22-25 June CC W28k 2015

Computational Geometry Week

31st Annual Symposium on Computational Geometry 24th Multimedia Exposition

- 4th Young Researchers Forum
- CG Workshops
- Geometric Networks
- 4th Annual Minisymposium on Computational Topology
- Stochastic Geometry and Random Generation
- Geometric Intersection Graphs: Problems and Directions

CG Week 2015

Campus Map



Auditorium Map



Sunday, June 21

18:30 - 22:00

Welcome Reception

Zwarte doos (drinks and buffet) Den Dolech 2

The buffet is open between 19:00 and 21:00. There will be enough food for dinner, so be on time!

Monday, June 22

09:00 Welcome

09:10 Best Paper

Combinatorial Discrepancy for Boxes via the gamma₂ Norm Jiří Matoušek and Aleksandar Nikolov.

09:30 Multimedia Session

Tilt: The Video - Designing Worlds to Control Robot Swarms with Only Global Signals Aaron Becker, Erik Demaine, Sandor Fekete, Hamed Shad, and Rose Morris-Wright.

Automatic Proofs for Formulae Enumerating Proper Polycubes Gill Barequet and Mira Shalah.

Visualizing Sparse Filtrations

Nicholas Cavanna, Mahmoodreza Jahanseir, and Donald Sheehy.

Visualizing Quickest Visibility Maps

Topi Talvitie.

10:00 YRF Previews

Session A (Blauwe Zaal) Session Chair: Rodrigo Silveira

10:30 Coffee break

| 11:00 | SOCG | Session A (AUD 4) Session Chair: János Pach | | | |
|-------|---|--|--|--|--|
| | Sylvester-Gallai for Arrangements of Subspaces | | | | |
| | Zeev Dvir and Guano | ida Hu | | | |

Computational Aspects of the Colorful Carathéodory Theorem Wolfgang Mulzer and Yannik Stein.

Semi-algebraic Ramsey Numbers Andrew Suk.

A Short Proof of a Near-Optimal Cardinality Estimate for the Product of a Sum Set Oliver Roche-Newton.

A Geometric Approach for the Upper Bound **Theorem for Minkowski Sums of Convex** Polytopes

Menelaos I. Karavelas and Eleni Tzanaki.

Two Proofs for Shallow Packings Kunal Dutta, Esther Ezra and Arijit Ghosh.

Session B (AUD 5) Session Chair: Lars Arge

Shortest Path in a Polygon using Sublinear Space

Sariel Har-Peled.

SOCG

Optimal Morphs of Convex Drawings

Patrizio Angelini, Giordano Da Lozzo, Fabrizio Frati, Anna Lubiw, Maurizio Patrignani and Vincenzo Roselli.

1-String B₂-VPG Representation of Planar Graphs

Therese Biedl and Martin Derka.

Spanners and Reachability Oracles for Directed Transmission Graphs

Haim Kaplan, Wolfgang Mulzer, Liam Roditty and Paul Seiferth.

Recognition and Complexity of Point Visibility Graphs

Jean Cardinal and Udo Hoffmann.

Geometric Spanners for Points Inside a Polygonal Domain

Mohammad Ali Abam, Marjan Adeli, Hamid Homapour and Pooya Zafar Asadollahpoor.

13:00 Lunch

Session A (Blauwe Zaal)

Session A (Blauwe Zaal) Session Chair: János Pach

Session A (Blauwe Zaal)

Session Chair: Wolfgang Mulzer

14:00 YRF

Session A (Blauwe Zaal)

Generalized Offsetting Using a Variable-Radius Voronoi Diagram Martin Held, Stefan Huber and Peter Palfrader.

Randomized Incremental Construction for the Hausdorff Voronoi Diagram Elena Khramtcova and Evanthia Papadopoulou.

Experiments on Parallel Polygon Triangulation Using Ear Clipping Günther Eder, Martin Held and Peter Palfrader.

Flips in Edge-Labelled Pseudo-Triangulations

Prosenjit Bose and Sander Verdonschot.

Model-based Classification of Trajectories

Maike Buchin and Stef Sijben.

Clustering time series under the Frechet distance

Anne Driemel, Amer Krivosija and Christian Sohler.

