

平成 28 年度 生体医歯工学共同研究実施報告書

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生体医歯工学共同研究拠点 研究所長会議 議長 殿

共同研究代表者

所属機関 State University of New York  
at Fredonia

職名 Professor

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下記により、共同研究の実施報告を致します。

記

研究題目	(和)医療及び生物医学用途イメージングデバイスと光符号 (英)Imaging devices and optical codes for medical and biomedical applications		
研究領域	1. 生体材料に関する基礎・応用研究 2. 生体工学に関する基礎・応用研究 3. 生体機能分子に関する基礎・応用研究 ④ 化学・電気・機械・材料工学の生体応用研究		
研究期間	平成 28 年 6 月 1 日～平成 29 年 3 月 31 日		
研究組織			
氏名	所属機関・部局等	職名	役割分担
Reneta P. Barneva	School of Business, State University of New York at Fredonia, USA	Professor	Leader
Lisa Walters	School of Business, State University of New York at Fredonia, USA	Professor	Participant
Valentin E. Brimkov	Mathematics Department, Buffalo State College, State University of New York, USA	Professor	Participant
Daniel D. Cunningham	Mathematics Department, Buffalo State College, State University of New York, USA	Professor	Participant
Antoine Deza	Department of Computing and Software, Faculty of Engineering, McMaster University, Hamilton, Canada	Professor and Canada Chair in Combinatorial Optimization	Participant

José Ramón Dorronsoro	Telecommunications and Computing Department, Escuela Politécnica Superior, Universidad Autónoma de Madrid and Instituto de Ingeniería del Conocimiento of the UAM, Spain	Professor and Senior Researcher	Participant
Remy Malgouyres	IUT Department of Informatics, Université d'Auvergne (Clermont 1), France	Professor	Participant
Volodymyr Gnatyuk	V.E. Lashkaryov Institute of Semiconductor Physics, National Academy of Sciences of Ukraine	Associate Professor	Participant
Kostadin Koroutchev	Departamento de Ingeniería Informática, Escuela Politécnica Superior, Universidad Autónoma de Madrid, Spain	Associate Professor	Participant
Alberto Suarez	Departamento de Ingeniería Informática, Escuela Politécnica Superior, Universidad Autónoma de Madrid, Spain	Associate Professor	Participant
Akira Takahashi	Faculty of Informatics, Shizuoka University, Japan	Associate Professor	Participant
Sergey Gagarsky	Quantum Electronics and Biomedical Optics Department, State University of Information Technologies, Mechanics & Optics, Russia	Senior Researcher	Participant
Michael Vynnycky	KTH Royal Institute of Technology, Sweden	Professor	Participant
Boris Brimkov	Department of Computational and Applied Mathematics, Rice University, USA	Graduate Student	Participant
Andrew David Speers	Department of Computer Science and Engineering, Faculty of Engineering, York University, Canada	Graduate Student	Participant
Kamen Kanev	Graduate School of Informatics, Shizuoka University, Japan	Professor	Participant
Vygantas Mizeikis	Research Institute of Electronics, Shizuoka University, Japan	Professor	Participant
<b>所要経費</b>			
旅費総額	研究・会議費総額	消耗品費総額	
125,000 円	0 円	75,042 円	
<b>生体医歯工学共同研究拠点内対応教員</b>	(共同研究をした教員名を記載) Reneta Barneva, Kamen Kanev, Vygantas Mizeikis		
<b>共同研究継続の希望について</b>	○ 有 ・ 無	平成29年度研究費総額(千円)	200
		※継続を希望される場合記入してください	
<b>研究成果</b>			
<p>A. Risk evaluation in biomedical organizations: identifying the processes, which may lead to serious potential problems using deviation codes, predicting the level of the risk, and optimizing the available resources for solving the problems.</p> <p>B. Heuristic and space-efficient algorithms for imaging devices: developing efficient graph algorithms, particularly under the log-space computational model for imaging.</p> <p>C. New educational models: employing new technologies in education, promoting collaborative educational</p>			

environments, and designing new interfaces.

D. Defining appropriate discrete geometrical primitives, more specifically in the direction of constructing a polyhedral surface called a graceful surface, which provides the best possible approximation with respect to certain criteria.

E. Introducing 3D marking for imaging devices through laser-induced marks and studying the various ways, parameters and materials for 3D marking.

