CAN PEHLIVANTURK, Ph.D.

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PERSONAL STATEMENT

Postdoctoral fellow at the Department of Mechanical Engineering (Dynamic Systems and Control) at the University of Texas at Austin. Research focus includes modelling, guidance, and control of dynamic systems with emphasis on trajectory optimization. Primary interests lie in mathematical and experimental modelling of physical systems, convex and non-convex optimization, control system design for mechanical systems, software development and deployment. 9 years of post-graduate experience as a teaching/research assistant, an industry intern, and a postdoctoral fellow. Previous work includes advisory software for directional drilling, quadrotor motion planning with obstacle avoidance, motion capture and estimation, vibration control, and mechanical design and prototyping. Aspire to continue learning and apply the interdisciplinary knowledge to a career in research and engineering.

EDUCATION

The University of Texas at Austin (UT – Austin)

- **Doctor of Philosophy** – Mechanical Engineering - GPA: 3.83/4.00 — Aug 2014 – Dec 2018
  Dissertation: Modelling, guidance, and control for cost conscious directional drilling
- **Master of Science** – Mechanical Engineering - GPA: 3.96/4.00 — Sep 2012 – Aug 2014
  Thesis: Lossless convexification of quadrotor motion planning with experiments

Middle East Technical University (METU)

- **Bachelor of Science** – Mechanical Engineering - GPA: 3.46/4.00 — Sep 2008 – June 2012
  Erasmus Exchange Program (Spring 2011) – Technical University of Denmark (DTU)

EXPERIENCE

Postdoctoral Fellow, UT – Austin, Nuclear and Applied Robotics Group — April 2019 – Present

Evaluation of augmented reality capabilities on army-compatible experimental hardware

- This project aims to develop augmented reality interfaces to enhance the situational awareness of individuals working together with autonomous robotic agents in the field. The objectives include increasing the tactical edge at the dismount as well as improving the quality of information fed to the mission command.
- The system utilizes a Hololens 2 augmented reality (AR) headset as a surrogate to what is going to be used in the field by the Army (IVAS). The AR headset is able to render holographic images in the user's field of vision. These images are used to locate and display information about the robotic agents available. Moreover, the system enables interactions with the robots using hand gestures.

Working on building fully autonomous UAV solutions for hazardous environments.

Graduate Research Assistant, UT – Austin, Dept. of Petroleum & Geosystems Engineering — Sep 2015 – Dec 2018

Worked with our industry sponsors to identify their requirements and built algorithms/software to increase the value they get out of drilling operations.

Developed **Slide Drilling Guidance System**: Advisory software for directional drilling, being implemented by an operator.

- Reduced order wellbore propagation model: < 1% Positional Error for sections > 1000ft. Fraction of computation time compared to the state-of-the-art models.
- Genetic Algorithm Path Optimizer: ~15% reduced drilling time, ~10% better tracking of the planned path, tracking fault correction, better wellbore quality.

Developed **Rotary Steerable System (RSS) Correction Path Optimizer**: Non-linear optimization algorithm targeted for RSS

- Convexified shortest correction trajectory algorithm: Solved using semidefinite programming (SDPT3), provides a feasible initial guess for the non-linear solver.
- Non-convex optimal correction trajectory algorithm: Solved using interior point optimizer (IPOPT), provides a controllable trade-off between proximity to the target line versus the tortuosity of the wellbore.

Engineering Intern, ConocoPhillips – Drilling & Engineering Technology Team — Summer 2015, Summer 2016

Created relevant environments to model drillstring vibrations: Developed a modeling software and an experimental testbed. Developed controllers to mitigate torsional drillstring vibrations: Reduced unwanted bit velocity increase by a factor of 5.

Graduate Research Assistant, UT – Austin, Dept. of Aerospace Engineering — June 2013 – June 2015

Set up a lab space and experiments to demonstrate real time optimal trajectory generation and density control for decentralized autonomous agents with conflict avoidance.

Developed a real-time quadrotor motion planning algorithm using lossless convexification.

Teaching Assistant, UT – Austin, Dept. of Mechanical Engineering — Aug 2012 – June 2013

Engineering Intern, ASELSAN Electronics Inc. – Platform Integration Design Department — Summer 2011

Engineering Intern, ROKETSAN Missile Industries Inc. – Manufacturing Department — Summer 2010

SKILLS

- **Technical Knowledge:** Software development, control theory, optimization, analytical, numerical, and experimental methods, applied intelligence, mechanical design and manufacturing, prototyping and integration
- **Programming:** C++, MATLAB, Python, ROS
- **Other Software:** CAD/CAE, ROS, Latex, Git, Unreal Engine
- **Language:** English (fluent), Turkish (native)

PUBLICATIONS

1. D'Angelo, J., Pehlivanturk, C., Ashok, P., van Oort, E., Shahri, M., Vasicek, A., & Behounek, M. (2020, February 25). Guidance for Calibration of a Directional Drilling Wellbore Propagation Model Using Field Data. Society of Petroleum Engineers. doi:10.2118/199611-MS
2. Pehlivantürk, C., Chen, D., Ashok, P., van Oort, E., (2019) Path Advisory for Slide Drilling using a Nonlinear Wellbore Propagation Model and Genetic Algorithm, Journal of Petroleum Science and Engineering
3. Pehlivantürk, C., D'Angelo, J.J., Cao, D., Chen, D., Ashok, P., van Oort, E. (2019), Slide Drilling Guidance System for Directional Drilling Path Optimization. Society of Petroleum Engineers
4. Pehlivantürk, C., Chen, D., & van Oort, E. (2017), Torsional Drillstring Vibration Modelling and Mitigation with Feedback Control. Society of Petroleum Engineers, doi:10.2118/184697-MS
5. Shor, R.J., Pehlivanturk, C., Acikmese, B., van Oort, E. (2015), Propagation of Torsional Vibrations in Drillstrings: How Borehole Geometry Affects Transmission and Implications on Mitigation Techniques, ICoEV.
6. Pehlivantürk, C. (2014), Lossless convexification of quadrotor motion planning with experiments, The University of Texas at Austin.
7. N. Demir, B. Açıkmese, and C. Pehlivanturk. (2014). Density control for decentralized autonomous agents with conflict avoidance. IFAC World Congress, pages 11715–11721.
8. Pehlivantürk C., Özkan O. and Baker D. K. (2014), Modeling and simulations of a micro solar power system, International Journal of Energy Research, 38, pages 1129-1144. DOI: 10.1002/er.3119
9. Pehlivantürk, C., Özkan, O., Baker, D. K., (2012). "Modeling and Simulations of a Micro Solar Power System: Coupling Parabolic Through Collectors and Evacuated Tube Collectors with Organic Rankine Cycle", Proceedings of 6th International Ege Energy Symposium and Exhibition (IEESE-6), Izmir, Turkey.