15:30 Coffee break

16:00 YRF

Session A (Blauwe Zaal)

Pose Statistics for Eccentric Parts Fatemeh Panahi, Aviv Adler and A. Frank van der Stappen.

On the Hardness of Unlabeled Multi-Robot Motion Planning Kiril Solovey and Dan Halperin.

Subsampling in Smoothed Range Spaces

Yan Zheng and Jeff Phillips.

Covering Exactly One of Each Pair

Gui Citovsky, Joseph Mitchell, Esther Arkin, Aritra Banik, Matthew Katz, Paz Carmi and Marina Simakov.

Approximate Diameter with Inexact Input Data

Masood Seddighin, Hamid Homapour and Mohammad Ghodsi.

2048 is NP-Complete

Ahmed Abdelrazek, Aditya Acharya and Philip Dasler.

Computational Topology Session B (AUD 2)

A Brief Pre-History of Computational Topology Jeff Erickson.

Approximating Persistent Homology in Euclidean Space Magnus Botnan.

Practical parameterised complexity for knots and 3-manifolds Benjamin A. Burton.

Geometric Networks Session C (AUD 7)

Connectivity properties of random bluetooth networks Gabor Lugosi.

Efficiently navigating a random Delaunay triangulation Nicholas Broutin.

Computational Topology Session B (AUD 2)

Parameter-Free (Friendly?) Topology Inference Through Sparsification Tamal Dey.

Zigzag Persistence via Reflections and Transpositions Clément Maria.

Open Problem Session

Geometric Networks Session C (AUD 7)

Geometric network optimization in the face of uncertainty Joe Mitchell.

Batched point location in SINR Diagrams via algebraic tools Matya Katz.

Interference minimization in asymmetric sensor networks Kevin Buchin.

17:30 Program End

Tuesday, June 23

09:10 SOCG Session A (AUD 4) Session Chair: Monique Teillaud

An Optimal Algorithm for the Separating Common Tangents of Two Polygons Mikkel Abrahamsen.

A Linear-Time Algorithm for the Geodesic Center of a Simple Polygon

Luis Barba, Prosenjit Bose, Matias Korman, Jean-Lou De Carufel, Hee-Kap Ahn and Eunjin Oh.

On the Smoothed Complexity of Convex Hulls Olivier Devillers, Marc Glisse, Xavier Goaoc and Rémy Thomasse.

Finding All Maximal Subsequences with Hereditary Properties

Drago Bokal, Sergio Cabello and David Eppstein.

10:30 Coffee break

| 11:00 | SOCG |
|-------|------|
|-------|------|

12:00 Invited Speaker

Combinatorial Redundancy Detection Komei Fukuda, Bernd Gaertner and May Szedlak.

Effectiveness of Local Search for Geometric Optimization

Vincent Cohen-Addad and Claire Mathieu.

On the Shadow Simplex Method for Curved Polyhedra

Daniel Dadush and Nicolai Hähnle.

SOCG Session B (AUD 5) Session Chair: Donald Sheehy

Riemannian Simplices and Triangulations Ramsay Dyer, Gert Vegter and Mathijs Wintraecken.

An Edge-Based Framework for Enumerating 3-Manifold Triangulations

Benjamin A. Burton and William Pettersson.

Order on Order Types

Alexander Pilz and Emo Welzl.

Limits of Order Types

Xavier Goaoc, Alfredo Hubard, Remi de Joannis de Verclos, Jean-Sebastien Sereni and Jan Volec.

SOCG

Session B (AUD 5) Session Chair: Lars Arge

Pattern Overlap Implies Runaway Growth in Hierarchical Tile Systems Ho-Lin Chen, David Doty, Jan Manuch, Arash Rafiey and Ladislav Stacho.

Space Exploration via Proximity Search Sariel Har-Peled, Nirman Kumar, David Mount and Benjamin Raichel.

Star Unfolding from a Geodesic Curve Stephen Kiazyk and Anna Lubiw.

> Session A (Blauwe Zaal) Session Chair: János Pach

The Dirac-Motzkin Problem on Ordinary Lines and the Orchard Problem Ben Green.

