Binjian **Xin**

Deep Learning · Autonomous Driving · Software Design

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"Decoding ≠ Interpretation, Abstraction = Understanding"

Education

KIT (University of Karlsruhe)

Karlsruhe, Germany

PhD with Department of Measurement and Control Engineering (MRT) in Image Processing

Mar. 2002 - Jan. 2009

- 3D image data analysis and defect detection[0],
- Image processing and visual inspection[00],
- Image sensor fusion[0],
- Project (Daimler-Benz)[0],
- Teaching activities.

Tongji University

Shanghai, China

MSc in Robotics

Mar. 1998 - Sep. 2001

- "Kinematic studies for a multimodal orthopaedic training simulator", TUM, Germany,[0],
- Research and application in evolutionary algorithms[0].

BSc in Electrical Engineering

Sep. 1993 - Sep. 1998

- Bachelor work "Simulation of an adaptive Fuzzy-Logic System".

Experience

Siasun Robot, Shanghai Research Institute

Shanghai, China

Technical Expert, Deep Reinforcement Learning

Nov. 2024 -

- Development of reinforcement learning algorithms for humanoid robot gait and manipulator control
- Robot 3D semantics and SLAM

Newrizon

Shanghai, China

Technical Expert, Advanced Development

Nov. 2020 - May 2024

- Reinforcemnt learning based motion planning (20% increase in energy efficiency)[000].
  - Application of DDPG, TD3, SAC in Online/Offline mode for motion planning
  - Sequential model based reinforcement learning (RDPG) for POMDP
  - Distributed training of multi-agent and federated learning
  - Diffusion based Q-Learning (IDQL) for offline reinforcement learning
  - Design and implementation of deep reinforcement learning data pipeline (ETL & Deep Learning) → **tspace**
  - CAN Application package (Pydantic integration, CI/CD with Github Action, dynamic loading, property cache) → **candycan**
- Deep learning based time series prediction and battery state of safety prediction based on generative models.[00]
  - Unsupervised learning of multimodal time series with GANs
  - Design and implementation of time series analysis software package with generative models → **funes-ts**
  - Prediction based on time series foundation model
  - Model distillation and data distillation
- Research in applications of end-to-end perception and planning in autonomous driving.
  - Driving decision of automated driving systems with natural languange interface based on LLMs or VLMs[00]
  - Occlusion recovery with latent diffusion models for front-view camera[0]
  - 3D reconstruction of driving scenes with NERF and Gaussian Splatting
  - Neural motion planning (MPNet)
  - Behavior and motion prediction (CVAE-H, VectorNet, TNT, Trajectron++, MotionDiffuser)
  - Multi-Armed Bandits, Contextual Bandits
  - Driving style adaption for autonomous driving (DAgger/RLHF/DPO/ControlNet in MetaDrive)
  - Model-based reinforcement learning (World Model,Dreamer,APRL)
  - Diffusion policy for reinforcement learning (Quality Score Matching, Diffusion Policy)
- Chip evaluation (Chiplite Chiplet SoC on self-driving applications)
- Team 2 engineers

Nio

Shanghai, China

Senior Manager, Autonomous Driving

Nov. 2017 - Nov. 2020

- Development of L4 autonomous driving systems.
  - perception and sensor fusion
    - Image object detection and semantic segmentation (Darknet)
    - Traffic light detection and its state estimation
    - Lidar point cloud processing and object detection (pointnet++)
    - Monocular depth (based on calibration,vanishing point estimation, monocular depth with Packnet-SFM)
    - Radar, Video and lidar object sensor fusion and multi-object tracking
    - Camera, Lidar calibration
  - Motion planning and vehicle control
    - Routing with dynamic programming (Hybrid A*,RRT,MCTS)
    - APA routing with Reeds-Shepp constraints
    - Decoupled lateral and longitudinal motion planning on structured and unstructured roads
    - Path planning with MPC
    - behavior planning with vehicle state machine
    - Behvior cloning of lateral planning based on recurrent models
  - ADS system development and integration under ROS
- Fleet: electric vehicles (10+) with level 4 sensor configuration and computing platform.
- Intelligent charging and automatic parking assistance system (public funded project).
- License application and operation of Intelligent Connected Vehicle (ICV) road test in Shanghai and Beijing.
- Top 3 at testing mileage in Beijing with T3 license.
- 5G ICV Demonstration in Hainan Boao Forum, 2019.
- Chip evaluation (Huawei Ascend on self-driving applications)
- Team (10+ engineers) build-up and development management.

