Peter H. Christiansen

Computer Vision and Deep Learning Expert

I am an early adopter of deep learning technologies. Over the past nine years, I have applied machine learning, deep learning, and computer vision to develop autonomous systems. My background is research-oriented with in-depth knowledge of deep learning technologies. This is complemented by industrial experience for developing Python software and bringing machine learning systems into production.

Civil status

Married, 2 children

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scholar.google.com

Languages

Danish - native
English - professional

Projects

2023 **Open Source Project: Multi-task Learning Python Package**

Open Source Project and Python Package

Development of an open source Python package called (TorchBricks) for creating single-task and multi-task deep learning models.

Technologies: *Python, Pytorch, ONNX, CI/CD with GitHub actions*

2023 **TheAILab: Developing a Car Mountable Camera System**

TheAiLab

Developing and selling a custom car mountable high speed camera system for monitoring biodiversity along public roads. Developing hardware, CAD drawings, 3D printing and PCB drawings.

Technologies: *Camera technology, ROS, FreeCAD, 3D printing*

Experience

Jan. 24 - Jan. 26 **Milestone Systems**

Sensior Computer Vision Engineer

Developing an end-to-end Computer Vision platform for dataset management, model training and model benchmarking.

Technologies: *Python, AWS, ML Tooling*

Jan. 22 - Jan. 24 **Volkswagen Group, CARIAD: Active Learning for Self-Driving Cars**

Freelancing, TheAILab

Developing Active Learning algorithms for self-driving cars. Deep learning model training for semantic segmentation and object detection. Export and deployment of quantized models with ONNX and ONNX Runtime (CPU/Cuda/TensorRT). Large investigation and usage of multiple experiment tracking tools. Modern Python development of a machine learning system (MLOps, experiment tracking, CI/CD in azure, code review, pre-commits, linting, type-hints and environments)

Technologies: *Python, Pytorch, ONNX, ONNX Runtime, Azure*

Jan. 21 - Dec. 21 **AGCO A/S: Datascience Combine Harvester**

Freelanching, Self-employed (Hviid Christiansen ApS)

Data science (Python) and software development (C++) on embedded platform to automate and optimize harvesting on a small fleet of Combine Harvesters. Using Datascience to monitor and visualize operations of the small fleet as timeseries and on maps.

Technologies: *Python, C++, Pandas, Matplotlib, scikit-learn, mongodb, sqlite*

Apr. 20 - Dec. 20 **Machine Learning and Computer Vision on Embedded Platform**

Freelanching, Self-employed (Hviid Christiansen ApS)

The LEGO group: Deep Learning on a Microcontroller

Deep learning algorithms on highly constraint hardware (OpenMV). Model training in Tensorflow/keras and transfer learning in Tensorflow JS. Deployment of quantized models on a microcontroller (TFlite, C++).

Technologies: *Tensorflow / Keras, Tensorflow JS, Tensorflow tflite for micro controllers, image classification, object detection, Python, Typescript, C++*

Oct. 17 - Mar. 20 **Industrial Postdoc**

EIVA A/S

Visual Based Navigation for Autonomous Underwater Vehicle

Using computer vision to navigate underwater autonomous systems. Implementation of a real-time Visual SLAM system (Python, C++ and Ceres Solver). Creating a novel deep learning algorithm (UnsuperPoint) for interest point detection (Python and Pytorch). Model is deployed on Nvidia Jetson (C++, LibTorch). Creating a deep learning based multi-view stereo algorithm. Marker Detection (ARUCO) for robot localization.

Technologies: *Deep learning, OpenCV, Pytorch, LibTorch, Ceres Solver, Multiview Stereo, Real-time Visual SLAM, Marker ARUCO detector, Camera Calibration, Python, C++*

Oct. 14 - Sep. 17 **PhD Student**

Department of Engineering, Aarhus University

Thesis *TractorEYE: Vision-based Real-time Detection for Autonomous Vehicles in Agriculture*

PhD thesis on obstacle detection with RGB and thermal camera for autonomous tractors. Early adaption of deep learning technologies for image recognition (image classification, object detection and semantic segmentation). Development of a novel anomaly detection algorithm (DeepAnomaly). Creating a multi-sensor platform and dataset (FieldSAFE). Work involves localization, calibration, registration and fusion of cameras (RGB, thermal, stereo, 360), LiDAR, GPS and IMU. The PhD is founded by Innovation Fund Denmark through the project Safer Autonomous Farming Equipment (SAFE).