Session A (AUD 4)

Session Chair: János Pach

13:00 Lunch

14:00 YRF

Session A (Blauwe Zaal)

Drawing Planar Cubic 3-Connected Graphs with Minimal Visual Complexity Alexander Igamberdiev, Wouter Meulemans and André Schulz.

1-String B1-VPG Representations of Planar Partial 3-Trees

Therese Biedl and Martin Derka.

An Optimal Algorithm for Tiling the Plane with a Translated Polyomino Andrew Winslow.

Recognizing Weighted and Seeded Disk Graphs

Boris Klemz, Martin Nöllenburg and Roman Prutkin.

Automatic Proofs for Formulae Enumerating Proper Polycubes

Mira Shalah and Gill Barequet.

Realization of simply connected polygonal linkages

Clinton Bowen, Stephane Durocher, Maarten Löffler, Anika Rounds, André Schulz and Csaba Tóth.

15:30 Coffee break

16:00 YRF

Session A (Blauwe Zaal)

Diamonds are a Quiver's Best Friend Clément Maria.

A hom-tree lower bound for the Reeb graph interleaving distance Vin de Silva, Elizabeth Munch and

Anastasios Stefanou.

The Offset Filtration of Convex Objects Dan Halperin, Michael Kerber and Doron Shaharabani.

Computational Topology Session B (AUD 2)

Statistical Approaches to Topological Data Analysis Brittany Terese Fasy.

Tutorial on the R Package TDA Jisu Kim.

Geometric Networks Session C (AUD 7)

Wireless networks: Do not disturb my circles Roger Wattenhofer.

On the minimum-cost range assignment problem Lilach Chaitman.

Computational Topology Session B (AUD 2)

Describing High-Order Statistical Dependence Using "concurrence topology", with Application to Functional MRI Brain Data Steven P. Ellis.

Multi-Scale Local Shape Analysis and Feature Selection in Machine Learning Applications Ellen Gasparovic.

Using Cycles in High Dimensional Data to Analyze Protein Binding Giseon Heo.

Persistence Images: An Alternative Persistent Homology Representation Lori Ziegelmeier.

Geometric Networks Session C (AUD 7)

Euclidean traveling salesman tours through stochastic neighborhoods Subhash Suri.

Competitive local routing with constraints André van Renssen.

An overview on compact routing Cyrille Gavoille.

Open Problem Session

Ends at 18:00

17:30 Program End



Map Legend

All labels match the centrefold map. Numbers correspond to the restaurants at the back of this booklet.

| н | Hampshire Inn Vestdijk 14-16 T: +31 40 844 5 min. walk fro station | 4000 om the t | train | I | Inntel Hotels Art Mathildelaan 1 T: +31 40 7513500 10 min. walk from the train station | Q | Queen Hotel Markt 7 T: +31 40 2452480 5 min. walk from the train station |
|------------------|--|------------------------|--|----------------------|---|----------|--|
| R | La Reine Wilhelminapleir T: +31 40 820 <i>10 min. walk fr</i> <i>station</i> | n 3 0311 rom the | train | S | Sandton Hotel Stratumsedijk 23D T: +31 40 2121330 <i>18 min. walk from the</i> <i>train station</i> | | |
| Recep | otion | ZD | Sunday, Jun De Zwarte D Den Dolech | e 21, 1)oos 2 | 18:30-22:00 | | |
| Touris Infori | st nation | ¥ | Eindhoven B Stationspleir | Brandst n 17 | core / VVV | | |
| Centr | al Station | \sim | NS (Nederla | ndse S | Spoorwegen) is the abbreviation f | or the D | utch railway. |
| Post (| Office | \succ | Bruna Admir Nieuwe Emn | rant nasing | el 24 | | |

Tourist Information

W Eindhoven Brandstore / VVV, Stationsplein 17 (next to Central Station)

Telephone: +31 900 1122363

| Opening hours: | Mon | 10:00-18:00 |
|----------------|--------------------|-------------|
| | Tue, Wed, Thu, Fri | 09:00-18:00 |
| | Sat | 10:00-17:00 |
| | Sun | closed |

Post Office

The Dutch postal company has closed most post offices and now cooperates with bookstores to deliver its services to the public. The services offered differ per place. If you're just looking for stamps, most book stores (e.g., Ako or Bruna) and the tourist information office can help you. For anything more complicated, try the specialized desk in the Bruna Admirant.