Patac/SAIC-GM

Shanghai, China

Technical Manager, ADAS

Oct. 2015 - Nov. 2017

- System & software architecture design for active safety domain unit (ADU).
- PATAC ADU A sample: system and software architecture of embedded platform.
- Software architecture of SAIC-MAXUS SV73 highway assist.
- Camera based driver monitoring system.
- Surround view camera system[0].
- Team 3 engineers

Visteon Asia Pacific

Shanghai, China

Software Manager

Jan. 2015 - Aug. 2015

- SOP project of instrument clusters.
- Team 15+ engineers

Hella Electronics

Shanghai, China

Senior Manager, Software

Jul. 2014 - Jan. 2015

- SOP project of BCM and PEPS.
- Platform project of PEPS, BCM, BSW.
- Team 15+ engineers

Harman R&D Center

Shanghai, China

Senior Manager, ADAS

Sep. 2009 - Jul. 2014

- Development of video based ADAS system.
- SOP projects of camera based parking systems
  - SOP of 3D surround view system (SVS) for Geely KC-1, first SOP of SVS in China
  - SOP of rear view camera deployment (Geely, Ssangyong, Tata, GM, Suzuki, Hyundai and VW).
- Supervision of ADAS advanced research:
  - LDW and FCW on infotainment platform,
  - Augmented navigation,
  - Moving object detection.
  - Design of surround view demo systems (Robot car and OEM vehicles) and demos (CES, Geneva Motor Show).
- Team 10 engineers

Skills

Programming	C/C++, Python, Shell, Matlab, CMake, Rust, Mojo, Html
Development	Git, ROS, OpenCV, MRPT, PCL, CARLA, MetaDrive, Emacs, Literate Programming
Python	PyTest, UnitTest, Pydantic, functional/meta-programming, async, nbdev, poetry, pyenv, ruff
HMI	Streamlit, Textual, Qt
Data Analysis	Numpy, Pandas, Dask, Pyspark, Parquet, Arrow, Matplotlib, Plotly, MongoDB, PostgreSQL
Time Series	AutoGluon, Chronos, TimeGPT
Deep learning	Tensorflow, Pytorch, Jax, LLM, Langchain, GNN, Huggingface Transoformers/PEFT/Diffusers, Wandb, >10000h
Reinforcement Learning	Huggingface TRL, Mujoco, Gym, stable-baselines3, Vowpal Wabbit
DevOps	Jira, Confluence, Github Actions, Gitlab CI/CD, Docker
Documenation	LaTeX, Markdown, OrgMode
Languages	Chinese, English, German

Publications

Journal Articles

[0] Binjian Xin. "Multiscale analysis of rough groove textures for three-dimensional optical measurements". In: *Optical Engineering* 48.7 (2009), pp. 073602–073602.

[0] Xin, Binjian, Michael Heizmann, Sören Kammel, and Christoph Stiller. "Analysis of Image Sequences for the Inspection of Grinded Surfaces." In: *tm-Technisches Messen* 71.4 (2004), pp. 218–226.

[0] Xin, Binjian, Lei Wang, and Qidi Wu. "A review of research and application of Ant Colony System." In: *Journal of Tongji University: Natural Science* 30.7 (2002), pp. 82–87.

Conference Proceedings

[0] Binjian Xin. "Evaluation of two and a half dimensional surface data with form component and groove bands." In: *Machine Vision Applications in Industrial Inspection XV*. Vol. 6503. SPIE. 2007, pp. 95–104.

[0] M. Frey, R. Riener, R. Burgkart, and Xin, Binjian. "Robot based teaching system: The Munich knee simulator." In: *VDI BERICHTE*. Vol. 1679. VDI. 2002, pp. 491–496.

Book

[0] Binjian Xin. *Evaluation and characterization of 3d surface data with groove textures.* KIT Scientific Publishing, 2009.

Patents

[0] Binjian Xin. *Natural language interface and large language model based autonomous driving decision module.* Mar. 22, 2024.

[0] Binjian Xin. *Natural language interface and multimodal foundation model based autonomous driving desicion system.* Mar. 22, 2024. Applied.

[0] Hongchen Pan and Xin, Binjian. *Driving style classification method, apparatus, device, storage medium, and program.* Oct. 24, 2023.

[0] Binjian Xin. *Vehicle-mounted camera view-blocked area enhancement detection based on latent diffusion model.* May 30, 2023.

[0] Binjian Xin. *Battery safety detection method based on generative model.* Aug. 11, 2023.

[0] Xin, Binjian and Yang Chen. *Machine learning based time series feature generation and fault battery detection method and device.* Aug. 8, 2023.

[0] Binjian Xin. *Reward driven controller parameter optimization.* July 29, 2022. Pending.

[0] Xin, Binjian, Jingwei Fu, and Hongchen Pan. *Simulation based controller parameter design, testing and device*. Feb. 8, 2022.

[0] J. Fang, S. Li, L. Jin, Z. Xu, B. Cao, and Xin, Binjian. *A multi-camera based rear view system.* Mar. 29, 2017.

[0] J. Boehm, T. Hercke, N. Rau, S. Schweikert, A. Warzok, and Xin, Binjian. *Evaluation method for honed structures on motor cyliner bores*. Aug. 28, 2008.