

CALL FOR PAPERS

***AI EDAM* Special Issue, August 2010, Vol. 24, No. 3 DESIGN PEDAGOGY: REPRESENTATIONS AND PROCESSES**

Guest Editors: Daniel Frey, William Birmingham, & Clive Dym

This Special Issue of *AI EDAM* will be devoted to papers concerned with design pedagogy, focusing on how explicit representations of design knowledge and design processes impact teaching design.

Design pedagogy raises significant challenges for researchers in design theory, methodology, and AI. When people learn engineering design or seek to improve their skill as designers, knowledge must be constructed. The teacher is often required to formalize and structure a body of knowledge gained from experience. The student is challenged to observe carefully, form hypotheses, and test them through projects. No design method can be effective unless it is teachable, which is probably not an exaggeration.

To advance this important topic, we seek papers dealing with design knowledge and its representation in humans, software, and other processes. Papers addressing the implications for education are particularly encouraged with education broadly construed to include undergraduate, graduate, professional, and K–12.

Although papers with normal AI content are desired for this Special Issue, we broaden the scope to also include papers that provide knowledge and associated methodology for design pedagogy.

The aim of this Special Issue on design pedagogy is to further discussion at the intersection of theory and practice. Topics may include, but are not limited to, the following:

- frameworks for teaching engineering design;
- representations and models of design knowledge;
- differences between expert and novice performance in design and means to bridge them;
- assessment of design skill; and
- particular design processes, how they represent knowledge, and how they facilitate design education.

All submissions will be anonymously reviewed by at least three reviewers. The selection for publication will be made on the basis of these reviews.

Information about the format and style required for *AI EDAM* papers can be found at www.cs.wpi.edu/~aiedam/Instructions/. However, note that all submissions for Special Issues go to the Guest Editors, **not** to the Editor in Chief.

Important Dates

Intent to submit (Title and Abstract):	As soon as possible
Submission deadline for full papers:	1 May 2009
Reviews due:	30 August 2009
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Revised version submission deadline:	15 January 2010

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CALL FOR PAPERS

AI EDAM Special Issue, November 2010, Vol. 24, No. 4 BIOLOGICALLY INSPIRED DESIGN

Guest Editors: Amaresh Chakrabarti & Li Shu

This Special Issue of *AI EDAM* will be devoted to papers concerned with biologically inspired design.

Natural processes have led to the development of a plethora of biological systems that carry out a multitude of tasks in a highly resource-effective way within a variety of environments and constraints. Many of these tasks, environments, and constraints are similar to those relevant in engineering design. Therefore, biological systems offer a rich, potential source of inspiration for novel and resource-effective engineering designs. History shows ample anecdotal evidence of using these systems as inspiration for engineering. Biologically inspired designs were previously an outcome of individual interest or accidental exposure, but supporting their use in inspiring engineering design is rapidly developing into an area of active research and exploration. This Special Issue is aimed at providing a state-of-the-art collection of research outcomes in this emerging area.

Although papers with normal AI content are desired, for this Special Issue we broaden the scope to include papers that provide knowledge and associated methodology for biologically inspired design. Suitable topics include, but are not limited to, the following:

- models, techniques, or systems, both human-centered and computational, for (supporting) biologically inspired design (including biomimetics/biomimicry/bionics);
- models of reasoning for biologically inspired design; and
- studies of reasoning for biologically inspired design.

All submissions will be anonymously reviewed by at least three expert reviewers. The selection for publication will be made on the basis of these reviews.

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CALL FOR PAPERS

AI EDAM Special Issue, May 2011, Vol. 25, No. 2 CONFIGURATION

Guest Editors: Alexander Felfernig, Markus Stumptner, & Juha Tiihonen

Configuration can be defined as the composition of a complex product from instances of a set of component types, taking into account restrictions on the compatibility of those component types.

From the viewpoint of product configuration, different artificial intelligence (AI) approaches are well established as central technologies in industrial configuration systems. However, the wide use of configuration technologies and the increasing size and complexity of configuration problems in industry makes the field more challenging than ever. Nowadays, the mass customization paradigm is extended from traditional physical products to the fields of software and service configuration. Traditional configuration systems have evolved into interactive Web-based applications that need to support highly sophisticated preference handling and explanation techniques.

In addition to the configuration of physical products, real-world applications of configuration technologies are also encountered in domains such as computational biology, service composition, design, image analysis, model-driven software engineering, and software product lines. The ever increasing range of real-world applications triggers the demand to extend existing configurator functionalities. A wide range of AI techniques provide major contributions in this context: constraint satisfaction, description logics, logic programming, case-based reasoning, learning, knowledge acquisition, intelligent testing, and different specialized problem solving methods.