Restaurant Guide

You'll find plenty of restaurants in the city center. Main restaurant areas are the Dommelstraat (almost directly opposite the train station), the Markt and the Bergen kwartier, comprising both the Kleine Berg and the Grote Berg. More information on the different areas in Eindhoven and its restaurants see http://wikitravel.org/en/Eindhoven. Below are some of our recommendations, for more recommendations as well as phone numbers please also refer to the CG Week website.

Restaurants

1. Bali

Keizersgracht 13 Indonesian restaurant with several good rice tables, each with a rich variety of Indonesian dishes.

2. In den Bergse Tuin

Grote Berg 17-19-21 A cozy bistro with lots of different dishes on the menu. For fans of specialty beer, this is the place to go with 125 different beers. Reservation recommended. (+31 40 2437727)

3. Gauchos

Stationsplein 7 Argentinian grill restaurant. Good steak but aside from a pasta no vegetarian options.

4. Indonesia

Jan van Lieshoutstraat 22 Indonesian food, you can either go à la carte or join the buffet.

- 5. De Karseboom
 - Grote Berg 10

Good quality food including vegetarian, fish and meat dishes. Tables inside and in the lovely garden behind the restaurant.

- 6. Lithos
 - Kerkstraat 40

Greek restaurant Lithos offers an a la carte menu with many classic Greek dishes, but also many specialities prepared with fresh ingredients and herbs from Greece.

- 7. Lounge 8
 - Catharinaplein 37

Lounge 8 facilitates small versions of all dishes, so that you can try out all the different dishes.

- 8. Ribs Factory
 - Kerkstraat 14

Spareribs, burgers and steaks. Awarded the certificate of excellence by TripAdvisor (2014).

- 9. Stads
 - Paradijslaan 48

A decent meal for a fair price. Lots of space and usually pretty quiet, a good choice for bigger groups.

10. The Trafalgar Pub

Dommelstraat 21 British pub with pretty good pub meals (e.g., shepherd's pie, vegetarian pie) around 12€.

- 11. Umami
 - Kleine Berg 57H

Asian Fusion (combining many tastes such as sweet/sour/bitter/umami) restaurant serving 3-course meals prepared in a French manner.

12. Yokohama

Stationsplein 11 Japanese teppanyaki and sushi restaurant. They serve both menus and a la carte dishes.

- 13. Zarzo
 - Bleekweg 7

Contemporary kitchen with a hint of the classic Spanish cuisine. If you don't mind paying a bit more this is the place to be in Eindhoven. Reservation recommended. (+31 40 2117700)

Wednesday, June 24

09:10 SOCG

Session A (AUD 4) Session Chair: John Hershberger

On the Beer Index of Convexity and Its Variants

Martin Balko, Vít Jelínek, Pavel Valtr and Bartosz Walczak.

Tight Bounds for Conflict-Free Chromatic Guarding of Orthogonal Art Galleries

Frank Hoffmann, Klaus Kriegel, Subhash Suri, Kevin Verbeek and Max Willert.

Low-Quality Dimension Reduction and High-**Dimensional Approximate Nearest Neighbor** Evangelos Anagnostopoulos, Ioannis Z. Emiris and Ioannis Psarros.

Restricted Isometry Property for General p-Norms

Zeyuan Allen-Zhu, Rati Gelashvili and Ilya Razenshteyn.

10:30 Coffee Break

11:00 SOCG

Session A (AUD 4) Session Chair: Csaba Tóth

Polynomials Vanishing on Cartesian Products: The Elekes-Szabó Theorem Revisited

Orit E. Raz, Micha Sharir and Frank de Zeeuw.

Bisector Energy and Few Distinct Distances Ben Lund, Adam Sheffer and Frank de Zeeuw.

Incidences between Points and Lines in Three Dimensions

Micha Sharir and Noam Solomon.

The Number of Unit-Area Triangles in the **Plane: Theme and Variations** Orit E. Raz and Micha Sharir.

On the Number of Rich Lines in Truly High **Dimensional Sets**

Zeev Dvir and Sivakanth Gopi.

