

Preface

This book concerns itself with the building envelope (BE), which besides the size and proportions of a building is the most apparent aesthetic quality in architecture. The book is divided into three parts. Part I briefly introduces the concept of an Intelligent Building Envelope, while Part II presents the dynamic cellular automaton-based shading system (CASS) for BEs. The book also addresses the optimization of CASS with graph-theoretic and heuristic algorithms. The optimization criteria include the “grayness” monotonicity, and pattern distribution error, which respectively represent the level of control over the cellular automaton (CA) pattern, and the uniformity of the CA pattern over an entire array of cells. The robustness of CASS and various types of prototypes are also discussed. Part III presents an algorithm for creating selective static solar shading for free-form apertures of a free-form building.

This book presents results of the research titled: “*Effective computational methods for grid and raster-based modeling of practical problems in architectural and urban design*” conducted from December 2013 to November 2015 under the Singapore University of Technology & Design and Massachusetts Institute of Technology Postdoctoral Program.

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