Oleh Rybkin

3300 Walnut St, L403, Philadelphia, PA 19104, USA
oleh@seas.upenn.edu • https://www.seas.upenn.edu/~oleh/

Research Interests

- Visual Model-Based Reinforcement Learning, Probabilistic Predictive Models, Deep Learning.

Education

- **University of Pennsylvania** — Philadelphia, PA
  Ph.D. in Computer Science advised by Kostas Daniilidis. — *2017 – Present*
- **Czech Technical University in Prague** — Prague, Czechia
  Bachelor's with Honours in Computer Science, minor in Mathematics. GPA: 3.95. — *2014 – 2017*

Publications

[8] **Oleh Rybkin**, Kostas Daniilidis, Sergey Levine, "Simple and Effective VAE Training with Calibrated Decoders", *arXiv, 2020.*

[7] Karl Pertsch*, **Oleh Rybkin***, Frederik Ebert, Chelsea Finn, Dinesh Jayaraman, Sergey levine, "Long-Horizon Visual Planning with Goal-Conditioned Hierarchical Predictors", *Neural Information Processing Systems (NeurIPS), 2020.*

[6] Karl Schmeckpeper, Annie Xie, **Oleh Rybkin**, Stephen Tian, Kostas Daniilidis, Sergey Levine, Chelsea Finn, "Learning Predictive Models From Observation and Interaction", *European Conference on Computer Vision (ECCV), 2020.*

[5] Ramanan Sekar*, **Oleh Rybkin***, Kostas Daniilidis, Pieter Abbeel, Danijar Hafner, Deepak Pathak, "Planning to Explore via Self-Supervised World Models", *International Conference on Machine Learning (ICML), 2020.*

[4] Karl Pertsch*, **Oleh Rybkin***, Jingyun Yang, Shenghao Zhou, Konstantinos G. Derpanis, Joseph Lim, Kostas Daniilidis, Andrew Jaegle, "Keyframing the Future: Keyframe Discovery for Visual Prediction and Planning", *Conference on Learning for Dynamics and Control (L4DC), 2020.*

[3] Karl Schmeckpeper, David Han, Kostas Daniilidis, **Oleh Rybkin**, "Visual Planning with Semi-Supervised Stochastic Action Representations", *Workshop on Model-Based Reasoning at ICML, 2019.*

[2] **Oleh Rybkin***, Karl Pertsch*, Konstantinos G. Derpanis, Kostas Daniilidis, Andrew Jaegle, "Learning what you can do before doing anything", *International Conference on Learning Representations (ICLR) 2019.*

[1] **Oleh Rybkin**, "Robust Focal Length Estimation", *Bachelor's Thesis, 2017.*

Achievements

- **Ranked 1st of 287 graduates by GPA; Dean's Outstanding Thesis Award,** FEE CTU in Prague. *2017*
- **Merit scholarship** for academic excellence, FEE CTU in Prague. *2014 – 2017*
- **B2 Czech language certificate,** Institute for language and preparatory studies, Charles University. *2013 – 2014*
- **Among top 0.1% of 180 000 participants** in the Ukrainian college entrance exam (EIT) in mathematics. *2013*

Mentoring and Supervision

- **Present**: Shenghao Zhou, Weiyu Du, Chuning Zhu.
- **Past**: Feifei Duan (now SWE at Waymo), Anton Arapin (now MS student at UChicago), Karl Schmeckpeper (now PhD student at UPenn), Ramanan Sekar (now ML SWE at Qualcomm).

Invited Talks

- **Scalable Visual Model-Based Reinforcement Learning**, Semiautonomous Seminar at UC Berkeley, Sep 2020.
- **Planning to Explore via Self-Supervised World Models**, Intel, July 2020.
- **Predictive Models of Videos for Understanding the World**, Google, Mountain View, May 2019.

