Naigui Xiao

🌐 https://printeger.github.io/   ✉ printeger@outlook.com
📞 +86 133151533600   🐙 https://github.com/Printeger

Education

M.S. *Harbin Engineering University, Harbin, China*
Naval Architecture and Ocean Engineering *2019 - 2022*
Final Grade: 3.5/5.0
Specialisms: Mainly focus on underwater robot navigation and control in underwater robot lab.
Thesis title: Research on Positioning Method of Underwater Robot Based on Multi-sensor Data Fusion
Detail: In this paper, a ROV localization method is proposed, which integrates multiple sensors such as camera, sonar and IMU through nonlinear optimization method to adapt to the special underwater environment.

B.Eng. *Nanjing University of Aeronautics and Astronautics, Nanjing, China*
Automation *2015 - 2019*
Final grade: 3.1/5.0
Specialisms: automatic control theory; Embedded System development; Signal processing; Visual SLAM
Thesis title: The Research and Implementation of SLAM System Based on Binocular Vision

Experience

Engineer of LiDAR Algorithm and Application *FEB 2022 - NOW*
Fulltime in Innovusion Co. *Suzhou, China*

- Develop multi-sensor fusion Lidar localization and perception algorithms for autonomous driving and road end applications.

ROV localization using SBS(Short Baseline Sonar) *JUN 2021 - AUG 2021*
Internship in Feimabin (Qingdao) Intelligent Technology Co., Ltd. *Qingdao, China*

- Responsible for the design of the positioning scheme of the ship cleaning robot, and code implementation.

ROV sea trial for coral protection in Sourth China Sea *MAR 2021 - MAY 2021*
Harbin Engineering University underwater robot lab *Sourth China Sea, China*

- In charge of the ROV control system design and to maintain and test. This experiment was designed to test the effect of using ROV to clean up acanthaster planci flooding in shallow waters, which feeds mainly on coral.

Pratical project of bionic UAV *SEP 2017 - JAN 2018*
Internship in Shenzhen DAMODA Intelligent Control Technology Company *Nanjing, China*

- Use Solidworks to design bionic butterfly ornithopteric aircraft. Write control program, make and test the prototype.

Human gesture recognition and 3D modeling *JUL 2018 - OCT 2018*
A campus science and innovation project *Nanjing, China*

- Using STM32 and six-axis inertial sensors make a wearable glove, which could colect the movement of human hand. Based on these information, Unity3D was used to build 3D models for visualization.

Motion-sensing game design based on FPGA *APR 2018 - JUN 2018*
A campus FPGA Design Competition *Nanjing, China*

- A Flappy Bird like game using FPGA, sound transducer was used to control character's movement.

Internship in AVIC Jiangxi Hongdu Aviation Industry Group Company *JUL 2017 - AUG 2017*
AVIC Jiangxi Hongdu Aviation Industry Group Company *Nanchang, China*

Skills

Skills: Robotics Related

My interest in robotics throughout my studies, and my knowledge of the field, has led me to develop skills in the following areas:

SLAM and mulit-sensor fusion: start with visual SLAM; and then explored the fusion of vision, sonar and IMU on underwater robot for application in underwater scenes(in my master's studies); also have experience in LiDAR odometry, LiDAR-IMU odometry and GPS-IMU fusion for autonomous driving(at work).

LiDAR data processing and application: handling LiDAR data in various methods, including registration, motion compentation, cluster, etc.

Design and execution of prototype experiments: over two years experience working cooperatively in ROV laboratory; self-motivated and tough enough to endure poor experimental environment.

Multi-platform development: develop on ROS and Baidu APOLLO.

Control theory: systematically studied in university, and used in many projects.

Design and modeling of robot structure: in development of bionic aircraft, CAD and Solidworks was used to design the prototype.

PCB design and embedded circuit programming: using STM32 series chips to develop control program in ROV and other project; also have FPGA development experience.

Design and modeling of robot structure: in development of bionic aircraft, CAD and Solidworks was used to design the prototype.

