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POSITIONS AND EMPLOYMENT

09/2012 – Present **Assistant Academic Specialist**, Joint appointment in Art + Design in the College of Art, Media and Design and the College of Engineering, Northeastern University

09/2012 – Present **Co-Founder**, 3-Spark, Rapid Prototyping and Additive Manufacturing Start-up

09/2012 – Present **Co-Founder**, Andros Robotics, Robotic Motor Rehabilitation Start-up

09/2009 – Present **Part-Time Instructor**, College of Professional Studies, Northeastern University

09/2011 – 05/2011 **Visiting Assistant Academic Specialist**, Creative Industries, Northeastern University

05/2009 – 05/2011 **Part-Time Instructor**, Creative Industries, Northeastern University

01/2009 – 05/2011 **Research Assistant**, Biomedical Mechatronics Lab, Northeastern University

09/2008 – 12/2008 **Teaching Assistant**, Dept. of Mechanical Engineering, Northeastern University

05/2008 – 08/2011 **Part-Time Instructor**, College of Professional Studies, Northeastern University

09/2007 – 05/2008 **Research Assistant**, Biomedical Mechatronics Lab, Northeastern University

01/2006 – 06/2006 **Optical Engineer**, Lexitek Inc., Wellesley, MA

01/2005 – 06/2005 **Mechanical Engineer**, Mercury Computer Inc., Chelmsford, MA

01/2004 – 06/2004 **Mechanical Engineer**, Mercury Computer Inc., Chelmsford, MA

EDUCATION

09/2009 – 05/2012 **Interdisciplinary Engineering Doctor of Philosophy**, Northeastern University
Dissertation: Design and Implementation of Patient Specific Virtual Reality Systems for Motor Rehabilitation

09/2007 – 08/2009 **Master of Science in Mechanical Engineering**, Northeastern University
Thesis: Design of Virtual Environments for Rehabilitation Devices

09/2002 – 05/2007 **Bachelor of Science in Mechanical Engineering**, Northeastern University

HONORS AND AWARDS

03/2012 **Best Undergraduate Interdisciplinary Project** at RISE 2012 for the Squid project

03/2012 **Entrepreneurship Award** at RISE 2012 for the Squid project

06/2011 Recipient of a **Tier 1 Seed/Proof of Concept Grant** for the No2Nox project

07/2011 Recipient of internal support for the **Mobile Learning Digital Media Project** from NU Ed-Tech

04/2010 **Best Interdisciplinary Project** at the Northeastern Research Expo, ATLAS-BR Project

04/2010 **Best Poster** at the IEEE Haptics Symposium, HERI Project

09/2009 Recipient of a **National Science Foundation Supplement Fellowship** for “Active Knee Rehabilitation Orthotic Device (AKROD)” NSF Award CBET-0828772.

08/2009 Recipient of an **Undergraduate Student Research Grant** for “Managing the Tradeoffs in the Digital Transformation of an Educational Board Game to a Computer Based Simulation”.

RESEARCH AND TEACHING INTERESTS

- Virtual reality, games and devices for impact specifically games for education, health and rehabilitation
 - Procedural content generation in virtual worlds and dynamic virtual worlds and games
 - Human-computer interactions, usability, user interface design and psychophysiological sensors
 - Advanced tabletop gaming systems
 - Mobile games, hardware and apps for smart phones and tablets
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JOURNAL AND SELECTED CONFERENCE PUBLICATIONS

