCRIPTION \ \

Generative design processes are constantly evolving and contributing to new innovative design workflows. The new digital techniques, combined with human sensibility and manual (analogue) techniques, are opening new grounds of design exploration that are directed towards seamless integration of form, material, and the applied forces. This integrated process entails a shift from traditional form-finding techniques to processes of a generative and performative nature. As a result, different Dynamics are evolving in the Design process, reflecting a synthesis of form, material, and performance.

Design Dynamics investigates the relationship between forces in nature and evolving form out of it. Participants will be working on exercises, using techniques presented in the workshop. Workshop exercises will use Polygonal Modelling in combination with Particle Systems, Computational Fluid Dynamics, Optimization & Evolutionary Solvers and Vectorial Fields to design forms of different scale and complexity. The proposed workflow will combine the use of Rhino, Grasshopper, CFD with some plug-ins such as Kangaroo, Weaverbird, and Firefly to actuate it. During the workshop, participants will also be introduced for how to make their design more interactive using sensors and actuators.

STRUCTURE \ \

Participants will learn to generate their form with polygonal modelling technique in Rhino. This form will be taken into Rhino/ Grasshopper environment where it will be used to analyse and to develop their design using Kangaroo and understanding particle dynamics through flex hopper as well. We will also take a tour to understand Computational Fluid Dynamics to design and analyse built forms accordingly. The workshop will also demonstrate use of laser cutting machine as a part of the exercise that deal with different design challenges, interrogating the aesthetic potential of Design Optimization. Each topic will be presented with both theoretical introduction and practical application. In the evening of Second day, participants will split into groups to develop their own projects, with direct supervision by the tutors, and towards their last day evening presentation.

DAY 1 SATURDAY (8 HOURS)

1. INTRODUCTION TO PARTICLE SYSTEMS AND COMPUTATIONAL FLUID DYNAMICS.
2. CFD UNDERSTANDING AND APPLICATIONS
3. VECTORIAL FIELDS
4. PARTICLE-SPRING SYSTEM IN KANGAROO

DAY 2 SUNDAY (8 HOURS)

1. EVOLUTIONARY SOLVER & OPTIMIZATION
2. INTRODUCTION TO FLEXHOPPER
3. INTRODUCTION TO SENSORS, ACTUATORS AND MICROCONTROLLERS TO MAKE DESIGN INTERACTIVE.
4. DESIGN PROJECT ASSIGNMENT USING CFD AND KANGAROO
5. INTRODUCTION TO LASER CUTTING
6. PROJECT DEVELOPMENT THROUGH DESIGN ITERATIONS, REVIEWS AND CREATING INSTALLATION.

TAKE AWAYS \ \

- Understanding how to use kangaroo to rationalize and modularize elements of design for easy fabrication.
- In order to experiment on your own Arduino kit an extra amount of **50 USD** for Arduino kit has to be paid. Your designed model along with you and some more goodies.

TOOLS \ \

All the participants should have following tools installed on their workstations:

1. **Rhinoceros SR12** or Higher (30-day Trial version can be downloaded from <https://www.rhino3d.com/download>)
2. **Grasshopper for Rhino** (<http://www.grasshopper3d.com/page/download-1>)
3. **Kangaroo for Grasshopper** (<http://www.food4rhino.com/app/kangaroo-physics>)
4. **Weaverbird for grasshopper** (<http://www.giulio-piacentino.com/weaverbird/>)
5. **Firefly for Grasshopper** (<http://www.food4rhino.com/app/firefly>)
6. **Arduino IDE 1.6.0** (<https://www.arduino.cc/en/Main/OldSoftwareReleases>)
7. **Lunchbox for Grasshopper** (<http://www.food4rhino.com/app/lunchbox>)
8. **AutoCAD**
9. **Adobe Suite**

REGISTRATION \ \

A total of **15 seats** are available for the workshop per workshop coordinator. Registration will close 3 days prior to the workshop or till the seats last.

Please follow the link to complete the registration:

1 PASS permits 1 PARTICIPANT in 1 WORKSHOP

Refer to the [eduPass](#) Section to learn more about the Professional/Student/Group/Multiple registration.