Skills: Data Analysis and Computing

During years of study, work and practice, the following computing abilities have been developed:

C/C++ for development: is my primary programming language, familiar with tools and utilities available in C++(CMake, Bazel, etc.)

Python for data processing: use python as an efficient tool for processing data and previewing new ideas; in a period of time, tried to use neural network for pointcloud classification.

Use MATLAB to process data: used for control system simulation in some projects during undergraduate years.

Use git to manage projects and collaborate with others: proficient in git management of project code with team.

Skills: Reading and Communication

Keep reading papers: this is where I get new knowledge and keep up with trends.

Collaborate and communicate with people from different backgrounds: shared workspace, materials, and knowledge.

Language competence: proficient in English for communication, presentation and reading.

Open Source Projects

MobileGPS2PC	Transmit mobile phone GPS to server in Baidu APOLLO module using websocket.
GIOODOM	GPS IMU Fusion via ESKF on ROS.
LIGO	A robust odometry that fused LiDAR, IMU and GPS, which can still work when different sensors join and exit.
LiDAR-IMU Calibration	LiDAR to IMU calibration using hand-eye method.
LiDAR-IMU Extrinsic refine	GPS Refine extrinsic of LiDAR to IMU.
Highway mapping	Build LiDAR pointcloud map through RTK and IMU measurements.

Grants and Awards

2x academic scholarships in HEU

1x academic scholarship in NUAA

Third prize of Aircraft Design Competition

Second Prize in Anlu Cup FPGA Competition

Outstanding Student Certificate of Visual SLAM Course of Deep Blue Institute(Online course)

3x Runner-up of the Intercollegiate Cup Football Competition in 15/16, 16/17 and 17/18 academic year:(

Academic Interests

Robotics Related

1. Real-time and Large-scale SLAM. I find that there is a great demand in real application scenarios.

2. SLAM in Dynamic Environments.I have encountered such a problem at work, we came up with a redundant solution, but I didn't like it.

3. Map reuse and update in dynamic environment.

4. Deep Learning for SLAM. Since deep learning techniques have shown great potential in various tasks. How will he applied in SLAM is exciting.

5. Semantic related. It is important for robots or autonomous systems to have a richer understanding of environment.

6. Collaborative SLAM. Multiple robots or UAVs working together to build a shared map of the environment is a promising approach to solve the localization problem in large-scale environments.

6. Go deeper into the robot localization method and do something challenging and interesting.

Robotics Related

1. Use sensor fusion and SLAM to improve this new method for human and computer interaction.

2. Any novel research and applications.

Other Interests

Hobbies: football, cycling, reading, play electric guitar(still amateur:P)

Figure 1: some pic of myself:)

Q1: How would you introduce yourself?

A1: I come from a small city in the middle of China, and like many children who love science fiction, I have had an endless interest in cosmic machinery since I was a child. When I was about to graduate from high school and faced the first choice in my life, I hoped to become an astronomer, to maximize my understanding of the universe in which I exist during my lifetime, and to be at the forefront of exploration. Unfortunately, my college entrance examination score was a bit short of universities that offer astronomy majors, but it does not matter, I can still choose other majors and try to get as close to it as possible. (That is why I chose NUAA), making robots also sounds cool, and someday the space explorer may have my contribution.

During university, my chosen major allowed me to dabble in all directions related to robots, from structural design (engineering drawing, mechanics) to system simulation (control theory), from circuit principles (Digital and Analog circuit) to embedded circuit (PCB design, embedded circuit), from microcomputer principles to C/C++. I participated in some interesting projects and chose SLAM as the direction of my graduation design in my senior year. As a graduate student, I was fortunate to enter the underwater robot laboratory, where I could continue to explore the direction of multi-sensor fusion positioning around robots. I got a lot of opportunities to practice knowledge in practice.