1. Ranky R., **Sivak M.**, Gade V., Deutsch J., Mavroidis C., "Modular Mechatronic System for Stationary Bicycles Interfaced with Virtual Environment for Rehabilitation of Patients Post Stroke", *Journal of NeuroEngineering and Rehabilitation* Submitted for publication
2. **Sivak M.**, Murray D., Dick L., Mavroidis C., Holden M., "Development of a Low-Cost Virtual Reality-based Smart Glove for Rehabilitation", *International Conference Series on Disability, Virtual Reality and Associated Technologies*, September 2012
3. Farjadian A., **Sivak M.**, Mavroidis C. "SQUID: Smartphone-Based Sensorized Shirt for Home Rehabilitation and Monitoring", *Accepted to ICRA in September 2013*
4. **Sivak M.**, Dick L., Murray D., Mavroidis C., and Holden M. "Characterization of a Low-Cost Bimanual Glove System for Stroke Rehabilitation", *In preparation for submission in Fall of 2012*
5. **Sivak M.**, Holden M., and Mavroidis C., "Design and Use of Inertial Measurement Units and Potentiometers in a Low-Cost Bi-Manual Glove System for Stroke Rehabilitation", *In preparation for submission in Fall of 2012*
6. Mavroidis C., Ranky R., **Sivak M.**, Patriitti B., Dipisa J., Caddle A., Gilhooly K., Govoni L., Sivak S., Lancia M., Drillio R. and Bonato P., "Patient Specific Ankle-Foot Orthosis Using Layered Manufacturing", *Journal of NeuroEngineering and Rehabilitation*, Vol. 8, No. 1, 2011.
7. **Sivak M.**, Unluhisarcikli O., Weinberg B., Bonato P. and Mavroidis C., "Design of a Haptic System for Hand Rehabilitation Integrating an Interactive Game with an Advanced Robotic Device", *Proceedings of the 2010 IEEE Haptics Symposium*, Waltham, MA, March 25-26, 2010. **Winner of best poster and Nominated for best demonstration.**
8. Ding Y., **Sivak M.**, Weinberg B., Mavroidis C. and Holden M., "NUVABAT: Northeastern University Virtual Ankle and Balance Trainer", *Proceedings of the 2010 IEEE Haptics Conference*, Waltham, MA, March 25-26, 2010.
9. Ranky R., **Sivak M.**, Lewis J., Deutsch J., Mavroidis C., "Modular Stationary Bicycle Mechatronic Kit Interfaced with a Virtual Environment for Rehabilitation of Individuals with Movement Asymmetry", *IEEE Virtual Reality 2010*, Waltham, USA, March 2010.
10. Weinberg B., Unluhisarcikli O., **Sivak M.**, Bonato P. and Mavroidis C., "A Robotic Hand Rehabilitation System With Interactive Gaming Using Novel Electro-Rheological Fluid Based Actuators" *Proceedings of the 2010 IEEE International Conference on Robotics and Automation (ICRA2010)*, Anchorage, Alaska, May 3 - 8, 2010.
11. Ozsecen, M., **Sivak M.**, Mavroidis C., "Dielectric Electroactive Polymer Actuator as a Haptic Interface", *Proc. SPIE 7647*, 764737, April 2010
12. **Sivak M.**, Mavroidis C. and Holden M., "Design of a Low Cost Multiple User Virtual Environment for Rehabilitation (MUVER) of Patients with Stroke," *Proceedings of the 2009 MMVR: Medicine Meets Virtual Reality Conference*, January 19 - 22, 2009, Long Beach, CA.
13. Weinberg B., Khanicheh A., **Sivak M.**, Unluhisarcikli O., Morel G., Shannon J., Kelliher J., Sabadosa M., Bonmassar G., Patriitti B., Bonato P. and Mavroidis C., "Variable Resistance Hand Rehabilitation Device Using an Electro-Rheological Fluid Damper", *Proceedings of the 2009 World Haptics Conference*, Salt Lake City, UT, March 18-20, 2009.
14. Isaacs J. A., Laird J., Sivak S., and **Sivak M.**, "Greening the Supply Chain: Development of a Computer Game to Teach Environmentally Benign Manufacturing", *Proceedings of ASEE 2008 Annual Conference and Exposition*, American Society for Engineering Education, Pittsburgh, PA, CD-ROM, June 22-25, 2008.

15. Sivak S., **Sivak M.**, Isaacs J. A., Laird J., and McDonald A., "Managing the Tradeoffs in the Digital Transformation of an Educational Board Game to a Computer Based Simulation", *Proceedings of the 2007 ACM SIGGRAPH Symposium on Video Games, The 34th International Conference and Exhibition on Computer Graphics and Interactive Technologies*, pp. 97-102, San Diego, CA, August 5-9, 2007.
16. Sivak S., **Sivak M.**, Isaacs J. A., Laird J., and McDonald A., "Iterative Digital Transformation of an Educational Board Game to Address Environmental Issues in the Engineering Classroom", *Proceedings of Games, Learning, and Society Conference 3.0*, Madison, WI, July 12-13, 2007.