* indicates authors that contributed equally

Experience

- **GRASP lab, University of Pennsylvania** — Philadelphia, PA
  Doctoral Student advised by Kostas Daniilidis — *Aug 2017 - Present*
  - Developing self-supervised reinforcement learning methods with planning to explore and active model-building [5].
  - Developing stable and more effective methods for training probabilistic models [8].
  - Developing methods for incorporating experience of other agents by learning general action representations [2,3,6].
  - Developing temporal abstraction mechanisms for long-horizon visual planning [4,7]
  - Developing methods for understanding human behaviour via predictive models.
- **RAIL lab, University of California, Berkeley** — Berkeley, CA
  Visiting Student Researcher advised by Sergey Levine and Chelsea Finn — *Feb – Oct 2019*
  - Developed a model-based agent that performs hierarchical prediction and is able to scale to tasks with much longer horizon [7].
  - Developed a learning-based robotic planning method that learns with guidance from human data instead of learning purely from scratch with robotic data [3,6], based on my earlier work on action representations [2].
- **Okutomi-Tanaka lab, Tokyo Institute of Technology** — Tokyo, Japan
  Visiting Student Researcher advised by Akihiko Torii — *Jun – Aug 2017*
  - Worked on Structure from Motion, Computer Vision.
  - Developed a novel algorithm for robust Structure from Motion by performing overlapping reconstructions.
- **Center for Machine Perception, Czech technical university in Prague** — Prague, Czechia
  Undergraduate Research Assistant advised by Tomas Pajdla — *Sep 2015 - Jun 2017*
  - Worked on Algebraic Geometry and Computer Vision.
  - Investigated application of techniques from Algebraic Geometry such as fast Groebner basis construction for chordal graphs for middle-scale Structure from Motion problems.
  - Investigated conventional methods of focal length computation. Based on this research, proposed and evaluated an algorithm for robust focal length computation in presence of noisy data and errors in calibration [1].
- **Willow team, INRIA** — Paris, France
  Visiting Student Researcher advised by Josef Sivic — *Aug – Sep 2016*
  - Worked on Algebraic Geometry, Machine Learning and Computer Vision.
  - Investigated application of Machine Learning techniques to the problem of camera focal length estimation.

Teaching Experience

- **"Deep Learning in Computer Vision"**, CIS680, Fall 2018, taught by Jianbo Shi. Led the Teaching Assistant team of three people. Managed the team, gave guest and substitute lectures, created homework, held review sessions and office hours, graded projects.
- **"Machine Perception"**, CIS580, Spring 2020, taught by Kostas Daniilidis. Led the Teaching Assistant team of four people for the second half of the course on Deep Learning. Managed the team, gave lectures, created homework, held review sessions and office hours, graded projects

Reviewing Service

- Conference on Neural Information Processing Systems (NeurIPS), 2020.
- International Conference on Machine Learning (ICML), 2020. *Top reviewer certificate.*
- IEEE Transactions on Image Processing (TIP), 2020.
- IEEE conference on Computer Vision and Pattern Recognition (CVPR), 2020.
- International Conference on Learning Representations (ICLR), 2020.
- International Conference on Computer Vision (ICCV), 2019.
- Several worshops affiliated with RSS, ICML and NeurIPS.

Selected Class Projects

- Developed a Generative Adversarial Network that generates driving scene images from scratch via first generating segmentation masks. Team project for CIS680 (3 people).
- Developed perceptual, planning and navigation systems for a Kobuki TurtleBot to navigate between 3 landmarks, and gave a live demo. Team project for ARO (2 people).

Relevant Coursework

- At UPenn: Deep Computer Vision, Deep Learning Theory, Advanced Machine Learning, Advanced Geometry.
- Attended the International Computer Vision Summer School in Sicily, 2018.
- At CTU, graduate-level: Advanced Robotics, Mathematics for Cybernetics, Autonomous Robotics.
- At CTU, undergraduate-level: Machine Learning, Artifical Intelligence, Optimization, Statistics.

Languages

- **Native:** Ukrainian, Russian.
- **Fluent:** English, Czech.

Programming Skills

- **Currently using:** PyTorch, TensorFlow, Python, LaTeX, Git.
- **Other experience:** C/C++, Matlab, C#, Java, Maple.