使用した設備・資料・試料等

Research equipment available in the labs of Prof.Mizeikis (laser systems for surface and volumetric marking and digital encoding of transparent materials) and Prof.Kanev (computing systems, interactive tabletops, and specialized optical readers for code extraction and analysis)

本研究成果に関連する論文発表状況

- (1) R.P. Barneva, V.E. Brimkov, J.M.R. Tavares. Computational Modeling of Objects Represented in Images, Springer Verlag, LNCS 10149, Berlin-Heidelberg, 2017 (to appear).
- (2) R.P. Barneva, V.E. Brimkov. Mathematics for Applications in Imaging, Journal of Mathematics for Applications, Institute of Mathematics, Brno University of Technology, Vol. 5, No 2, 2016, 80 pages.
- (3) V.E. Brimkov, R.P. Barneva. Graph-theoretic and polyhedral combinatorics issues and approaches in imaging sciences. Discrete Applied Mathematics 216(2), 321-322, 2017.
- (4) L. Walters, R.P. Barneva, Prioritization of Process Improvement Using Risk Evaluation in the Manufacturing of Biologics, Quality Management Journal, American Society for Quality, 2017 (to appear).
- (5) B. Brimkov. Complexity and Computation of Connected Zero Forcing. CoRR abs/1607.00658, 2016.
- (6) R.P. Barneva, K. Kanev, B. Kapralos, M. Jenkin, B. Brimkov. Integrating technology-enhanced collaborative surfaces and gamification for the next generation classroom, Journal of Educational Technology Systems, Sage, Vol. 45(3), March 2017, 309-325.
- (7) R. Biswas, P. Bhowmick, V.E. Brimkov. On the polyhedra of graceful spheres and circular geodesics. Discrete Applied Mathematics 216: 362-375, 2017.
- (8) V.A. Gnatyuk, O.I. Vlasenko, S.N. Levytskyi, T. Aoki, V. Mizeikis, S.V. Gagarsky, K.S. Zelenska, D.V. Gnatyuk. Laser-induced creation of marks as information carriers for digital recording, Journal of Laser Micro/Nanoengineering (JLMN), Vol. 11, No 2 (July 2016) 164-169.
- (9) S. Saleem, M. Vynnycky, H. Fredriksson. The Influence of Peritectic Reaction/Transformation on Crack Susceptibility in the Continuous Casting of Steels, Metallurgical and Materials Transactions B, Feb 2017, DOI: 10.1007/s11663-017-0926-8.
- (10) B.J. Florio, M. Vynnycky, s.l. Mitchell, S. B. G. O'Brien. On the interactive effects of mould taper and superheat on air gaps in continuous casting, Acta Mechanica, Sep 2016, DOI: 10.1007/s00707-016-1717-z.
- (11) S. Saleem, M. Vynnycky, H. Fredriksson. A Study of the Oscillation Marks' Characteristics of Continuously Cast Incoloy Alloy 825 Blooms, Metallurgical and Materials Transactions A, Jun 2016, DOI: 10.1007/s11661-016-3582-8.
- (12) A.S. Nick, M. Vynnycky, H. Fredriksson. A Theoretical Analysis of the Interaction Between Pores and Inclusions During the Continuous Casting of Steel, Metallurgical and Materials Transactions A, Apr 2016, DOI: 10.1007/s11661-016-3449-z.
- (13) R.P. Barneva, B.B. Bhattacharya, V.E. Brimkov, P. Bhowmick, A. Biswas. Methods and

Applications in Image Analysis, Special Track on Applications of the 17th International Workshop on Combinatorial Image Analysis, Research Publishing 2016, ISBN 978-981-09-7518-0.

- ( 1 4 ) R.P. Barneva, V.E. Brimkov, P. Hung, K. Kanev, Motion tracking for gesture analysis in sports, IEEE 19th Western New York Image and Signal Processing Workshop, Rochester Institute of Technology, November 18, 2016 (to appear)
- ( 1 5 ) B. Brimkov, I.V. Hicks. Memory efficient algorithms for cactus graphs and block graphs. Discrete Applied Mathematics 216, 393-407, 2017
- ( 1 6 ) B. Brimkov, C.C. Fast, I.V. Hicks. Graphs with Extremal Connected Forcing Numbers. CoRR abs/1701.08500, 2017.
- ( 1 7 ) B. Brimkov, I.V. Hicks. Chromatic and flow polynomials of generalized vertex join graphs and outerplanar graphs. Discrete Applied Mathematics 204, 13-21, 2016.
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- ( 2 0 ) B. Brimkov, I.V. Hicks. On the logspace shortest path problem. Electronic Colloquium on Computational Complexity (ECCC) 23: 3, 2016.