BOOK CHAPTERS

1. Blocks, Planes, Drain, and Kain: Well Played for Legacy of Kain: Soul Reaver by **Mark Sivak**, Well Played 3.0: Video Games, Value and Meaning, Drew Davidson et al, 2011
2. Half Life 2: Being Gordon Freeman by **Mark Sivak**, Well Played 1.0: Video Games, Value and Meaning, Drew Davidson et al, 2009

PATENTS

1. Lorden T., Morgan A., Sheehan J., Wilbur T., Peters K., Moran A., Aas A., Schaffer A., **Sivak M.**, Mavroidis C., "Squid: Exercise Effectiveness and Muscle Activation Tracking", Provisional Patent application filed on Dec. 2, 2011. Application 61566239.
2. **Sivak M.**, Holden M., Mavroidis C., Bajpai A., Bintz K., Chrisos J., Clark A., Lentz D., "Multiple User Smart Glove for Virtual Environment based Rehabilitation", PCT patent application filled on Jan. 20, 2010. International Published Application on July 29, 2010, WO-2010-085476.
3. Ranky R., **Sivak M.**, Lewis J., Deutsch J., Weinberg B., Mavroidis C., "Instrumented Handle and Pedal Systems for Use in Rehabilitation, Exercise, and Training Equipment", US patent application filed on Sept 16, 2010. United States Patent Application 20110082009 published on April 7, 2011. United States Patent No. US 8,025,607 issued on Sept. 27, 2011.
4. **Sivak M.**, Ranky R., DiPisa J., Caddle A., Gilhooly K., Govoni L., Sivak S., Lancia M., Bonato P., Mavroidis C., "Patient Specific Ankle Foot Orthotic Device," PCT application filed on November 27, 2007. International Published Application on June 5, 2008, WO-2008-066856. US patent application filed on May 27, 2009.
5. Weinberg B., Bonato P., Unluhisarcikli O., **Sivak M.**, Mavroidis C., Mirelman A., Johnson L., Pappas N., Hackmeister K., Lau D., "A Multiple Degree of Freedom Rehabilitation System Having a Smart Fluid Based Multi-Mode Actuator". PCT patent application filled on March 22, 2010. International Published Application on Sept 23, 2010, WO-2010-108170.

INVITED LECTURES AND PANELS

- | | |
|---------|---|
| 04/2012 | Panel Member , "If I hear 'Gameification' one more time I'm going to scream", <i>PAX East</i> , Boston, MA |
| 01/2009 | Invited Speaker , "Design of a Low Cost Multiple User Virtual Environment for Rehabilitation (MUVER) of Patients with Stroke," <i>MMVR: Medicine Meets Virtual Reality Conference</i> , Long Beach, CA |
| 08/2007 | Invited Speaker , "Managing the Tradeoffs in the Digital Transformation of an Educational Board Game to a Computer Based Simulation", <i>Sandbox at SIGGRAPH 2007</i> , San Diego, CA |
| 07/2007 | Invited Speaker , "Iterative Digital Transformation of an Educational Board Game to Address Environmental Issues in the Engineering Classroom", <i>Games, Learning, and Society Conference 3.0</i> , Madison, WI |