CALENDAR \ \

The workshop will be held on:

AUGUST 17 : 10:30 AM - 7:30 PM (SATURDAY)

AUGUST 18 : 10:30 AM - 7:30 PM (SUNDAY)

VENUE: Third Floor, 145/1, Shahpur Jat, New Delhi



REQUIREMENTS \ \

- Participants should bring their own computer with above mentioned software installed. More details will be sent to the registered participants.
- Your system should be equipped with NVidia or AMD Graphics Card
- NVIDIA: GeForce Game Ready Driver 372.90 or above
- AMD: Radeon Software Version 16.9.1 or above
- Intermediate knowledge of 3D modelling acquired on Rhino. (If you wish to gain expertise in Rhinoceros Join our workshop Algorithms and Parametric Fabrication in Design V 5.01)
- Intermediate knowledge of Grasshopper. (If you wish to gain expertise in grasshopper Join our workshop Programming Morphologies V 5.02)
- In order to experiment on your own Arduino kit an extra amount of **50 USD** for Arduino kit has to be paid.s
- Link to the respective software for download will be sent to the registered participants separately.





INTELLIGENT

SURFACES

**ENERGY MODELLING & CREATING INTELLIGENT
BUILT ENVIRONMENT**

**SAT-SUNDAY //
SEPTEMBER 31-01**

v5.05

COURSE DESCRIPTION \ \

Enhancement in computation and analyzing data in real time has evolved the way we design our built environment and create building facades. We have been following our intuition to predict the size or shape of any space, but the new technologies now allow us to solidify our prediction and provide better solution. The new digital techniques, combined with human sensibility and manual (analogue) techniques, are opening new grounds of design exploration that are directed towards seamless integration of form, material, and its shape. This integrated process entails a shift from traditional prediction-based model to the processes of a generative and performative nature. This has resulted, in evolving our Design process, reflecting a synthesis of form, material, and performance.

Intelligent Surfaces focuses on creating building surfaces based on the weather data collected and modelling as per the energy requirement. Participants will be working on exercises, using techniques presented in the workshop. Workshop exercises will use Energy Modelling in combination with Computational Fluid Dynamics, Optimization & Evolutionary Solvers and Vectorial Fields to design forms of different scale and complexity. The proposed workflow will combine the use of general Weather data, Solar access analysis, daylight simulations, radiance skies, comfort charts, wind simulation, on Rhino, Grasshopper and CFD with some plugins, such as Weaverbird, and Lunchbox. During the workshop, participants will also be introduced about how to make their design more interactive using sensors and actuators with the help of firefly plugin.

STRUCTURE \ \

Participants will learn to generate their form by creating energy model for a built form in Rhino. This form will be analysed using the evolutionary solvers and components of ladybug and honeybee to optimize design. We will also take a tour to understand wind using CFD on built forms. The workshop will also demonstrate use of laser cutting machine as a part of the exercise that deal with different design challenges, interrogating the aesthetic potential of built design. Each topic will be presented with both theoretical introduction and practical application. In the evening of Second day, participants will split into groups to develop their own projects, with direct supervision by the tutor, and towards their last day evening presentation.

DAY 1 SATURDAY (8 HOURS)

1. INTRODUCTION TO THE BASIC OF ENERGY MODELLING (WEATHER DATA, COMFORT CHARTS, SUN DIAGRAM, ETC.
2. INTRODUCTION TO LADYBUG TOOLS, HONEYBEE AND FIREFLY
3. VECTORIAL FIELD
4. LIST OF DATA MANIPULATION IN GRASSHOPPER
5. CALCULATE OUTDOOR THERMAL COMFORT, DRAW INTERACTIVE DIAGRAMS AND APPLY CONDITIONAL STATEMENTS, GENERATE CUSTOMIZED RESULT VISUALIZATIONS.

