

Honda Research Institute USA (HRI-US) strives to be at the cutting edge of Honda's research and development activities. Driven by Honda's global slogan – The Power of Dreams – we pursue emerging technologies and bring them into reality to make people happy by engaging daily in highly scientific, pioneering work. We realize that dreams don't come from organizations, systems, or money. They come from people, and we seek people who have such a challenging spirit to join us.

Currently, HRI-US is offering spring and summer research internships to highly motivated Ph.D. (and qualified M.S.) students. Interns will work closely with HRI researchers, and publishing results in academic forums is highly encouraged. We are looking for candidates with good publication track records and excellent programming skills to join our team!

How to Apply: Submit applications through our website (<https://usa.honda-ri.com/careers>)
Candidates must have the legal right to work in the U.S.A.

List of Jobs: Follow the link for detailed job description

Robotics

Traffic Modeling (Job Number: P22INT-12)

Motion Planner Development (Job Number: P22INT-11)

Modeling and Analysis of Automated Vehicles (Job Number: P22INT-16)

Optimization and Control in Interactive Multi-agent Scenarios (Job Number: P22INT-17)

Physical Human-Robot Interaction (Job Number: P22INT-19)

Intention Estimation for Teleoperation (Job Number: P22INT-20)

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Robotic Dexterous Manipulation (Job Number: P22INT-18)

Interpersonal Dynamics Understanding in Human-Human-Robot Interaction (Job Number: P22INT-22)

Deep Learning Based Dexterous Manipulation (Job Number: P22INT-23)

Autonomous Systems (Job Number: P22INT-24)

Semantic SLAM (Job Number: P22INT-25)

Interactive Decision Making for Autonomous Robots (Job Number: P22INT-04)

Human-Computer Interaction

Computational Models for Human-Aware Systems (Job Number: P22INT-07)

Human Factors Research for Next Generation Mobility (Job Number: P22INT-08)

Human Behavior Research for Next General Mobility Systems (Job Number: P22INT-09)

Framework and Behavioral Study for Human-AI Teaming (Job Number: P22INT-15)

Affective Computing and Human State Prediction (Job Number: P22INT-10)

Computer Vision

Human Action Understanding (Job Number: P22INT-03)

Behavior Prediction (Job Number: P22INT-06)

Human Activity Prediction (Job Number: P22INT-05)

Lane Line Condition Estimation (Job Number: P22INT-26)

Machine Learning/AI

Behavior Modeling and Prediction of Road Users (Job Number: P22INT-01)

Interactive Decision Making for Autonomous Driving (Job Number: P22INT-02)

Robotics

Traffic Modeling (Job Number: P22INT-12)

Tasks for this position will focus on developing a model that predicts how traffic vehicles react during certain driving scenarios. This includes expanding on an existing MatLab traffic model to incorporate new scenarios using recorded naturalistic driving data. You are expected to:

- Provide daily updates to your supervisor on the status of your tasks.
- Use git for version control of the traffic model.
- Develop the model in MatLab & Simulink.

Qualifications:

- Must have experience with MatLab & Simulink.
- Must have general experience with coding in C++.
- M.S. candidate in computer.

Bonus Qualifications:

- Ph.D candidate in computer science.
- Experience with generating models in MatLab.

Duration: 3 months

Motion Planner Development (Job Number: P22INT-11)

Tasks for this position will focus on improving/enhancing features for an autonomous vehicle motion planner. This includes: modifying existing planner logic in ROS framework, running simulations in CarMaker for the motion planner. You are expected to:

- Provide daily updates to your supervisor on the status of your tasks.
- Use git for version control of the motion planner code.
- Code in the ROS framework using C++.
- Create Python scripts to automated tasks.

Qualifications:

- M.S. in computer science.
- Must have experience with using ROS-framework packages.
- Must have general experience with coding in C++.

Bonus Qualifications:

- Ph.D in computer science.
- Path planning experience.

Duration: 3 months

Modeling and Analysis of Automated Vehicles (Job Number: P22INT-16)

This research project focuses on modeling and analyzing automated vehicles on the level of a transportation network. This project involves data analysis, developing AV models, and demonstrating their benefits on a macroscopic level.

