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 FUILD 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.

T O O L S \ \

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.giuliopia-centino.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**

R E G I S T R A T I O N \ \

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.

C A L E N D E R \ \

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

R E Q U I R E M E N T S \ \

- 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.
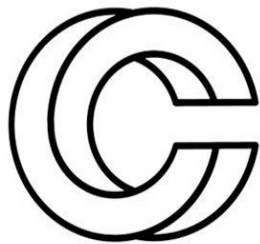
CLASSROOM
COMPETITIONS

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 a 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.

SPARRO