Research statement

# 研究报告

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## 周延林

Over the past three years, I have gained a strong foundation in information security through my undergraduate studies. However, I have also developed a keen interest in artificial intelligence and robotics. In addition to completing the required courses for my major, I have taken courses such as Introduction to Artificial Intelligence and Machine Learning and Application, where I have achieved excellent results. Through these courses, I have gained knowledge of cutting-edge technologies, including deep learning, reinforcement learning, and natural language processing.

在过去的三年里，我通过本科学习在信息安全方面打下了坚实的基础。然而，我也对人工智能和机器人产生了浓厚的兴趣。除了完成本专业的必修课外，我还选修了《人工智能导论》、《机器学习与应用》等课程，取得了优异的成绩。通过这些课程，我获得了前沿技术的知识，包括深度学习、强化学习和自然语言处理。

Furthermore, my strong background in mathematics has given me the analytical skills necessary for success in these fields. During high school, I won several prizes in mathematics contests, and in college, I have consistently scored full or near-full marks in all math-related courses. I possess excellent math thinking and computing skills, which have been invaluable in my pursuit of knowledge in these fields.In addition to my coursework, I have gained research experience in a laboratory setting. Through this experience, I have honed my skills in reading and interpreting academic papers.

此外，我强大的数学背景使我具备了在这些领域取得成功所需的分析技能。在高中期间，我在数学竞赛中赢得了几个奖项，在大学里，我在所有数学相关课程中都一直取得满分或接近满分的成绩。我拥有出色的数学思维和计算能力，这对我追求这些领域的知识是非常宝贵的。除了我的课程，我还在实验室环境中获得了研究经验。通过这次经历，我磨练了阅读和解读学术论文的技能。

***Research experience***

***研究经验***

During my sophomore year, I had the opportunity to participate in research at our college's data security joint laboratory. I worked on the "Enclave Storage Engine for Practical Databases" project, which aims to achieve true encrypted storage in the cloud to protect privacy in the era of big data. Through extensive literature review, I gained knowledge of concepts related to searchable encryption, SGX, and secure data computing.

在我大二的时候，我有机会在我们学院的数据安全联合实验室参与研究。我参与了“实用数据库的Enclave存储引擎”项目，该项目旨在实现云中真正的加密存储，以在大数据时代保护隐私。通过广泛的文献综述，我了解了与可搜索加密、SGX和安全数据计算相关的概念。

In my work, I was mainly responsible for debugging the operation of opengauss and implementing data encryption on the client side.Through this experience, I gained valuable insights into the challenges and opportunities in the field of data security. I believe that privacy protection will continue to be a crucial aspect in the rapidly developing field of artificial intelligence, and I am eager to explore this topic further in my research.

在工作中，我主要负责调试opengauss的操作，并在客户端实现数据加密。通过这段经历，我对数据安全领域的挑战和机遇有了宝贵的见解。我相信隐私保护将继续是快速发展的人工智能领域的一个关键方面，我渴望在我的研究中进一步探索这个话题。

During my junior year, I had the opportunity to conduct research at the Institute of Artificial Intelligence at our university. Specifically, I worked on a project focused on the development of humanoid double-wheeled legs. Through this experience, I gained proficiency in the use of the Robot Operating System (ROS) and further developed my coding skills to effectively operate the robots. I am excited to further explore the intersections of information security, artificial intelligence, and robotics. I believe that my experience in these fields, combined with my dedication to research and willingness to learn, make me a strong candidate for the summer camp at Tsinghua University.

在我大三的时候，我有机会在我们大学的人工智能研究所进行研究。具体来说，我参与了一个专注于开发人形两轮腿的项目。通过这次经历，我熟练地使用了机器人操作系统（ROS），并进一步发展了我的编码技能，以有效地操作机器人。我很高兴能进一步探索信息安全、人工智能和机器人技术的交叉点。我相信，我在这些领域的经验，加上我对研究的执着和学习的意愿，使我成为清华大学夏令营的有力候选人。

During the summer following my sophomore year, I had the opportunity to intern at China Soft International, where I worked on a project focused on License Plate Occlusion Detection and License Plate Recognition System. As the development manager, I was responsible for implementing and optimizing the model.

大二那年夏天，我有机会在中软国际实习，在那里我从事了一个专注于车牌遮挡检测和车牌识别系统的项目。作为开发经理，我负责实施和优化模型。

In the early stages of the project, I utilized TensorFlow to implement the LeNet neural network. Through further research, I gained a deeper understanding of related technologies such as RNN, LSTM, and CRNN, which I ultimately used to develop a recurrent neural network for detection. Through this project, I acquired a wealth of knowledge related to neural network algorithms.

在项目的早期阶段，我使用TensorFlow来实现LeNet神经网络。通过进一步的研究，我对RNN、LSTM和CRNN等相关技术有了更深入的了解，最终我将其用于开发用于检测的递归神经网络。通过这个项目，我获得了与神经网络算法相关的丰富知识。

My experience at China Soft International not only provided me with valuable technical skills but also allowed me to gain hands-on experience in a professional setting. I collaborated with colleagues from diverse backgrounds and developed strong communication and problem-solving skills.