Key Responsibilities:

- Integrate an AV model into a macroscopic traffic simulator.
- Investigate the effect of different penetration rates of AVs on performance metrics.
- Publish relevant results in conference proceedings or journals.

Minimum Qualifications:

- M.S. candidate in mechanical engineering, civil engineering, or similar fields.
- Experience in vehicle modeling and/or traffic modeling.
- Experience with traffic simulators (VISSIM, SUMO).
- Excellent programming skills in Python, C++.

Bonus Qualifications:

- Ph.D. candidate in engineering.
- Research experience in automated vehicles, traffic modeling and large-scale simulation.
- Strong publication record.
- Experience with vehicle simulators (Carla).

Duration: 3 months

Optimization and Control in Interactive Multi-agent Scenarios (Job Number: P22INT-17)

This research project focuses on cooperative control of connected automated vehicles (CAVs) in a highway scenario. This project involves modeling and control of CAVs interacting with human-driven vehicles (HDVs).

Key Responsibilities:

- Formulate and solve a distributed optimal control problem for CAVs on a highway.
- Investigate interactions between CAVs and HDVs.
- Explore learning-based models for trajectory prediction in mixed-traffic scenarios.
- Publish relevant results in conference proceedings or journals.

Minimum Qualifications:

- M.S. candidate in mechanical engineering, electrical engineering, computer science, or similar fields.
- Experience in Optimal Control techniques (LQR, MPC, etc.).
- Excellent programming skills in Python (including PyTorch/Tensorflow), C++.

Bonus Qualifications:

- Ph.D. candidate in engineering, mathematics.
- Research experience in mixed traffic scenarios (HDVs), distributed optimization.
- Experience with vehicle simulators (Carla, VISSIM), numerical optimization tools (eg. CasADi).
- Strong publication record.

Duration: 3 months

Physical Human-Robot Interaction (Job Number: P22INT-19)

The focus of this research is to model and control the interaction between a robotic hand and human body, and develop, implement, and validate algorithms to enable a safe physical human-robot interaction.

Key Responsibilities:

- Model the physical interaction between the human and robot
- Develop, implement, and validate pHRI control algorithms both in simulation and on hardware
- Publish research results at top-tier conferences and journals in robotics as well as machine learning.

Minimum Qualifications:

- Ph.D. or highly qualified M.S. candidate in mechanical engineering, electrical engineering, robotics, computer science, or a related field.
- Excellent knowledge of robot kinematics, dynamics, and interaction control.
- Experienced in ROS.
- Very good programming skills in C++ or Python.
- Experience in machine learning methods.

Bonus Qualifications:

- Experience in interaction control for pHRI.
- Experience with implementation of real-time control algorithms on robotic systems.

Duration: 3 ~ 4 months

Intention Estimation for Teleoperation (Job Number: P22INT-20)

This internship focuses on development, implementation and testing of algorithms to model and infer intention of a human operator (the operator's target, action, and task) during object manipulation by a tele-operated robot, to enhance human robot interaction performance using algorithms involving probabilistic modeling and machine learning.

Key Responsibilities:

- Conduct literature survey on related work.
- Build a framework to model human behavior from multi-modal input and a priori knowledge for human intention prediction (the operator's target, action, and task) in robot teleoperation environment.
- Design and implement the algorithms both in simulation and on hardware related to robot manipulation including perception, planning, and optimization.
- Setup robots for testing and capability evaluation.
- Design experiments to evaluate the human-machine interaction performance.
- Prepare written and oral reports on the code and result.

Minimum Qualifications:

- Ph.D. or highly qualified M.S. candidate in robotics, computer science, electrical engineering, or related field.

- Experience in computer vision, path planning, and control of robotic systems.
- Experience in conducting hardware experiments using ROS.
- Experience in applied statistics i.e. probabilistic models and Bayesian models, machine learning, and neural network.
- Excellent programming skills in either C++ or Python.

Bonus Qualifications:

- Research experience with Deep Learning and Transfer Learning.
- Research experience with human motion/action recognition.
- Research experience with task procedure modeling.
- Experience in conducting human-robot interaction experiments in teleoperation environment.
- Experience with PyTorch, TensorFlow, or Pyro.