As a successful AI application area, configuration has attracted lasting industrial interest and renewed research, as demonstrated by recent workshops on configuration at IJCAI 2009, ECAI 2008, AAI 2007, ECAI 2006, IJCAI 2005, ECAI 2004, IJCAI 2003, ECAI 2002, IJCAI 2001, ECAI 2000, AAI 1999, and the AAI 1996 Fall Symposium.

The goal of this Special Issue on configuration is to demonstrate novel and innovative configuration research as well as new industrial applications of configuration technologies. We encourage submissions describing novel results involving AI in configuration-related areas, which may include, but are not limited to, the following:

- theoretical issues justified by practical concerns;
- methods for computing configurations and supporting configuration tasks;
- methods for effective configuration knowledge base development, testing, and debugging;
- configuration and product and service design, product and service life cycle management, and production management;
- thorough case studies highlighting new practical problems, needs, and experiences; and
- practical and new applications based on a well-defined theory or model.

Articles that survey different approaches and thoroughly analyze their differences and commonalities are also welcome.

Papers will be anonymously reviewed by at least two reviewers. Quality papers not selected for this Special Issue may be considered for standard publication in *AI EDAM*.

Information about the format and style required for *AI EDAM* papers can be found at www.cs.wpi.edu/~aiedam/Instructions/. However, note that all submissions for Special Issues go to the Guest Editors, **not** to the Editor in Chief.

Important Dates

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CALL FOR PAPERS

AI EDAM Special Issue, August 2011, Vol. 25, No. 3 THE ROLE OF GESTURE IN DESIGNING

Guest Editors: Willemien Visser & Mary Lou Maher

Design generally involves teams of designers collaborating on a design project. Although individual participants in a design team may make independent contributions to the project, collaborative design assumes that contributions are based on the interactions among different participants. This interaction occurs through various modalities (semiotic systems): verbal interaction has thus far received the most attention, both in research and in development, but graphical, gestural interaction and other modalities (gaze, posture, prosody) also play important roles. This Special Issue of *AI EDAM* focuses on the role of gesture in designing.

Compared with verbal and graphical interaction, gestural expression has been barely analyzed in studies on collaborative design. Nevertheless, gesture has been shown to be used frequently by designers in their interactions and with varying functions (e.g., specification of design objects, as well as management of interactions).

The analysis of gesture's function in collaborative design has implications for environments that support remote collaborative design. Until now, they mainly supported pen-based pointing or command gestures, but if such environments are to effectively support designers collaborating from remote locations, representational and other types of gestures must also be visible and transmitted to the design partners.

To advance this important topic, we seek papers that provide theoretical or empirical contributions to the role of gesture in designing, either in the context of computer supported collaborative design or as a precursor to designing effective collaborative design environments.

The aim of this Special Issue on the role of gesture in designing is to further discussion at the intersection of theory and practice. Contributions are sought from artificial intelligence (AI), human–computer interaction (HCI), and computer supported collaborative work (CSCW) perspectives as well as cognitive science disciplines, such as psychology and pragmatics. Topics may include, but are not limited to, the following:

- theoretical aspects of gesture in design interaction;
- the role of gestures in design thinking;
- gesture and multimodal interaction in design interaction: gesture with speech, writing, drawing, and other modalities;
- AI and cognitive models of gesture in design interaction;
- the role of gesture and multimodal interaction in remote design collaboration;
- HCI and studies of gesture in collaborative design environments;
- new HCI technologies that enable gesture in design environments;
- gesture and multimodal interaction in CSCW design environments; and
- the role of gestures in defining an external representation of the design model (either to the computer or to a person).

All submissions will be anonymously reviewed by at least three expert reviewers. The selection for publication will be made on the basis of these reviews.

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CALL FOR PAPERS

AI EDAM Special Issue, November 2011, Vol. 25, No. 4 REPRESENTING AND REASONING ABOUT THREE-DIMENSIONAL SPACE

Guest Editors: Sean Hanna & Bill Regli

This Special Issue will survey the range of approaches to representing and reasoning about three-dimensional (3-D) space. We seek practice-based contributions in spatial design domains such as architecture, urban planning, and mechanical design; theoretical contributions, for example, from cognitive modeling; and technical approaches to the representation of space from computer-aided design (CAD)/manufacturing, computer-aided architectural design, and computer-aided engineering. Our intent is to provide common ground across this variety of disciplines and focus the discussion on specific factors that support a wide variety of design and engineering problem domains, so that representations and approaches can be usefully compared.