DAY 2 SUNDAY (8 HOURS)

1. PREPARING DAYLIGHT SIMULATION, GRID BASED AND VIEW BASED DAYLIGHT SIMULATION.
2. CREATE RADIANCE MATERIALS AND RADIANCE SKIES.
3. PREPARE AND INTERPRET GEOMETRY FOR ENERGY MODELLING.
4. INTRODUCTION TO SENSORS, ACTUATORS AND MICROCONTROLLERS TO MAKE DESIGN INTERACTIVE.
5. DESIGN PROJECT ASSIGNMENT WITH THE USE OF LADYBUY TOOLS AND AN OPTIMIZED ENERGY MODEL FOR BUILDINGS
6. INTRODUCTION TO LASER CUTTING/3D PRINTING
7. PROJECT DEVELOPMENT THROUGH ITERATIONS, REVIEWS AND CREATING CLIMATE RESPONSIVE BUILDING FACADE

TAKE AWAYS \ \

- Using CFD to create environmentally responsive buildings.
- Learning how to use wind and solar to your own advantage in designing.
- In order to experiment on your own Arduino kit an extra amount of **50 USD** for Arduino kit has to be paid. Your designed model along with you and some more goodies.

TOOLS \ \

All the participants should have following tools installed on their workstations:

1. **Rhinoceros SR12** or Higher (30-day Trial version can be downloaded from <https://www.rhino3d.com/download>)
2. **Grasshopper for Rhino** (<http://www.grasshopper3d.com/page/download-1>)
3. **Ladybug tools for grasshopper** (<http://www.food4rhino.com/app/ladybug-tools>)
4. **Weaverbird for grasshopper** (<http://www.giulio-piacentino.com/weaverbird/>)
5. **Lunchbox for grasshopper** (<http://www.food4rhino.com/app/lunchbox>)
6. **Firefly for Grasshopper** (<http://www.food4rhino.com/app/firefly>)
7. **Arduino IDE 1.6.0** (<https://www.arduino.cc/en/Main/OldSoftwareReleases>)
8. **AutoCAD**
9. **Autodesk CFD**
10. **Adobe Suite**

REGISTRATION \ \

A total of **15 seats** are available for the workshop per workshop coordinator. Registration will close 3 days prior to the workshop or till the seats last.

Please follow the link to complete the registration:

1 PASS permits 1 PARTICIPANT in 1 WORKSHOP

Refer to the [eduPass](#) Section to learn more about the [Professional/Student/Group/Multiple registration](#).

CALENDER \ \

The workshop will be held on:

AUGUST 31 : 10:30 AM - 7:30 PM (SATURDAY)
SEPTEMBER 01 : 10:30 AM - 7:30 PM (SUNDAY)

VENUE: Third Floor, 145/1, Shahpur Jat, New Delhi



REQUIREMENTS \ \

- Participants should bring their own computer with above mentioned software installed. More details will be sent to the registered participants.
- Intermediate knowledge of 3D modelling acquired on Rhino. (If you wish to gain expertise in Rhinoceros Join our workshop Algorithms and Parametric Fabrication in Design V 5.01)
- Intermediate knowledge of Grasshopper. (If you wish to gain expertise in grasshopper Join our workshop Programming Morphologies V 5.02)
- In order to experiment on your own Arduino kit an extra amount of **50 USD** for Arduino kit has to be paid.
- Link to the respective software for download will be sent to the registered participants separately.





MORPHING

MATERIALS

*SMART PROGRAMMABLE MATERIALS FOR DESIGN
SOLUTIONS*

**SAT-SUNDAY //
SEPTEMBER 07-08**

v5.06

ABOUT \ \

This course focuses on developing and intergreting new materials Bi-metals like nitinol (memery retaining wire) into our architecture design workflow.

COURSE DESCRIPTION \ \

Material Computation is a design strategy that can be utilized by controlling inherent properties of material (length, size, density, etc.) with the help of data and microcontroller. This course will explore 'smart materials' - which can be programmed for specific design challenges (climate, space usage, preferences, etc.) that can arise in myriad of architectural situations. In the workshop you will be able to integrate these concepts in your design projects, detail them and explore a new dimension in built environment design. Besides learning about existing cases and synthesizing their techniques, the workshop will also be about hands on programming, prototyping in utilizing smart materials, their fabrication, working assembly detailing.

STRUCTURE \ \

The course is structured in three stages, primary stage will include equipping participants with technical knowledge of how to use allied scripting techniques and hardware to utilize smart materials. Intermediate stage will explore possibilities and application to spark application level ideas. Third stage will involve group level prototyping - discussion - review of the design.