Duration: 3 ~ 4 months

Visuotactile Perception for Robotic Manipulation (Job Number: P22INT-21)

The focus of this research is to use vision and tactile sensor data (contact locations and forces), exploiting finger-object contact information, to enable robots to manipulate objects in unstructured environments.

Key Responsibilities:

- Develop algorithms to fuse vision and tactile data to perceive finger-object contact conditions.
- Explore temporal and graph-based approaches to improve the perception of finger-object contact conditions.
- Implement and validate the developed algorithms in simulation and on hardware.
- Publish research results in top-tier conferences and journals in robotics and machine learning.

Minimum Qualifications:

- Ph.D. or highly qualified M.S. candidate in computer science or related field.
- Experience in deep learning and other machine learning methods.
- Good programming skills in Python.
- Experience with Robot Operating System (ROS).

Bonus Qualifications:

- Experience with sim-to-real approaches.
- Experience with deep learning approaches such as GCNs, GNNs and LSTMs.
- Experience in perceiving object properties using force and pressure data from tactile sensors.
- Experience with PyTorch.

Duration: 3 ~ 4 months

Robotic Dexterous Manipulation (Job Number: P22INT-18)

The focus of this research is to develop, implement, and validate robust algorithms for planning and controlling dexterous manipulation considering dynamic behaviors and uncertainties.

Key Responsibilities:

- Develop algorithms for reducing the Sim2Real gap for dexterous manipulation.
- Develop robust model-based and learning-based algorithms for planning and control under uncertainties.
- Model dynamic behaviors for contact-rich dexterous manipulation.
- Implement and validate the developed algorithms in simulation and on hardware.
- Publish research results at top-tier conferences and journals in robotics as well as machine learning.

Minimum Qualifications:

- Ph.D. or highly qualified M.S. candidate in mechanical engineering, robotics, computer science, or a related field.
- Excellent knowledge of robot kinematics, dynamics, control, and probabilistic methods is required.
- Experience in reinforcement learning and other machine learning methods.
- Excellent programming skills in C++ or Python.
- Experience in ROS.

Bonus Qualifications:

- Experience in robotic manipulation and grasping.
- Experience with deep reinforcement learning and sim-to-real approaches.
- Experience with implementation of real-time control algorithms on robotic systems
- Experience with TensorFlow.

Duration: 3 ~ 4 months

Interpersonal Dynamics Understanding in Human-Human-Robot Interaction (Job Number: P22INT-22)

The focus of this research is to investigate how robots affect interpersonal dynamics among groups of humans in a shared space with robots. In this role, you will be developing and implementing human-human-robot interaction algorithms that have a positive effect on the interpersonal dynamics in the shared space.

Key Responsibilities:

- Analyze subjective and objective human behavioral data to draw inferential conclusions.
- Develop and implement algorithms to estimate humans' emotional state from sensor data.
- Develop and implement algorithms that use the estimated emotional state to improve human-robot interaction.
- Publish research results at top-tier conferences and journals in robotics and human-machine interaction.

Minimum Qualifications:

- Ph.D. or highly qualified M.S. candidate in computer science or related field.
- Experience with deep learning and other machine learning methods
- Good programming skills in Python or C++.
- Experience in deep learning frameworks such as Pytorch and Tensorflow.

Bonus Qualifications:

- Experience with Robot Operating System (ROS).
- Experience with analyzing human behavioral data from visual, audio, and physiological sensors.

Duration: 3 ~ 4 months

Deep Learning Based Dexterous Manipulation (Job Number: P22INT-23)

The focus of the research is to extend machine learning techniques (i.e. behavior cloning, imitation, reinforcement) to enable multi-fingered robot hand to dexterously manipulate objects using vision and tactile sensor data. The candidate is expected to utilize both simulation and the real hardware to implement the result on the learnt policy.

Key Responsibilities:

- Develop algorithms to learn policies to manipulate an object on the multi-fingered robot hand.
- Explore various machine learning techniques to utilize available data on simulated data and the real data.
- Implement and validate the developed algorithms in simulation and on hardware.