The way 3-D space is represented and understood is fundamental to all design. In architecture and urban design, space is the product of design. In the engineering of smaller artifacts, it is the context in which their parts relate to one another. In manufacturing, it is the environment in which control systems must operate physical processes.

Papers may address alternative representations of space. The typical Cartesian representation of geometry as symbolic primitives in relation to a single origin is powerful and ubiquitous, but relationships between geometry (of adjacency interior/exterior, convex space) that are clear to designers require significant additional computation. Parametric and topological alternatives, graph-based representations, and distance metrics each play a role across a variety of disciplines from cognitive and perceptual modeling to virtual reality and CAD. Spatial reasoning techniques from artificial intelligence and robotics are also of interest. The choice of representation affects the process of design and should be understood prior to the creation and utilization of intelligent computational applications.

Reasoning about 3-D space may also be the focus of submitted papers. The analysis of space from either a methodological point of view or as used in design is of interest. In this context, “space” also includes work on 3-D representations and reasoning techniques for shape, form, and function. Work that deals with space while avoiding representation in the traditional sense, as in embodied robotics, is welcomed, as is work in which space itself plays a role in reasoning or serves as a means of communication, such as in agent-based models.

Topics may include, but are not limited to, the following:

- AI and cognitive models of 3-D space;
- approaches to perception and action in 3-D space;
- computational methods for spatial analysis;
- computational methods for spatial design (architecture, urban, etc.);
- the role of spatial reasoning in design;
- spatial reasoning in robotics and manufacturing/fabrication control systems;
- alternative representations in CAD and design tools;
- spatial representation as a common language across design disciplines;
- exchange of 3-D spatial data across systems, domains, and time;
- development and use of standards; and
- case studies.

All submissions will be anonymously reviewed by at least three reviewers, and the selection for publication will be made on the basis of these reviews. High quality papers not selected for this Special Issue may be considered for standard publication in *AI EDAM*.

Information about the format and style required for *AI EDAM* papers can be found at www.cs.wpi.edu/~aiedam/Instructions/ However, note that all submissions for Special Issues go to the Guest Editors, **not** to the Editor in Chief.

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INSTRUCTIONS FOR AUTHORS

AIMS AND SCOPE

AIEDAM: *Artificial Intelligence for Engineering Design, Analysis and Manufacturing* is a journal intended to reach two audiences: *engineers and designers* who see AI technologies as powerful means for solving difficult engineering problems; and *researchers in AI and Computer Science* who are interested in applications of AI and in the theoretical issues that arise from such applications. The journal publishes significant, original articles about AI theory and applications based on the most up to date research in all branches and phases of engineering. Suitable topics include analysis and evaluation, selection, configuration and design, manufacturing and assembly, and concurrent engineering. Specific subareas include cognitive modeling; creativity; learning; qualitative reasoning; spatial reasoning; graphics and modeling; constraints and preferences; style and brands; human-computer interaction; multimodal interaction; computational linguistics; design and process planning; scheduling; simulation; optimization; distributed teams and systems; multiagent applications; design rationale and histories; functional, behavioral, and structural reasoning; knowledge management; and ontologies. **AIEDAM** is also interested in original, major applications of state-of-the-art AI techniques to important engineering problems (practicum papers). In addition to the rapid publication and dissemination of unsolicited research papers, **AIEDAM** is committed to producing special issues on important, timely topics. **AIEDAM** is indexed in Compendex Plus, SciSearch, Research Alert, and CompuMath Citation Index.

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Paper should be typed in *double* spacing throughout, including tables, footnotes, references, and legends to tables and figures. One side of the paper, only, should be used and there should be a margin of at least 2.5 cm all around. The position of tables and

figures should be clearly indicated, in sequence, in the text. Tables, footnotes, and legends to figures should be typed separately. Where it is essential for clear cross-referencing, particularly in mathematically orientated material, paragraphs and subparagraphs may be numbered, and the decimal system should be used (i.e., 1.1.1., 1.1.2., etc.). A short running title of not more than 40 characters (including spaces) should be indicated if the full title is longer than this. The name of the laboratory where the work has been carried out should be indicated on the title page and the full postal address for the despatch of proofs and offprints should be included on a separate page. Minor corrections to the manuscript may be typed or neatly printed in ink; retyping is required for significant changes. Numbers should be spelled out when they occur at the beginning of a sentence; use Arabic numerals elsewhere.