Technologies: *Deep learning, Anomaly detection, Object detection, Image Classification, Semantic Segmentation, Camera (RGB, Thermal and Stereo), ROS, Camera Calibration, Sensor Fusion, MATLAB, Python*

Mar. 14 - Sep. 14 **Research Assistant**

Department of Engineering, Aarhus University

Automatic detection and recognition of wildlife using a thermal camera (paper) from a drone (UAV). Running field experiments and development of a route planning software for drones (MATLAB and C#).

Education

Dec. 14 - Apr. 18 **PhD**
Department of Engineering, Aarhus University
Thesis: *"TractorEYE: Vision-based Real-time Detection for Autonomous Vehicles in Agriculture"*. Published 14 papers related to computer vision, machine learning and autonomous systems.

Jan. 12- Jan. 14 **Master of Science in Information Technology**
Department of Engineering, Aarhus University
Specialization in embedded real-time systems and digital signal processing. Targeting machine learning, signal and image processing through five courses, one R&D, one reading course and the master thesis.
MSc Thesis: *"Automated Classification of Seedlings Using Computer Vision"* (Download). A camera-based system for automatically recognizing plants. Work involved image processing and machine learning in MATLAB
Technologies: *Machine Learning, Computer Vision, Image processing, MATLAB, C++*
Grades: ECTS weighted average: 10.4 (7-step-scale)

Aug. 08 - Jan. 12 **Bachelor of Engineering in Electronics and Computer Engineering**
Aarhus School of Engineering
Specialization in Digital Signal Processing.
BSc Thesis: *"Surveillance System Based on Remote Microphone Arrays"* (Download). A microphone array to detect the position of a sound source and a beamforming algorithm to amplify a signal from a specific position. Algorithms to perform sound source localization and interfacing of 8 microphones was implemented on a DSP platform.
Technologies: *Signal processing, microphone arrays, MATLAB and C-programing on a DSP.*
Grades: ECTS weighted average: 10.3 (7-step-scale)

Aug. 04 - Jun. 07 **STX, Mathematical student**
Munkensdam Gymnasium

Selected Courses

Dec. 16 - Jan. 18 **Self-Driving Car Engineer Nanodegree Program**
Udacity (online)
PhD course collection, 10 ECTS

Apr. 15 - Jul. 15 **Deep Learning for Image Analysis**
Department of Engineering, Aarhus University
PhD reading course, 5 ECTS

Feb. 13 - Apr. 13 **Artificial Intelligence for Robotics**
Udacity (online)
MSc reading course, 5 ECTS

Mar. 12 - Jun. 13 **Computer Vision**
Department of Engineering, Aarhus University
MSc course, 5 ECTS

Aug. 12 - Nov. 12 **Optimization in ICT and Physical Systems**
Department of Engineering, Aarhus University
MSc course, 5 ECTS

Technologies

Publications - sorted by relevance

Jul. 19
UnsuperPoint: End-to-end Unsupervised Interest Point Detector and Descriptor
arXiv preprint arXiv:1907.04011
P.H. Christiansen, M.F. Kragh, Y. Brodskiy, H. Karstoft

Oct. 17
Dissertation
TractorEye: Vision-Based Detection for Autonomous Vehicles in Agriculture
PhD Dissertation, AU Library Scholarly Publishing Services
P.H. Christiansen, R. N. Jørgensen, H. Karstoft

Nov. 16
DeepAnomaly: Combining Background Subtraction and Deep Learning for Detecting Obstacles and Anomalies in an Agricultural Field.
Sensors, 16(11),
P.H. Christiansen, L.N. Nielsen, K. A. Steen, R. N. Jørgensen, and H. Karstoft