DAY 1 SATURDAY (8 HOURS)

1. INTRODUCTION TO SMART MATERIALS AND THEIR PROPERTIES.
2. USE OF CONDUCTIVE FABRIC AND BIMETALLIC STRIPS
3. TAKING DATA OUT OF MATERIALS
4. USE OF ACTUATORS AND SENSORS
5. GRASSHOPPER INTERFACE WITH UDP
6. MAKING MATERIAL COMMUNICATE WITH DIGITAL INTERFACES USING GRASSHOPPER AND FIREFLY.

DAY 2 SUNDAY (8 HOURS)

1. UTILIZING MATERIAL COMPUTATION STRATEGIES IN REAL TIME ARCHITECTURAL SITUATIONS
2. MAKING A SCALE ARCHITECTURAL PROTOTYPE WITH THE HELP OF LEARNED TECHNIQUES, PRESENTATION AND REVIEW FOR THE SAME.

TAKE AWAYS \ \

- Understanding how to utilize different materials in architectural context.
- Understanding how bi-metallic materials work and we can incorporate them in our design context.
- Your designed model along with you and some more goodies.

REQUIREMENTS \ \

- Participants should bring their own computer with above mentioned software installed. More details will be sent to the registered participants.
- Intermediate knowledge of 3D modelling acquired on Rhino. (If you wish to gain expertise in Rhinoceros Join our workshop Algorithms and Parametric Fabrication in Design V 5.01)
- Intermediate knowledge of Grasshopper. (If you wish to gain expertise in grasshopper Join our workshop Programming Morphologies V 5.02)
- In order to experiment on your own Arduino kit an extra amount of **50 USD** for Arduino kit has to be paid.
- Link to the respective software for download will be sent to the registered participants separately.

TOOLS \ \

All the participants should have following tools installed on their workstations:

1. **Rhinoceros SR12** or Higher (30-day Trial version can be downloaded from <https://www.rhino3d.com/download>)
2. **Grasshopper for Rhino** (<http://www.grasshopper3d.com/page/download-1>)
3. **Weaverbird for grasshopper** (<http://www.giulio-piacentino.com/weaverbird/>)
4. **Lunchbox for grasshopper** (<http://www.food4rhino.com/app/lunchbox>)
5. **Firefly for Grasshopper** (<http://www.food4rhino.com/app/firefly>)
6. **Arduino IDE 1.6.0** (<https://www.arduino.cc/en/Main/OldSoftwareReleases>)
7. **AutoCAD**
8. **Adobe Suite**



REGISTRATION \ \

A total of **20 seats** are available for the workshop per workshop coordinator. Registration will close 3 days prior to the workshop or till the seats last.

Please follow the link to complete the registration:

1 PASS permits 1 PARTICIPANT in 1 WORKSHOP

Refer to the [eduPass](#) Section to learn more about the Professional/Student/Group/Multiple registration.

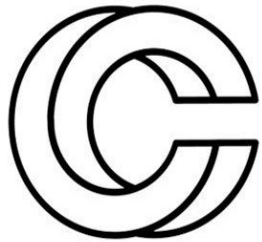
CALENDER \ \

The workshop will be held on:

SEPTEMBER 07 : 10:30 AM - 7:30 PM (SATURDAY)
SEPTEMBER 08 : 10:30 AM - 7:30 PM (SUNDAY)

VENUE: Third Floor, 145/1, Shahpur Jat, New Delhi





CLASSROOM COMPETITIONS

Classroom competitions are a part of this series of workshops and is meant for all the designers who want to explore their way with hands on experience to gain skills and create real world projects. Under this series you participate in workshops at one of these Micro-studio and get awarded a trophy.

In association with **UNI**, we are now expanding our vision of creating these micro-studios globally with a fusion of online design community and offline classrooms.