ACADEMIC AND RESEARCH PROJECTS

- 09/2011 – Present **Squid: Exercise Effectiveness and Muscle Activation Tracking**
Co-PI and Advisor, Interdisciplinary Capstone Project
- Collaborated and advised a team of interdisciplinary students from computer science, creative industries, and mechanical engineering in creation of a fitness device and software suite
- 09/2009 – Present **Angle Tracking and Location At-Home System for Bimanual Rehabilitation (ATLAS)**
Co-PI, Advisor and Lead Engineer, Dissertation Research and Capstone Design Advisor
- Advised a team of Mechanical Engineering students in designing and fabricating a low cost bimanual glove system for stroke rehabilitation
 - Designed novel virtual environments for rehabilitation of fine finger movements using bimanual movements
- 09/2010 – Present **No2Nox**
Co-PI, Technical and Game Design Lead, Educational Game
- Member of an interdisciplinary team to create a fun, educational experience for middle school students to learn about sustainability and their environmental choices
- 09/2011 – Present
01/ 2007 – 05/2007 **Shortfall Digital**
Co-PI, Game/Engine Engineer, Educational Game
- Created and balanced the videogame engine using a previous board game's features and engineering equations to form a real world experience in sustainability and environmentally benign manufacturing for undergraduate engineering students
- 01/ 2008 – 8/2009 **Design of Multiple User Virtual Environments for Rehabilitation (MUVER)**
Researcher/Designer/Engineer, Master's Thesis Research
- Combined videogame design philosophy and telerehabilitation to create a novel stroke motor rehabilitation system
 - Developed new methods to allow for multiple users to interact in a virtual environment
- 09/ 2009 – 09/2010 **Active Knee Rehabilitation Orthotic System for Gait Retraining using Force Fields (ANdROS)**
Researcher/Engineer
- Used unique controller algorithms to dynamically change the virtual reality of the user, to better fit their needs in gait rehabilitation post-stroke
- 01/2009 – 06/2010 **Virtual Reality Augmented Cycling Kit (VRack), VRehab LLC.**
Researcher/Designer/Engineer, Master's Thesis Research
- Designed and implemented an instrumented stationary bicycle kit for tracking rehabilitation progress
 - Worked alongside physical therapists to create novel interfaces for the user and practitioner of the system to display feedback and configuration options
- 09/2007 – 06/2009 **Hand Enhancement Robotic Rehabilitation Interface (HERRI)**
Interface/Virtual Environment Engineer, Master's Thesis Research
- Implemented a virtual environment to assist in hand motor rehabilitation of patients post-stroke with a novel robotic rehabilitation device
- 09/ 2006 – 12/2007 **Design and Implementation of Patient Specific Ankle-Foot Orthotic Devices**
Head Modeler/Designer, Capstone (Senior) Design
- Worked with a team of Mechanical Engineering students on a novel process and product to create patient specific orthotic devices using Rapid Prototyping and 3D scanners

SERVICE AND OUTREACH

- 09/2012 – Present **Student Success Committee Member**, *Department of Art + Design, Northeastern University*
- Collected feedback from students on all aspects of their education including course material, student groups, co-op, and post graduation plans
 - Created reports and actionable information from student feedback to increase their satisfaction with their degree and strengthen all the programs available in the department
- 01/2010 – Present **Faculty Advisor**, *Northeastern University Game Development Club*
- Advised on behalf of the students during the creation and drafting of the constitution of a Game Development Student Group that draws approximately 50 active students from all over the university
 - Provided students with ideas and information in the creation of club events and projects
- 05/2009 – 05/2012 **Steering Committee Member**, *Creative Industries Program, Northeastern University*
- Worked with a diverse team to create courses and curriculums for the new combined undergraduate majors
 - Contributed to the design of new graduate programs in Game Design
 - Provided instructor feedback on current courses and curriculum to constantly improve current undergraduate combined majors
- 09/2011 – 05/2012 **Curriculum Committee Member**, *Creative Industries Program, Northeastern University*
- Worked with a diverse team to create courses and curriculums for the new combined undergraduate majors
- 01/2012 & 01/2010 **Organizer and Host**, *Global Game Jam, Northeastern University*
- Hosted the worldwide marathon game design event by advising groups of game designers and providing them space and software
 - Helped to foster relationships between students and industry during the event
- 07/2011 – 05/2012 **Member**, *Mobile Learning Digital Media Curriculum Program, Northeastern University*
- Submitted a winning proposal to use an iPad 2 to teach Math and Physics for Games by using apps that look under the hood at Math and Physics theory
 - Presented the work at Ed-Tech events on campus promoting the program and blogged about the apps and project on the Ed-Tech website
- 08/2009 **Organizer**, *Game Jam at SIGGRAPH 2009, New Orleans, LA*
- Worked with a small team to fund and run a marathon game design competition at the SIGGRAPH conference
 - Created a base video game in twenty-four hours to be used by the student and industry teams in the competition
- 08/2008 **Public Relations Chair**, *Sandbox Symposium and SIGGRAPH 2008, Los Angeles, CA*
- Communicated with online and offline sources to promote the event
 - Contributed panel and keynote speaker suggestions to the committee
- 09/2007 – 12/2007 **Engineering Peer Mentor**, *College of Engineering, Northeastern University*
- 09/2006 – 12/2006
- Volunteered to help first year undergraduate students adjust to college life
- 09/2004 – 12/2004
- Presented students with information on the engineering disciplines to assist them in choosing a major