Because I have always adhered to the concept of learning for use, I joined a company related to lidar after graduation to engage in algorithm research and development related to autonomous driving, hoping to combine the learning in school with actual application here. In the more than one year since I joined the company, I think my personal ability has greatly improved compared to the school period, and I can independently propose solutions to the corresponding needs and problems and implement them in engineering. I really like the passion of a start-up company and the flat management of the team I belong to. It is an unforgettable memory to brainstorm and sweat with my peers here. However, for some reasons, I feel it is time to take a step forward.

First of all, I want to continue to delve into the SLAM algorithm direction of multi-sensor fusion. In this general direction, there are almost no colleagues in the team who can give me relevant guidance or discuss related issues together; secondly, personal learning and improvement are subject to project progress requirements and development needs, which makes it difficult for people to invest too much energy and time to explore new ideas and innovate; I deeply feel that my knowledge reserve and ability are far from enough, I have a strong desire for knowledge, I hope to have time and energy to learn new knowledge, and at the same time, I do not want to be just a knowledge porter, but can freely explore and realize my own inspiration, and be at the forefront of the field. Finally, it is difficult to ensure the balance of work and life. I am willing to invest time in what should be done, but I also want to have the energy to develop other hobbies, rather than live for work.

I often look back and examine myself. I think my biggest advantage is that I will devote myself wholeheartedly to the things I decide to do. At the same time, my little cleverness allows me to draw inferences from one another in different fields and quickly get started with new fields and problems. The biggest disadvantage is that I am not decisive enough, I often like to plan and then move, and I hesitate to make a decision when I consider too much.

In life, I am a sincere person, I hope to treat others with sincerity, and others can also treat others with sincerity. Football is my favourite sport. I am a Liverpool fan. This club sometimes resonates with me. As a working-class team, without a lot of money, it realizes its dreams through passion and sweat. Cycling is my new hobby, I enjoy the freedom and speed of cycling. I like rock and roll and reading, and when I have nothing to do, I will play my favourite songs with an electric guitar, but I am still noob hahaha.

Q2: Why do I want to be a PhD?

A2: The idea of becoming a PhD does not come out of nowhere.

First and foremost, **Deepening knowledge:** I feel that the knowledge I had was still lack for what I want to do. I am eager to acquire advanced research skills, delve deeper into my chosen subject and contribute to its advancement.

Furthermore, **Intellectual curiosity:** I would consider myself a person driven by a curiosity to explore and uncover new knowledge in the field I am interested in. I found robotics interesting, and I wanted to put my energy

into it, rather than doing some other easy but boring job for living.

Additionally, **Personal development:** I view pursuing a PhD as an opportunity for personal growth and challenge to myself. Cannot get into comfort zone at this age. ,

Lastly, I want to do something meaningful and make my life fulfilled.

Q3: Why do I think I am qualified for a PhD?

As a PhD candidate, I believe I am qualified for a doctoral program due to the following reasons:

1. Academic related: Throughout my academic journey, I have consistently demonstrated strong academic performance. Meanwhile, I systematically learned a lot of knowledge related to robotics, which enables me to look at problems from a holistic perspective. I keep reading the literature to keep up with the latest trends and critically analysing existing literature, identifying limitations, and apply to the problems encountered. These skills are crucial for conducting independent research at the doctoral level.

Experience and Problem-Solving Skills: I have actively engaged in research, science projects and experiments throughout my academic career and work, either as part of coursework or independently. Most tend towards application, so although there is no paper published, but I think there is a strong ability. And have already invested in my academic interest(SLAM) in many years of effort(in study and work).

Motivation and Perseverance: I am highly motivated to contribute to the knowledge base of my interest field and hate I have smattering of knowledge. I am prepared to invest the time and effort necessary to complete a rigorous doctoral program. I have demonstrated resilience in the face of challenges and setbacks, whether it is in arduous sea trials or intense work. and I am committed to seeing my research through to completion.

Communication and Collaboration Skills: I have honed my communication skills through presentations, academic writing, and engaging in discussions with peers. I am adept at conveying complex ideas clearly and concisely. Additionally, I value collaboration and have experience working in interdisciplinary teams, which will enable me to effectively collaborate with other researchers and professionals in my field.