

## Micha Livne - Curriculum Vitae

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**EMPLOYMENT**      **Chief Research Scientist in Seraph Labs, Toronto, ON, Canada**      **Nov 2014 to present**

I established Seraph Computer Vision Labs to provide research services to multiple companies in the areas of image analysis, and video-based 3D human tracking. All projects involved deep learning, and ML.

**Research internship in Adobe Research, Seattle, WA, USA**      **June 2014 to Dec. 2014**

**Research internship in Disney Research, Pittsburgh, PA, USA**      **May 2013 to Nov. 2013**

**Research internship in Epson EDGE, Markham, ON, Canada**      **Sept. 2011 to April 2012**

**Research internship in MERL, Boston, MA**      **April 2010 to July 2010**

**DA in Intel Development Center, Haifa, Israel**      **March 2006 to July 2009**

Software engineer position as Design Automation engineer.

**EDUCATION**      **University of Toronto, Toronto, Ontario, Canada.**

- **PhD in Computer Science**      **June 2011 to Present**

- ◇ Supervisor: Professor David J. Fleet
- ◇ Area of Study: Computer Vision, Machine Learning.
- ◇ expected graduation date: Oct. 2018.

**University of Toronto, Toronto, Ontario, Canada.**

- **MSc. in Computer Science**      **Sept. 2009 to May 2011**

- ◇ Supervisor: Professor David J. Fleet
- ◇ Area of Study: Computer Vision.
- ◇ Research title: "Human attributes from 3D pose tracking".

**Technion - Israel Institute of Technology, Israel.**

- **BSc. in Electrical engineering**      **June 2009**

- ◇ Final grade point average: 94.3/100, Summa cum laude.
- ◇ Computer Science specialization.
- ◇ Majors: Artificial Intelligence (Machine learning), Image Processing, Algorithms.
- ◇ Minors: Systems Control, Signal processing.

- **BSc. in Physics**      **June 2009**

- ◇ Final grade point average: 94.3/100, Summa cum laude..
- ◇ Majors: Optics, Quantum mechanics.

ACADEMIC  
EXPERIENCE

**University of Toronto, Toronto, Ontario, Canada.**

- Graduate student **Sept. 2009 to present**
  - ◇ Includes MSc. and current PhD research and course work.
  - ◇ **MSc. Research:** “Human attributes from 3D pose tracking”. I studied different biological and perceptual attributes (age, weight, mood for example) that can be inferred from human walking motions, based on both video tracking and accurate motion capture data.
  - ◇ **PhD. Research:** Computer Vision and Machine Learning. I work mainly on 3D tracking (objects and humans) with physical models in Computer Vision. I work mainly on general ML inference framework to characterize knowledge transfer between multiple tasks in machine learning. Optimization, and physical simulations play a large role in most of my research.
  - ◇ **Teaching Assistant:** **Sept. 2009 to present**
    - CSC 369, CSC 418, CSC 320:
      - Prepared and lectured weekly tutorials in an undergraduate courses.
      - Graded programming and written assignments in an undergraduate course.
  - ◇ **Research Internships:** See below in Sec. **Professional Experience.**

**Technion - Israel Institute of Technology, Israel.**

- Undergraduate research **Oct. 2007 to March 2009**
  - ◇ Project 1 (individual topics for excellent students):
    - **Title:** 3D Tic-Tac-Toe Reinforcement Learning agent.
    - **Description:** Development of a 3D Tic-Tac-Toe Reinforcement Learning agent and implementation of a genetic algorithm to isolate the optimal features needed for each player, in order to allow efficient depth search of future movements.
    - **Supervisor:** Prof. Ron Meir
  - ◇ Project 2:
    - **Title:** Multi UAV search algorithm.
    - **Description:** Development of a multi Unmanned Aerial Vehicle search algorithm according to 3D probability and risk maps.
    - **Supervisor:** Dr. Mark Moulin.
  - ◇ Project 3:
    - **Title:** Recognition of roads in satellite images.
    - **Description:** Development of a road recognition algorithm based on satellite images using new approach of edge integration for shape modeling by finding global minimum of an active contour model’s energy.
    - **Supervisor:** Dr. Chen Sagiv.
- Undergraduate student **Oct. 2004 to March 2009**

HONORS AND  
AWARDS

**University of Toronto, Toronto, Ontario, Canada.**

- Research contribution to **University of Toronto’s Computational Vision Lab** was made on my behalf by **Disney Research** (\$30k), 2014.
- University MSc. graduate funding package. September 2009 to February 2011.
- University PhD. graduate funding package. February 2011 to present.
- Ray Reiter Graduate Award in Computer Science, 2011.