Minimum Qualifications:

- Ph.D. or highly qualified M.S. candidate in computer science, robotics, or related field.
- Experience in deep learning and other machine learning methods.
- Experience in robotics manipulation, control, path planning.
- Good programming skills in Python and C++.
- Experience with Robot Operating System (ROS).

Bonus Qualifications:

- Experience with sim-to-real approaches.
- Experience in multi-fingered robotics hand, dexterous manipulation.
- Experience in Deep Reinforcement Learning, Imitation Learning, Model Predictive Control.
- Experience with PyTorch or TensorFlow.

Duration: 3 ~ 4 months

Autonomous Systems (Job Number: P22INT-24)

The project involves design and development of software modules for our Autonomous Driving activities. The candidate will be involved in the research and development of state of the art motion planning and multi-agent decision making algorithms, and sim to real transfer.

Key Responsibilities:

- Implement low-latency and high-performance software prototype modules, integrate, deploy, and test them in both simulation and real AD vehicles.
- Develop software infrastructure and tools, such as test scenarios, baseline algorithms, module interfaces, etc. to facilitate team's development efforts.
- Be an essential member of a team of engineers and scientists that develop autonomous driving technologies in a fast-paced software development environment.

Minimum Qualifications:

- M.S. or Ph.D. candidate in computer science, electrical engineering or related field.

- Expertise in autonomous systems research and in one or more of the following: robot motion planning, multi-agent decision making, sim to real transfer, system of systems.
- Ability to architect a full system including software components and hardware platforms.
- Excellent programming skills in C++ and Python.
- Experience with Robot Operating System (ROS).
- Familiar with modern software engineering tools such as Git, CI/CD, Containers (Docker, Kubernetes).

Bonus Qualifications:

- Hands-on experience in real-world robotics applications.
- Experience with vehicle simulators such as Carla, Carmaker, etc.
- Experience with software engineering tools and processes (Jira, Agile, Scrum, Kanban, etc.)

Duration: 3 ~ 4 months

Semantic SLAM (Job Number: P22INT-25)

This internship concerns with extending Vision based Mapping and Localization system with novel scene representation methods to create a Map that is enriched with semantic information and a Localization system that is robust against dynamic objects, illumination variation and long-term structural changes in the environment.

Key Responsibilities:

- Design and development of Learning based Semantic Representation of Visual Scenes.
- Integration of Semantic Frontend with SLAM Backend.
- Develop evaluation metrics to confirm the efficacy of proposed algorithms.

Minimum Qualifications:

- M.S. or equivalent skill in Computer Science, Robotics, Electrical Engineering, or related field.
- Familiarity with Learning based Semantic Keypoint Detection, Tracking, Scene and Object representations.
- Familiarity with classical SLAM pipeline such as Feature Extraction, Triangulation, Graph Optimization, Loop Closure, etc.
- Ability to transfer conceptual models to working code in Python and/or C++.
- Experience with Deep Learning frameworks TensorFlow and/or PyTorch.

Bonus Qualifications:

- Familiarity with recent advances in Semantic SLAM, Visual Place Recognition, Long-Term Localization, Distributed Mapping, etc.
- Hands on experience with vehicle sensors and hardware, including Cameras, GPS, IMU, USB, CAN, Ethernet, Embedded Computers.

Duration: 3 months

Interactive Decision Making for Autonomous Robots (Job Number: P22INT-04)

This project focuses on implementing a planning and control system for an autonomous mobile robot. This will include research and development for enabling an autonomous system to strategize and learn about its

interactions with other agents. This is an opportunity for applied work in game theory, planning, and safe RL. You are expected to:

- Develop a planning algorithm that can strategize about interactions with other agents.
- Implement and deploy the algorithm on an autonomous mobile robot.
- Analyze and diagnose the performance of the system.

Qualifications:

- MS or PhD candidate in computer science, electrical engineering, robotics, or other related field.
- Strong familiarity and research experience in path planning and control of robotic systems.
- Excellent programming skills in either Python or C++.