This fusion will help us in combining different ideologies and diverse methodologies, to create a continuum which links ideas such as exploration, debate and collaboration at a global level to understand and create **'Architecture of Everything'**





EDUPASS

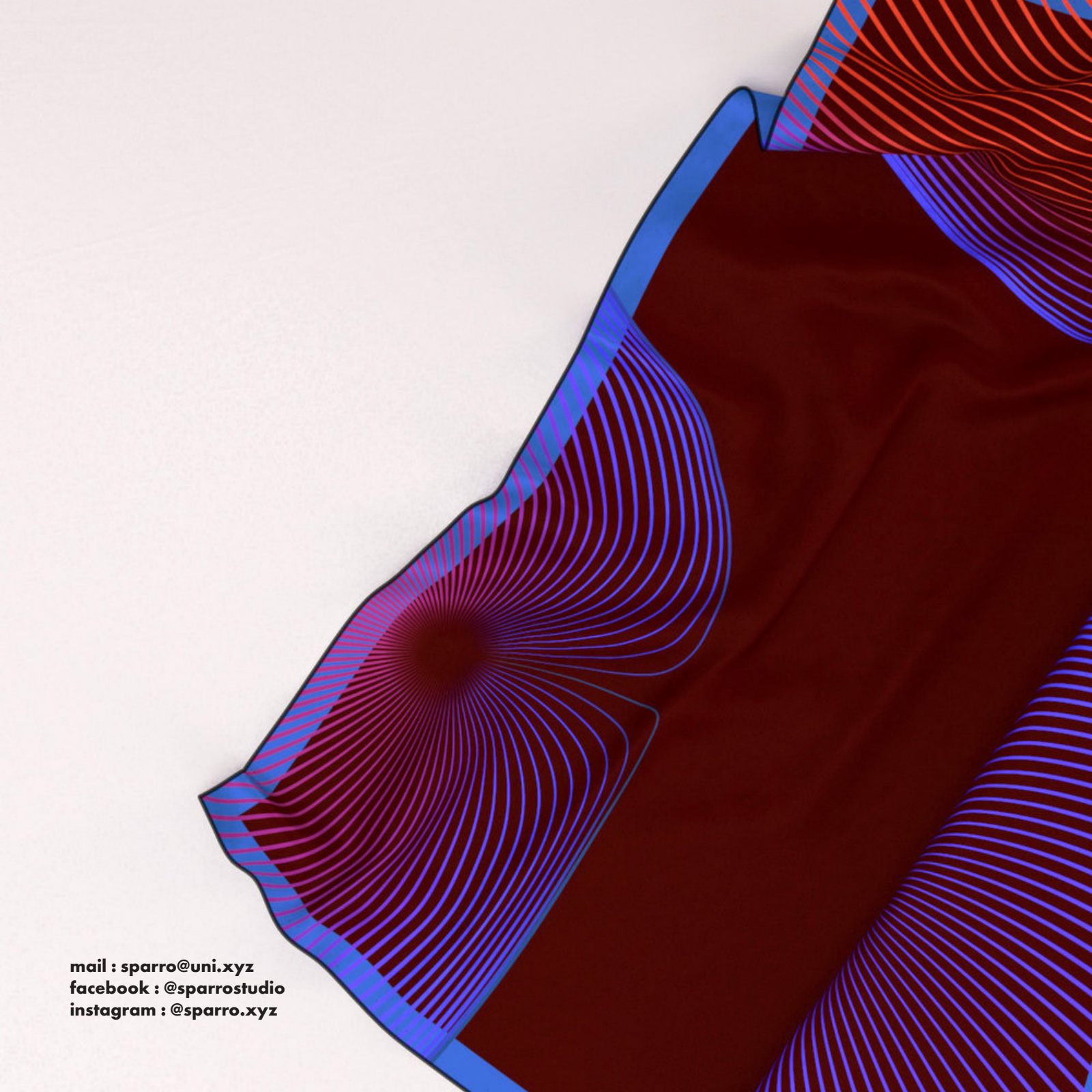
EDUpass is a pass which can be used to participate in any workshop in this series (registration to be done 3 days prior the commencement of the workshop). Multiple EDUpasses can be purchased and used in a group to attend a single workshop or a single participant can register for multiple workshops.

For example, If you had purchased 6 passes, you can register to 6 different workshops or bring along 5 other friends/colleague with you to attend a single workshop of your choice.



HOW DOES IT WORK?

A Participant can purchase as many passes as he/she wants and 1 PASS permits entry to any 1 workshop and classroom competition of his/her choice.



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facebook : [@sparrostudio](https://www.facebook.com/sparrostudio)
instagram : [@sparro.xyz](https://www.instagram.com/sparro.xyz)**