## **Technion - Israel Institute of Technology, Israel.**

- Received BSc. degree in Electrical Engineering and BSc. in Physics, as part of a special program for excellent students. Both awarded summa cum laude.
- President's list of honors for scholastic achievements during the spring semester of 2004/05, and the spring semester of 2005/06. Dean's list of honors for scholastic achievements during the winter semester of 2005/06, the winter and spring semester of 2006/07, and during the winter semester of 2007/08.
- President's list of honors for scholastic achievements scholarship (spring semester of 2004/05, spring semester of 2005/06).
- Israel's ministry of education scholarship. 2007, 2008.

## **"May Boyar" High school, Jerusalem, Israel.**

- Received high school diploma with honors.

## PROFESSIONAL EXPERIENCE

### **Chief Research Scientist in Seraph Labs, Toronto, ON, Canada      Nov. 2014 to present**

I established Seraph Computer Vision Labs to provide research services to multiple companies in the areas of image analysis, and video-based 3D human tracking. All projects involved deep learning, and ML.

- I founded a Computer Vision/Machine Learning lab, with the goal of pushing ahead CV/ML research, while giving smaller start-ups (who typically cannot afford to hire ML researchers) accessibility to one of the biggest revolutions that mankind is about to experience.
- Job Description: Managed, supervised, and executed end-to end research. I took an idea from discussion, through evidence-based research, into a working prototype, with multiple companies.
- Skills and Expertise Acquired:
  - ◇ Establishing, and managing a small company
  - ◇ Building research frameworks that can support research needs while taking production needs into account
  - ◇ Incorporating state-of-the-art research directions in product-oriented solutions
  - ◇ Managing a research team, while collaborating with other researches, and engineers

### **Research internship in Adobe Systems, Seattle, WA, USA      June 2014 to Dec. 2014**

Adobe Research - CTL (Creative Technologies Labs)

- Host: Dr. Danny Kaufman
- Job Description: Capturing Dynamics - Developing 3D tracking of rigid objects with inference of physical properties and interaction with an unknown environment.
- Skills and Expertise Acquired:
  - ◇ Incorporated contact in Variational Integrator physical simulation framework while preserving symplecticity of the system.
  - ◇ Developed a simple rigid body 3D tracking ICP-like algorithm of RGBZ data.
  - ◇ Developed a system that infers physical/geometrical parameters of a target system.

### **Research internship in Disney Research, Pittsburgh, PA, USA      May 2013 to Nov. 2013**

DRP - Disney Research Pittsburgh

- Host: Dr. Leonid Sigal
- Job Description: Physics-based performance capture - Developing accurate 3D tracking of human body shape and pose from monocular depth sensor.
- Skills and Expertise Acquired:
  - ◊ Developed a fast and accurate body mesh model.
  - ◊ Developed online tracking algorithm, with physics-based prior.
  - ◊ Develop contact predictor system to estimate contact of unknown environment.

**Research internship in Epson EDGE, Markham, ON, Canada Sept. 2011 to April 2012**

Epson EDGE research group.

- Job Description: Solving visual servoing problem with emphasize on both calibrated and calibration-less solutions.
- Skills and Expertise Acquired:
  - ◊ Programming capabilities including (but not limited to): OpenCV, Python SWIG bindings.
  - ◊ Research and development of calibration-less visual servoing solution and automatic self-calibration procedure.

**Research internship in MERL, Boston, MA, USA**

**April 2010 to July 2010**

MERL - Mitsubishi Electric Research Labs

- Host: Dr. Matthew E. Brand
- Job Description: Solving radiation therapy optimization problem using fast iterative QP (Quadratic Programming).
- Skills and Expertise Acquired:
  - ◊ Programming languages including (but not limited to): OpenMP, CUDA.
  - ◊ Research and development of an iterative QP algorithm.