Realization Spaces of Arrangements of Convex Bodies

Michael Gene Dobbins, Andreas Holmsen and Alfredo Hubard.

SOCG

Session B (AUD 5) Session Chair: Donald Sheehy

Session B (AUD 5)

Strong Equivalence of the Interleaving and **Functional Distortion Metrics for Reeb Graphs** Ulrich Bauer, Elizabeth Munch and Yusu Wang.

On Generalized Heawood Inequalities for Manifolds: A Van Kampen-Flores-type Nonembeddability Result

Xavier Goaoc, Isaac Mabillard, Pavel Patak, Zuzana Patakova, Martin Tancer and Uli Wagner.

Comparing Graphs via Persistence Distortion Tamal Dey, Dayu Shi and Yusu Wang.

Bounding Helly Numbers via Betti Numbers Xavier Goaoc, Pavel Patak, Zuzana Patakova, Martin Tancer and Uli Wagner.

Session Chair: Antoine Vigneron

SOCG

Computing Teichmüller Maps between Polygons

Mayank Goswami, Xianfeng Gu, Vamsi Pritham Pingali and Gaurish Telang.

On-line Coloring between Two Lines Stefan Felsner, Piotr Micek and Torsten Ueckerdt.

Building Efficient and Compact Data Structures for Simplicial Complexes

Jean-Daniel Boissonnat, Karthik C. S. and Sébastien Tavenas.

Shortest Path to a Segment and Quickest **Visibility Queries**

Esther Arkin, Alon Efrat, Christian Knauer, Joseph Mitchell, Valentin Polishchuk, Gunter Rote, Lena Schlipf and Topi Talvitie.

Trajectory Grouping Structure under Geodesic Distance

Irina Kostitsyna, Marc Van Kreveld, Maarten Löffler, Bettina Speckmann and Frank Staals.

From Proximity to Utility: A Voronoi Partition of Pareto Optima

Hsien-Chih Chang, Sariel Har-Peled and Benjamin Raichel.

13:00 Lunch

14:00 Business Meeting

15:30 Coffee Break

- 16:15 Bus Transfer
- 17:00 Boat Tours and Guided Tours

19:15 Reception and Dinner at Orangerie

22:45 Bus Transfer

23:15 Program End

Session A (Blauwe Zaal)

Excursion

Bus departure Eindhoven:

At **16:15** buses will take us from the Auditorium to 's-Hertogenbosch for a city tour. The city tour will be organized in small groups of 16, each having matching color camels. The tour consists of a city walk and a boat trip interleaved in different ways for the groups. The order of the groups as well as the starting positions is given below.

| Boat departure: | | Junction Molenstraat - Sint Jansstraat - Lepelstraat - Korenbrugstraat. | | | | |
|----------------------|------------|---|---|-----------------------------|--|--|
| City walk departure: | | Sint Janssingel. | | | | |
| | | | | | | |
| Groups A, B, C | (black, wh | nite, grey): | Depart at 16:50 for the boat trip ; | city walk is afterwards. | | |
| Groups D, E, F | (yellow, o | range, red): | Depart at 17:10 for the boat trip ; | city walk is afterwards. | | |
| Groups G, H, I | (blue, gre | en, brown): | Depart at 17:00 for the city walk ; | boat trip is in the middle. | | |
| Groups J, K, L | (pink, pur | ple, natural-dot): | Depart at 16:50 for the city walk ; | boat trip is afterwards. | | |

After the tour the tour guides will walk us to the conference dinner location (Orangerie). Arrival at the Orangerie starting at 19:15 for a drink; dinner at 19:45. Bus departure for the way back is from the Orangerie. The first bus leaves at 22:30. The other two buses leave at 22:45 to Eindhoven train station.

Orangerie

St. Josephstraat 15 5211 NH 's-Hertogenbosch



Thursday, June 25

09:30 SOCG

Session A (AUD 4) Session Chair: Antoine Vigneron

Faster Deterministic Volume Estimation in the Oracle Model via Thin Lattice Coverings Daniel Dadush.

Optimal Deterministic Algorithms for 2-d and 3-d Shallow Cuttings

Timothy M. Chan and Konstantinos Tsakalidis.

