

Field of Study

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For more details about the proposed study program in Japan, please consult the second document entitled : *Study Program in Japan in Details*.

Keywords : *Shape Modeling, F-Rep, Volume Modeling, Geometric Modeling, Genetic Algorithm, Genetic Programing, Range Data Analysis, F-Rep Reconstruction, Interactive Modeling, Languages and Interfaces for Geometric Modeling*

In a broad sense, my research field is dedicated to the study of shape, volume and geometric modeling, this essentially through the manipulation of F-Rep. The concept of F-Rep and functionally based geometric modeling is an interesting topic under intensive research for 10 years now. More information on these thema can be found on the HyperFun home page (www.hyperfun.org) and on the F-Rep home page (accessible through www.hyperfun.org), which present the existing tools and a list of research interests, publications and results.

More specifically, my research will focus on the processus of F-Rep reconstruction, which consists in the reconstruction of the function representating a model from an unorganized set of points. These points will be usually obtained with a 3D scanner or much more specific material such as MRI. The fact that the points are totally unorganized forbids us from getting topological information from the process of scanning, making the F-Rep reconstruction a hard task. This research will require preliminar research and results on field such as : Genetic Algorithm and Programing, Neural Network, Radial Basis Function, ... And the integration of these concepts within F-Rep should be carefully studied beforehand.

3D Scanning and F-Rep reconstruction will cover a deep range of practical applications such as : Industrial Design and CAD system, Historical Digitalisation and Restoration, Historical Simulation and Populating, Medical Visualization, ...