**DA in Intel Development Center, Haifa, Israel**

**March 2006 to July 2009**

- Job Description: DA (Design Automation) Engineer. The job included developing and implementing methods and algorithms in order to automate certain aspects of the chip design process. The working period covered the entire chip design process.
- Skills and Expertise Acquired:
  - ◊ Programming languages including (but not limited to): Perl/Tk, Incr. TCL/Tk, C Shell (additional details below).
  - ◊ Unix/Linux.
  - ◊ Analyzing methodology problems and developing and implementing solutions.
  - ◊ Working in team environments and individually and meeting firm work deadlines.
- During the working period, I was reviewed highly at all employee assessments.
- Major Project: I contributed to the development and implementation of a unique and innovative methodology for modeling the time skew (uncertainty of signal time arrival) within computer chips.

TECHNICAL  
SKILLS

**Computer languages/frameworks:**

- High proficiency: Perl/Tk, Incr. TCL/Tk, C/C++, C Shell, MATLAB, L<sup>A</sup>T<sub>E</sub>X/LyX, Python, CUDA, OpenCL, OpenMP, ITK, VTK, CMake, SWIG (Python),pytorch,tensorflow.
- Intermediate proficiency: Assembly, Pascal, Java.
- Familiarity with TCP/IP and network programming.

**Computer Environments:**

- High proficiency: Windows, Unix/Linux, Apple OS X.

High ability to learn new programming languages and environments as needed.

LANGUAGES

Hebrew Mother tongue  
English High proficiency

MILITARY  
SERVICE

**Officer (lieutenant) in the armed corps**

**Nov. 1998 to Dec. 2002**

PERSONAL  
INFORMATION

I enjoy facing challenges, whether at work or academic, and take a great pleasure of the process of solving the problems.

**Academic Interests:**

- Machine learning and computer vision.
- Design and analysis of algorithms with emphasis on real time algorithms.

**Extracurricular:**

- Personal interests:
  - ◇ Trekking and camping, Basketball , Swimming, Motorbike riding.
  - ◇ I'm a big fun of music (with a very diverse taste), and consider it as a very big part of my life.
- World experience:
  - ◇ 2002-2004: I travelled after the military service for a year and a half in Asia. The trip included south East Asia (Thailand, Laos, Vietnam, and Cambodia), India and Nepal.

REFERENCES

References are available upon request.

PUBLICATIONS

- [1] M. Livne, L. Sigal, M. A. Brubaker, and D. J. Fleet, "Walking on thin air: Environment-free physics-based markerless motion capture," *Computer and Robot Vision*, no. 15th, 2018.
- [2] D. Cadotte, A. Cadotte, J. Cohen-Adad, D. Fleet, M. Livne, J. Wilson, D. Mikulis, N. Nugaeva, and M. Fehlings, "Characterizing the location of spinal and vertebral levels in the human cervical spinal cord," *American Journal of Neuroradiology*, 2014. [Online]. Available: <http://www.ajnr.org/content/early/2014/12/18/ajnr.A4192.abstract>
- [3] A. Cadotte, D. W. Cadotte, M. Livne, J. Cohen-Adad, D. Fleet, D. Mikulis, and M. G. Fehlings, "Spinal cord segmentation by one dimensional normalized template matching: A novel, quantitative technique to analyze advanced magnetic resonance imaging data," *PLoS ONE*, vol. 10, no. 10, p. e0139323, 10 2015. [Online]. Available: <http://dx.doi.org/10.1371%2Fjournal.pone.0139323>
- [4] M. Livne, L. Sigal, N. F. Troje, and D. J. Fleet, "Human attributes from 3d pose tracking," *Computer Vision and Image Understanding (CVIU)*, vol. 116, pp. 648–660, 2012.
- [5] L. Sigal, D. J. Fleet, N. F. Troje, and M. Livne, "Human attributes from 3d pose tracking," in *ECCV 2010 ÷œ European Conference on Computer Vision*. European Conference on Computer Vision (ECCV), Heraklion, Greece, 2010.