Bonus Qualifications:

- PhD candidate in computer science, electrical engineering, robotics, or other related field
- Experience with ROS (Robot Operating System)
- Publication record of planning on robotic systems

Duration: 3 months

Human-Computer Interaction

Cognitive Models for Next Generation Mobility Systems (Job Number: P22INT-07)

Seamless interaction between human and automation requires the automation to be aware of human states and resultant behaviors. This position involves working with user study data to develop computational cognitive models of human state as well as optimizing automated mobility behavior based on human state using supervised and reinforcement learning algorithms. You are expected to:

- Conduct user studies and analyze data to understand user behavior with future automated mobility.
- Model dynamics of human behavior for human-automation interactions.
- Develop modeling framework to understand and predict human cognitive states.
- Create and validate tools to optimize system performance based on predicted human states.

Qualifications:

- Ph.D. or highly qualified M.S. candidate in computer science, electrical engineering, mathematics, statistics, psychology, cognitive science, or human behavior related field.
- Research experience in behavioral research and human-computer interaction.
- Excellent programming skills in Python and/or C++.

Bonus Qualifications:

- Experience in applied statistics i.e., probabilistic models and Bayesian models, machine/deep learning, reinforcement learning, and human-in-the-loop online learning
- Experience in open-source deep learning frameworks such as TensorFlow or PyTorch preferred
- Experience with designing and conducting human subject study

Duration: 3 months

Human Factors Research for Next Generation Mobility (Job Number: P22INT-08)

This project focuses on defining and establishing measures that can help assess mobility users in different situations across different mobility types. The project involves the design and evaluation of user studies that can help assess how emerging mobility systems can impact people. You are expected to:

- Conceptualize and quantify concepts, and determine methods to assess those concepts
- Design and implement complex experiments that can be used for testing hypothesis for the key project objectives.
- Establish and implement the user study design protocols, while ensuring the integrity of the experiment and the data generated is maintained
- Contribute towards preliminary data analysis to conduct hypothesis testing/regression analysis

Qualifications:

- Highly qualified M.S./Ph.D., candidate in human factors related field (human factors, cognitive science), psychology, or social science, statistics, or operation/industrial engineering.
- Familiarity with interaction/behavioral modeling for automobiles.
- Familiarity with using toolkits to develop experimental scenarios in simulation software (VR tools)
- Knowledge in experimental design, multivariate statistical methodologies e.g., causal inference with observable data, longitudinal analysis, classification, dimension reduction, clustering, hierarchical linear (random effects) modeling.

Duration: 3 months

Human Behavior Research for Next General Mobility Systems (Job Number: P22INT-09)

With the advent of emerging mobility systems, the need for designing these systems for humans is essential. This project involves identifying analysis methodologies on experimental datasets to identify behavioral patterns. This project would require ideation of performance metrics, testing hypothesis to discover how those metrics may have an impact on humans and proposing innovative methods to model and predict human behavior. The project will require knowledge on applying statistical models and machine learning methods on human experimental datasets. You are expected to:

- Define behavioral patterns and conduct recognition analysis.
- Reasoning of causalities between human characteristics with specific behavioral patterns.
- Build behavior modeling framework to understand and predict interactions between human and machine.
- Develop machine/deep learning tools to improve system performance and safety.

Qualifications:

- Ph.D. or highly qualified M.S. candidate in human behavior related field (human computer interaction, human factor engineering, cognitive science), psychology, or social science, statistics, or operation/industrial engineering.
- Familiarity with human-machine interface, interaction/behavioral modeling for automobiles.
- Knowledge in multivariate statistical methodologies e.g., causal inference with observable data, longitudinal analysis, classification, dimension reduction, clustering, hierarchical linear (random effects) modeling.
- Experience in applied statistics i.e., probabilistic models and Bayesian models, machine/deep learning.

Duration: 3 months

Framework and Behavioral Study for Human-AI Teaming (Job Number: P22INT-15)

This project focuses on computational model for human-AI interaction and teaming. The project involves design and development of AI assistant models and behavioral experiments for model assessment.

Key Responsibilities:

- Build statistical/predictive human-AI interaction model and framework.
- Design and conduct behavioral experimental studies to validate findings and test hypotheses.
- Conduct behavioral experiment data analysis and interpretation.
- Write research papers and reports to share findings.