我在中软国际的经验不仅为我提供了宝贵的技术技能，还让我在专业环境中获得了实践经验。我与来自不同背景的同事合作，培养了强大的沟通和解决问题的能力。

As part of my studies in "Machine Learning and Applications," I completed a project on "Handwritten Digit Generation Based on VAE." I used the PyTorch framework to implement a standard VAE and then used TensorFlow in combination with DCGAN to generate more realistic handwritten digits.

作为“机器学习与应用”研究的一部分，我完成了一个“基于VAE的手写数字生成”项目。我使用PyTorch框架实现了标准的VAE，然后将TensorFlow与DCGAN结合使用，生成更逼真的手写数字。

In addition, during the course "Introduction to Artificial Intelligence," I gained a general understanding of various aspects of intelligent technology. At the end of the course, I studied papers related to image super-resolution and learned how to construct technology for enhancing image resolution that produces results closest to the original high-resolution image.

此外，在“人工智能导论”课程中，我对智能技术的各个方面有了大致的了解。在课程结束时，我学习了与图像超分辨率相关的论文，并学习了如何构建增强图像分辨率的技术，以产生最接近原始高分辨率图像的结果。

These projects gave me hands-on experience with machine learning and artificial intelligence and helped me further develop my programming skills.

这些项目为我提供了机器学习和人工智能的实践经验，并帮助我进一步发展了编程技能。

***Research interests***

***研究兴趣***

My primary interest lies in the field of robotics. During my freshman year, I focused on hardware microelectronics. However, in my sophomore year, my passion for algorithms grew, and I became less interested in traditional software design. Consequently, I switched to information security and learned about cryptography and network attack and defense.

我的主要兴趣在于机器人领域。大一期间，我专注于硬件微电子。然而，在我大二的时候，我对算法的热情越来越高，对传统软件设计的兴趣也越来越小。因此，我转向了信息安全，学习了密码学和网络攻击与防御。

However, with the emergence and power of ChatGPT, I realized that the software era is coming to an end, and even my security major is not immune. It made me recognize that combining software and hardware is what I and humans should excel at. I possess strong coding skills that enable me to quickly implement related applications for physical operations.

然而，随着ChatGPT的出现和强大，我意识到软件时代即将结束，即使是我的安全专业也不能幸免。这让我认识到，软件和硬件的结合是我和人类应该擅长的。我拥有强大的编码技能，能够快速实现物理操作的相关应用程序。

Therefore, in my future graduate studies, I intend to focus more on researching fields related to robotics to achieve true success. Robotics research requires a diverse skill set, including knowledge of computer science, electronics, and mechanical engineering. I believe that my interdisciplinary background and passion for robotics would enable me to make significant contributions to the field.

因此，在我未来的研究生学习中，我打算更多地专注于机器人相关领域的研究，以取得真正的成功。机器人研究需要多种技能，包括计算机科学、电子和机械工程知识。我相信，我的跨学科背景和对机器人的热情将使我能够在该领域做出重大贡献。

***Future research planning***

***未来研究规划***

During my senior year of study, I plan to concentrate on the latest advancements in intelligent technology and immerse myself in literature related to my field of study to gain cutting-edge knowledge. I aim to participate in experiments conducted by relevant research groups to combine my theoretical knowledge with practical application. Additionally, I will continue to improve my thesis writing and English proficiency to ensure that I can publish high-level SCI papers during my master's studies. By doing so, I will enhance my research skills and contribute to the advancement of the field of information security.

在我的大四学习期间，我计划专注于智能技术的最新进展，并沉浸在与我的研究领域相关的文献中，以获得前沿知识。我的目标是参加相关研究小组进行的实验，将我的理论知识与实际应用相结合。此外，我将继续提高我的论文写作和英语水平，以确保我能在硕士研究期间发表高水平的SCI论文。通过这样做，我将提高我的研究技能，为信息安全领域的发展做出贡献。

Throughout my undergraduate studies, I have developed a passion for intelligent technology and gained valuable scientific research experience and skills. As a result, I have a solid foundation in scientific research. After conducting extensive research and consulting with professional mentors, I discovered that your supervisor's research in this field has had a profound impact, achieved numerous important results, and won several prestigious awards both domestically and internationally. I am impressed by the strong research atmosphere at your institution, and I believe that it can provide me with the opportunity to delve deeper and gain a better understanding of the field.

在我的本科学习中，我对智能技术产生了热情，并获得了宝贵的科学研究经验和技能。因此，我在科学研究方面有了坚实的基础。在进行了广泛的研究并咨询了专业导师后，我发现您的导师在该领域的研究产生了深远的影响，取得了许多重要成果，并获得了多项国内外著名奖项。贵机构浓厚的研究氛围给我留下了深刻印象，我相信这可以为我提供更深入研究和更好地了解该领域的机会。

My plans for the future involve developing my career in Beijing, where I can access abundant practical opportunities to integrate knowledge with practice, gain a better understanding of my profession, and map out my future development direction. If given the chance to attend your summer camp, I am committed to pursuing a doctoral degree after completing my master's degree. I plan to devote myself to a specific field for an extended period, achieve significant academic accomplishments, and contribute significantly to the field.

我对未来的计划包括在北京发展我的职业生涯，在那里我可以获得丰富的实践机会，将知识与实践相结合，更好地了解我的职业，并规划我未来的发展方向。如果有机会参加你们的夏令营，我将在完成硕士学位后继续攻读博士学位。我计划长期致力于某一特定领域，取得重大学术成就，并为该领域做出重大贡献。