COURSES TAUGHT AND DESIGNED

- 09/2012 – 12/2012
09/2011 – 12/2011 **Game Projects: Assets and Prototyping**, *Creative Industries Program, Northeastern University*
In this high level game design course students learned the process of bringing a game idea to proof of concept prototype and methods to evaluate prototypes. This course was project based and collaborative, allowing students from multiple backgrounds to work together. A final project was required.
- 09/2012 – 04/2013 **Game Design Capstone**, *Creative Industries Program, Northeastern University*
This senior level course is a two semester interdisciplinary project. In the first semester students form teams of 3-5 from different backgrounds (digital art, graphic design, programming, etc.) and develop concepts for a game. The deliverable for the first semester is a playable prototype. In the second semester the teams test their games and continue to iterate, revise and improve until the finished game is submitted at the end.
- 09/2012 – 12/2012 **Engineering Mechanics and Design**, *Department of Mechanical and Industrial Engineering, Northeastern University*
In this course sophomore Mechanical Engineering students are introduced to vector representation of forces and moments, free body diagrams, the equivalent force systems, and equations of equilibrium. Also presented are static and dynamic systems. This course includes a design project that demonstrates the fundamental concepts of equilibrium.
- 09/2012 – 12/2012 **Engineering Design**, *College of Engineering, Northeastern University*
All Engineering freshmen take this course in their first year. Topics in this course include the engineering design cycle and Computer Aided Design (CAD). Students have a minor and major design project to complete as a team.
- 01/2012 – 04/2012 **Physical Computing**, *Creative Industries Program, Northeastern University*
This high level elective course explores the communication between the physical world and the interactive, computer-based interface. Student in this course examine the potential of reactive analog and digital devices embedded within the physical realm using simple kit sensors and indicators. A final project is required.
- 09/2011 – 12/2011 **Game Interface Design**, *Creative Industries Program, Northeastern University*
This course's topics include Graphical User Interfaces (GUIs) as well as control schemes (keyboards, controllers, joysticks, touch screens, etc.) for videogames and interactive applications. Students completed several case studies on both successful and unsuccessful interfaces. They also created several paper prototypes of GUIs for existing games. A final project was required.
- 09/2011 – 05/2012
09/2010 – 05/2011
09/2009 – 12/2009 **Interactive Media Capstone**, *Creative Industries Program, Northeastern University*
Senior students in this course form interdisciplinary teams to accomplish a final project before completion of their degree. Students in 2011 completed a project with a team of mechanical engineering students to create a Smart-phone based fitness assessment tool. Students in 2010 created two office environment web based applications. Students in 2009 completed several projects in information visualization using the Processing language and information from SIGGRAPH.

09/2012 – 12/2012	Programming for Games , <i>Creative Industries Program, Northeastern University</i>
01/2011 – 04/2012	This course was designed as the first programming course for all game design combined majors, a mix of computer science and arts, media, and design students. The focus of the course was on good object oriented programming and learning about video games engines. The students learned the Panda 3D engine (Python) and the Unity engine (JavaScript or C#). A final project was required.
01/2011 – 04/2011	
01/2010 – 04/2010	
01/2011 – 04/2012	
09/2010 – 12/2010	Programming for Digital Media , <i>Creative Industries Program, Northeastern University</i>
09/2009 – 12/2009	The major focus of this course was learning the fundamentals of object oriented programming as well as the ActionScript 3 language. Students in this course, through projects, learned topics including encapsulation, composition, inheritance, and polymorphism. A final project was required.
05/2009 – 08/2009	
06/2011 – 08/2011	Game and Simulation Design , <i>Summer Discovery Program, Musiker Discovery Programs</i>
06/2008 – 08/2008	This course, taught for the Summer Discovery program was a high school level course in the foundations of game design. Topics included game analysis, common game genres and mechanics, game story and theme, theories of fun and enjoyment, and user interface design.
09/2010 – 12/2010	Games Design Algorithms , <i>Creative Industries Program, Northeastern University</i>
	In this course students learned the XNA framework (C#) as a tool to learn common algorithms found in 2D and 3D interactive applications. The main topics in this course included collision detection in 2D and 3D, physics in 2D and 3D, networking, input devices, and game mechanic systems. A final project was required.
09/2010 – 12/2010	Games and Society Lab , <i>Creative Industries Program, Northeastern University</i>
05/2010 – 07/2010	This recitation course was taught alongside Games and Society. The purpose of this course was to introduce students to influential and important board and video games and the analysis techniques to apply to games today.
01/2010 – 04/2010	
01/2009 – 04/2009	