Minimum Qualifications:

- Ph.D. candidate in computer science, electrical engineering, statistics, cognitive science or relevant field.
- Research experience in human factors and data analysis, such as human-machine Interaction, behavioral research, and AI background.
- Familiar with research methods in cognitive science (e.g., modeling theory of mind, behavior, emotion, intuition, decision making, etc.).

Bonus Qualifications:

- Passion for learning new technology trend and relevant knowledge.
- Strong problem-solving skills.
- Excellent communication skills.
- Be able to work independently within a multicultural environment.

Duration: 3 months

Affective Computing and Human State Prediction (Job Number: P22INT-10)

This project utilizes multimodal signals, including eye gaze, physiological, human motion, and behavioral responses to estimate human affective states. The successful candidate will process and fuse multimodal data, understand and propose key affective states, and design deep learning frameworks to predict them. The candidate is also expected to write and present the results well in scientific publications. You are expected to:

- Investigate human affective states through multimodal data.
- Design and develop deep learning frameworks, and conduct machine learning experiments.
- Analyze existing datasets and test hypothesis.

Qualifications:

- Strong M.S. candidate in CS, CE, EE, Data Science, ME, Applied Mathematics, or related fields.
- Strong programming skills in Python, with experiences in machine learning.
- Research experiences with Human Machine Interaction systems, such as vehicle simulators.
- Experiences in open-source deep learning neural network tools, such as Tensorflow, Keras, and PyTorch.

Bonus Qualifications:

- PhD candidate in related fields.
- Strong communication and interpersonal skills.
- Research experiences in physiological sensing, computer vision, or human gesture recognition.
- Excellent at signal processing, and multimodal fusion.
- Have conducted human participant experiments, or human factor related research.

Duration: 4 months

Computer Vision

Human Action Understanding (Job Number: P22INT-03)

The project focuses on research and development of computer vision and machine learning algorithms toward online human action understanding, including action recognition, action anticipation, action segmentation, and human-object interaction detection from video. You are expected to work on:

- Develop algorithm for action understanding using supervised and weakly supervised methods
- Support development of a benchmark dataset for evaluation of results
- Develop and evaluate metrics to verify reliability of the proposed algorithms
- Contribute to a portfolio of patents, academic publications, and prototypes to demonstrate research value

Qualifications:

- Ph.D. or highly qualified M.S. candidate in computer science, electrical engineering, or related field.
- Strong research experience in computer vision and machine learning.
- Hands-on experience in one or more of the following from video inputs: human pose estimation, action detection, action segmentation, action anticipation.
- Experience in open-source deep learning frameworks such as TensorFlow or PyTorch.

Bonus Qualifications:

- Anomaly detection.
- Publications in top-tier conferences (CVPR, ICCV, ECCV, ICML, NeurIPS, ICLR, etc.).

Duration: 3 months

Behavior Prediction (Job Number: P22INT-06)

This project focuses on developing computer vision and machine learning algorithms for analysis, prediction, and understanding of behavior and intention to support safe and effective motion planning and decision making in highly interactive scenes. You are expected to work on:

- Develop algorithms to advance research in agent behavior prediction in interactive scenes. Potential research topics include (but not limited to):
 - Identification of agent importance.
 - Explainability in future prediction (e.g. using language description).
 - Mode diversification in future prediction.
 - Robustness in future prediction.
 - Predicting agent intention.

Qualifications:

- Ph.D. or highly qualified M.S. candidate in computer science, electrical engineering, robotics, or related field.
- Strong research experience in computer vision, machine learning, and/or robotics.
- Experience in open-source deep learning frameworks such as PyTorch or Tensorflow.
- Excellent programming skills in Python.

Bonus Qualifications:

- Experience in one or more of the following: deep generative models, probabilistic neural networks, graph neural networks, reinforcement learning.
- Publications in top-tier conferences (CVPR, ICCV, ECCV, ICML, NeurIPS, ICLR, ICRA, IROS, ...).