Nov. 17
FieldSAFE: Dataset for Obstacle Detection in Agriculture
MDPI Sensors
M. Kragh, P. Christiansen, M.S. Laursen, M. Larsen, K.A. Steen, O. Green, H. Karstoft, R.N. Jørgensen

Feb. 16
Using Deep Learning to Challenge Safety Standard for Highly Autonomous Machines in Agriculture
Journal of Imaging
K. Steen, P. Christiansen, H. Karstoft, and R. N. Jørgensen

Jun. 16
Towards Autonomous Plant Production using Fully Convolutional Neural Networks

P. Christiansen, R. Sørensen, S. Skovsen, Claes D Jæger, R. N. Jørgensen, H. Karstoft, and K. A. Steen

Mar. 18
Multi-Modal Detection and Mapping of Static and Dynamic Obstacles in Agriculture for Process Evaluation
Frontiers in Robotics and AI
T. Korthals, M. Kragh, P. Christiansen, H. Karstoft, R.N. Jørgensen, U. Rückert

Aug. 17
Towards Inverse Sensor Mapping in Agriculture
International Conference on Intelligent Robots and Systems, Workshop
T. Korthals, M.F. Kragh, P. Christiansen, U. Rückert

Jun. 17
Platform for Evaluating Sensors and Human Detection in Autonomous Mowing Operations
Precision Agriculture
P. Christiansen, M. Kragh, K. A. Steen, H. Karstoft, R. N. Jørgensen

Jun. 16
Multi-modal Obstacle Detection and Evaluation of Occupancy Grid Mapping in Agriculture
International Conference on Agricultural Engineering
M. K. Hansen; P. Christiansen, T. Korthals, T. Jungeblut, H. Karstoft, R. N. Jørgensen

Jan. 14
Master Thesis

Automated Classification of Seedlings using Computer Vision

Technical Rapport

M. Dyrmann and P. Christiansen

Jan. 16

Estimation of Plant Species by Classifying Plants and Leaves in Combination

Journal of Field Robotics

M. Dyrmann, P. Christiansen, and H. S. Midtiby

Sep. 15

Towards a DSL for Perception-Based Safety Systems

International Workshop on Domain-Specific Languages and models for Robotic systems

J.T.I. Mogensen, S. Suvei, M. K. Hansen, P. Christiansen, U. P. Schultz

Jul. 15

Advanced Sensor Platform for Human Detection and Protection in Autonomous Farming

European Conference on Precision Agriculture

P. Christiansen, M. Kragh, K. A. Steen, H. Karstoft, R. N. Jørgensen

Jul. 16

Active-Sensor Data Fusion for Improved Stereo Block Matching

Image Analysis and Recognition

S-D Suvei, L. Bodenhagen, L. Kiforenko, P. Christiansen, R N Jørgensen, A G Buch, and N Krüger

Roles	Years of Experience	Level	Last Used
AWS	2	Medium	2026
C	2	Medium	2021
C++	2	Medium	2021
C#	1	Medium	2021
Camera Calibration	3	High	2020
Ceres Solver	2	Medium	2019
Computer Vision	10	High	2026
Deep Learning	8	High	2026
Embedded	5	Medium	2020
Git	11	High	2026
Image Classification	9	High	2026
Image Processing	9	High	2026
Machine Learning	14	High	2026
MATLAB	4	Medium	2015
Multi-view Geometry	3	High	2020
Object detection	9	High	2026
Photogrammetry	2	High	2020
Python	11	High	2026
PyTorch / LibTorch	7	High	2026
Research	5	High	2020
ROS1/ROS2 (Robot Operating System)	3	Medium	2025
Semantic Segmentation	8	High	2026
Sensor Fusion	3	Medium	2017
Signal Processing	4	High	2014
Stereo / Multi-view Camera	3	High	2020
Thermal Camera	3	Medium	2017
Tensorflow/Keras	2	High	2020
Tensorflow Lite for microcontrollers	1	Medium	2020
Tensorflow JS	1	Medium	2020
Typescript	1	Basics	2020
Visual SLAM	2	High	2019