STUDENT ADVISING

09/2012 – 05/2013	Adam Heaney, Caprice Hong, Matthew Tebaldi, Christopher Chin, Kristin Halloran, Capstone Advisor , Teleforce, Creative Industries Program
09/2012 – 05/2013	Kyle Billemeier, Phillip Quinn, Nicholas Bagley, Julia Murphy, Stephen Elliot, Capstone Advisor , Time Sink, Creative Industries Program
01/2012 – 05/2012	Alexandra Aas, Connie Chan, Michelle Gayowski, Directed Study Advisor , IDEA Studio, College of Business Administration and Creative Industries Program
01/2012 – 05/2012	Aadit Shah, Directed Study Advisor , No2Nox Programming, College of Computer and Information Science
03/2012 – 06/2012	Christopher Neveu, Master's Thesis Advisor , Dead Run, Digital Media Program Northeastern University College of Professional Studies
09/2011 – 05/2012	Alexandra Aas, Alexandra Moran, Amy Schaffer, Capstone Advisor , Squid, Creative Industries Program
09/2011 – 12/2011	Trevor Lorden, Adam Morgan, Kyle Peters, Joseph Sheehan, Thomas Wilbur, Capstone Advisor , Squid, Mechanical and Industrial Engineering
01/2012 – 05/2012	Trevor Lorden, Adam Morgan, Joseph Sheehan, Thomas Wilbur, Direct Study Advisor , Squid, Mechanical and Industrial Engineering

09/2009 – 12/2009 Avi Bajpai, Caitlyn Bintz, Jason Chrisos, Andrew Clark, Drew Lentz, **Capstone Advisor**,
ATLAS, Mechanical and Industrial Engineering

01/2012 – 05/2012 Avi Bajpai, Caitlyn Bintz, Jason Chrisos, Andrew Clark, Drew Lentz, **Directed Study Advisor**,
ATLAS, Mechanical and Industrial Engineering

TECHNICAL PROFICIENCIES

PROGRAMMING LANGUAGES: Python, Java, C/C++, ActionScript 3, JavaScript, C#, MATLAB, HTML, XML

VIDEO GAME ENGINES: Panda 3D, Unity, Unreal Development Kit, Source, GameMaker, StarCraft 2 Galaxy Editor

OTHER SOFTWARE: Eclipse, Visual Studio, LabView, Processing, Arudino, Flash CS5, FlashDevelop, Adobe
Photoshop, Adobe Dreamweaver, SolidWorks, MATLAB, Microsoft Office

HARDWARE: Microcontrollers (Arduino, LabView, and .Net), Data Acquisition (LabView, Simulink), Rapid
Prototyping (FDM and SLA), Electronics and Circuits, CNC, Manual Machining, Hand tools

SENSORS: Inertial Measurement Units, Bend Sensors, Heart Rate Monitors, Encoders, Load Cells, Pressure sensors,
Electromyography (EMG) Sensors, Infrared Reflectors

PROFESSIONAL AFFILIATIONS

- International Game Developers Association (IGDA)
- Association for Computing Machinery (ACM)
- American Society of Mechanical Engineers (ASME)
- Institute of Electrical and Electronics Engineers (IEEE)
- American Society of Engineering Educators (ASEE)