A Simpler Linear-Time Algorithm for Intersecting Two Convex Polyhedra in Three **Dimensions** Timothy M. Chan.

10:30 Coffee break

11:00 SOCG

Session A (AUD 4) Session Chair: Stefan Langerman

Approximate Geometric MST Range Queries Sunil Arya, David Mount and Eunhui Park.

Maintaining Contour Trees of Dynamic Terrains

Pankaj K. Agarwal, Thomas Mølhave, Morten Revsbæk, Issam Safa, Yusu Wang and Jungwoo Yang.

Hyperorthogonal Well-Folded Hilbert Curves Arie Bos and Herman Haverkort.

12:00 Invited Speaker

Modeling Real-World Data Sets Susanne Albers.

13:00 Lunch

14:00 Stochastic Geometry Session A (Blauwe Zaal)

Welcome

Introduction to several models from stochastic geometry Pierre Calka.

Introduction to the random generation of discrete structures Philippe Duchon.

Computational Topology Session B (AUD 2)

Introduction to Categories, **Part I: Key Concepts** Vin de Silva.

The Interleaving Distance Elizabeth Munch.

Geom. Intersection Graphs Session C (AUD 7)

Interval Graphs in Data Streaming Sergio Cabello.

Coloring and Independent Sets of Rectangles: Recent **Developments and New** Challenges Parinya Chalermsook.

Intersection Graphs and Order Dimension Stefan Felsner.

15:30 Coffee break

16:00 Stochastic Geometry Session A (Blauwe Zaal)

> **Central limit theorems for** random tessellations and random graphs Matthias Schulte.

Generalised Eden growth model and random planar trees Sergei Zuyev.

Computational Topology Session B (AUD 2)

Introduction to Categories, Part II: Persistence via Category Theory Vin de Silva.

Topos Theory for Persistenc Primoz Skraba.

Geom. Intersection Graphs Session C (AUD 7)

"No k Pairwise Crossing" vs "No k Pairwise Disjoint" Andrew Suk.

Colorings of Geometric Intersection Graphs and Related Problems Bartosz Walczak.

Open Problems Session

Approximability of the Discrete Fréchet Distance

Karl Bringmann and Wolfgang Mulzer.

The Hardness of Approximation of Euclidean k-Means

Pranjal Awasthi, Moses Charikar, Ravishankar Krishnaswamy and Ali Kemal Sinop.

A Fire Fighter's Problem

Rolf Klein, Elmar Langetepe and Christos Levcopoulos.

SOCG

SOCG

Session Chair: Csaba Tóth

Topological Analysis of Scalar Fields with Outliers

Mickaël Buchet, Frederic Chazal, Tamal Dey, Fengtao Fan, Steve Oudot and Yusu Wang.

On Computability and Triviality of Well Groups

Peter Franek and Marek Krcál.

Geometric Inference on Kernel Density Estimates

Jeff Phillips, Bei Wang and Yan Zheng.

Session A (Blauwe Zaal) Session Chair: Lars Arge

Session B (AUD 5)

WiFi

The TU Eindhoven is connected to the eduroam network. Besides eduroam, participants can make use of the guest network of the TU Eindhoven. To make use of the "guest" network, a guest account should be registered online (https://guest-registration.tue.nl/cgi-bin/event?code=72396). Registration should (preferably) be done before the conference.

Proceedings

Proceedings for the Symposium on Computational Geometry, Multimedia Exposition and the Young Researchers Forum can be found online. Links to all three are placed on the CG Week website.

Talks

All talks are in the auditorium of the TU Eindhoven, marked with AUD on all maps. For the SOCG symposium and the Young Researchers Forum fixed laptops will be used to host the presentations. These laptops by default have the following programs installed:

Microsoft Windows 8.1 Powerpoint 2010 Adobe reader 11.0.10 SumatraPDF 3.0 Libre office 4.4.3

Presenters will also be available for the speakers. Please remember to copy your presentation onto this computer well before the session in which you will present.

Lunches

The lunches are served in the Senaatszaal in the auditorium. Locals (recognizable by the orange name tags) can guide you to the exact location.

Water Bottles

Free water bottles are available during all breaks at the registration desk. There is one bottle per participant per day.