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Unless there are obvious and compelling reasons for variation (e.g. review articles, short communications), manuscripts should be organized as follows:

Title page. This is page 1. The title should be concise, informative, and free of abbreviations, chemical formulae, technical jargon, and esoteric terms. This page should include (a) the article's full title, (b) names and affiliations of all authors, (c) the name, mailing address, and telephone number of the corresponding author, (d) the address for reprint requests if different from that of the corresponding author, (e) a short title of 50 characters or less, and (f) a list of the number of manuscript pages, number of tables, and number of figures.

Abstract and keywords page. This is page 2 and should include (a) the article's full title, (b) an abstract of no more than 300 words, and (c) up to 5 keywords or phrases that reflect the content and major thrust of the article. The abstract should give a succinct account of the objective, methods, results, and significance of the subject matter.

Introduction. This section begins on page 3 and should clearly state the objective of the research in the context of previous work bearing directly on the subject. An extensive review of the literature is not usually appropriate.

Citations in text. Customary abbreviations will be accepted and the authors are recommended to employ *Système Internationale (SI/metric)* units. Special and unusual symbols should be clearly identified, especially if handwritten. Spell out acronyms at first use, but use only acronyms thereafter. All equipment supplies and products stated in the article should have the manufacturer name and location identified at first mention.

Tables. Tables should be numbered consecutively with Arabic numerals and each should be typed double-spaced on a separate sheet. All tables are to be grouped together after the references. A short explanatory title and column headings should make the table intelligible without reference to the text. All tables must be cited and their approximate positions indicated in the text.

Figures and legends. The number of figures should be the minimum necessary to make the essential points of the paper. Figures should be supplied no larger than $8 \times 10''$ (approx. 200×250 mm) and must be camera-ready. Photographs will be accepted only if the information cannot be presented easily in any other form. Explanation and keys should, as far as possible, be placed in the legends. Photographs for halftone reproduction must be on white glossy paper. Figures should be composed to occupy a single column (8.3 cm) or two columns (17 cm) after reduction. Diagrams and illustrations must have a professional appearance and be typed or drawn with sharp, black lettering to permit reduction. To assure legibility, letters, numbers, and symbols on figures should all be the same size and have a minimum height of 2 mm (i.e., 6 points on the pica scale) when reduced. Figures should be separate and not incorporated into the text copy.

Artwork should normally be in black and white; if authors have color figures, the publisher will provide a price quotation for the additional production costs. However, color figures can appear online free of cost. All figures must be identified on the back with the short title of the paper, figure number, and figure

orientation (top or bottom). Preferably, figures should be mounted on heavy sheets of the same size as the manuscript. Three complete sets of figures should be carefully packaged in protective envelopes, one to accompany each copy of the manuscript. Each figure must be cited and its approximate position clearly indicated within the text.

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References. Entries should be listed alphabetically by lead author at the end of the paper. All authors' names should be included, followed by the year of publication, the full title of the journal, volume, issue number, and inclusive page numbers. For books, the full title should be given, followed by the editors, volume number (if any), page numbers, publisher, and place of publication. Citations in the text should read Brown and Smith (1973) or (Brown & Smith, 1973). Where there are more than two authors the citation should read: Brown et al. (1973). The conventional Brown (1973a), Brown (1973b) should be used where more than one paper by the author(s) has appeared in the same year.

Journal or Magazine article

Schank, R.C. (1991). Where's the AI? *AI Magazine* 12(4), 38-49.

Segre, M.A. (1991). Learning how to plan. *Robotics and Autonomous Systems* 8(1-2), 93-111.

Book

Dym, C.L. (1994). *Engineering Design: A Synthesis of Views*. New York: Cambridge University Press.

Chapter in an edited book

Nierstrasz, O. (1993). Composing active objects. In *Research Directions in Concurrent Object-Oriented Programming* (Agha, G., Wegner, P., & Yonezawa, A., Eds.), pp. 151-171. Cambridge, MA: MIT Press.

Proceedings

Craw, S., & Sleeman, D. (1990). Automating the refinement of knowledge based systems. *Proc. Ninth Eur. AI Conf.*, pp. 167-172.

Proceedings with publisher identified

Mittal, S., & Frayman, F. (1989). Towards a generic model of configuration tasks. *Proc. Eleventh Int. Joint Conf. Artificial Intelligence*, pp. 1395-1401. San Francisco, CA: Morgan Kaufmann.

The alphabetical list of references begins a new page and must be typed double-spaced. Each in-text citation must have a corresponding reference and vice versa. List works by different authors who are cited within the same parentheses in chronological order, beginning with the earlier work. Journal titles should not be abbreviated. Only published articles and articles in press should appear in this list. The responsibility for the accuracy of references cited lies with the authors.

Author biographies. Brief author biographies will be printed at the end of each paper; they should not exceed 100 words for each author.

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