Duration: 3 months

Human Activity Prediction (Job Number: P22INT-05)

This project focuses on developing computer vision and machine learning algorithms to support autonomous systems (robots and vehicles) designed to cooperate with humans. The project involves design and development of innovative algorithms for recognition and prediction of human activities in an everyday environment. You are expected to work on:

- Develop algorithms to advance research in human activity prediction. Potential research topics include (but not limited to):
 - Action localization
 - Pose prediction
 - Action anticipation
 - Time-to-action prediction
 - Creation of a human activity prediction benchmark dataset for various applications

Qualifications:

- Ph.D. or highly qualified M.S. candidate in computer science, electrical engineering, robotics, or related field.
- Strong research experience in computer vision, machine learning, and/or robotics.
- Experience in open-source deep learning frameworks such as PyTorch or Tensorflow.
- Excellent programming skills in Python.

Bonus Qualifications:

- Experience in one or more of the following: graph neural networks, probabilistic neural networks, deep generative models, reinforcement learning.
- Publications in top-tier conferences (CVPR, ICCV, ECCV, ICML, NeurIPS, ICLR, ICRA, IROS, ...).

Duration: 3 months

Lane Line Condition Estimation (Job Number: P22INT-26)

The project focuses on development of a system to identify lane lines and their quality on the road. For eg. Freshly painted lines have good quality while old eroded painted lines have poor quality.

Key Responsibilities:

- Develop algorithms for visual scene understanding, object detection, lane line detection.
- Support development of a benchmark dataset for evaluation of results.
- Develop and evaluate metrics to verify reliability of the proposed algorithms.
- Contribute to a portfolio of patents, academic publications, and prototypes to demonstrate research value.

Minimum Qualifications:

- Ph.D. or highly qualified M.S. candidate in computer science, electrical engineering, or related field.
- Strong research experience in computer vision or robotics or machine learning.
- Hands-on experience in one or more of the following from video inputs: 3D scene understanding from images, video understanding.
- Experience with PyTorch along with proficiency in software development with Python.

Bonus Qualifications:

- Experience with monocular depth estimation, lane line estimation, video understanding, image segmentation, BEV segmentation.
- Publications in top-tier conferences (CVPR, ICCV, ECCV, ICML, NeurIPS, ICLR, IROS, ICRA etc.).

Duration: 3 months

Machine Learning/AI

Behavior Modeling and Prediction of Road Users (Job Number: P22INT-01)

This project focuses on the prediction of risky behaviors of road users, including vehicles, bikes and pedestrians, and the generation of explainable warnings to the driver when the risky behaviors are identified. The project involves development of behavior models of road users, from both domain knowledge and data. It also involves performing causal and probabilistic inference once the models are constructed.

You are expected to:

- Construct generative and predictive models for vehicle, bike, and pedestrian behaviors
- Come up with data generation and labeling method to learn the model parameters
- Develop inference algorithms using the constructed models to predict road user behaviors
- Generate language warnings from the prediction results

Qualifications:

- M.S. student in computer science, electrical engineering, robotics, mathematics, statistics or related fields.
- Experience in statistical inference and machine learning.
- Excellent programming skills in either C++ or Python.

Bonus Qualifications:

- Ph.D. candidate in computer science, electrical engineering, robotics, mathematics, or statistics
- Research experience in probabilistic graphical models, causal inference, and causal structure discovery
- Research experience in motion planning and collision avoidance
- Experience in deep learning and human-in-the-loop learning
- Experience in vehicle simulators, e.g. Carla.

Duration: 3 months

Interactive Decision Making for Autonomous Driving (Job Number: P22INT-02)

This position investigates decision making algorithms for autonomous driving. This will include research and development for combinatorial approaches of data-driven and control-theoretic methods. This is an opportunity for applied work in optimizations, deep learning, and controls. You are expected to:

- Design and implement deep learning-based decision-making algorithms.
- Implement the algorithm on a state-of-the-art traffic simulator.
- Analyze and diagnose the performance of the system.

Qualifications:

- M.S. or Ph.D. candidate in computer science, electrical engineering, robotics, or other related fields.
- Strong familiarity and research experience in optimizations, controls, and deep learning.
- Excellent programming skills in either Python or C++.

Bonus Qualifications:

- Ph.D. candidate in computer science, electrical engineering, robotics, or other related fields.
- Experience with ROS (Robot Operating System).
- Experience with simulators for autonomous cars.
- Publication record of deep learning methods for motion planning applications.

Duration: 3 months
