

1 Slide 1 ($\approx 15-20$ s) — Cover

Good afternoon, Professors. My name is Xiaofan Guo, and today I am pleased to present my PhD application on Indoor Localization for Patient Behavior Analysis in the Context of Connected Healthcare.

2 Slide 2–3 ($\approx 10-15$ s) — Outline

I will report in three parts, personal, research and summary.

First, I'll introduce my personal background.

3 Slide 4 ($\approx 30-35$ s) — Academic Background

Three years ago, I obtained my Bachelor's degree in Computer Science with Honors at Université Clermont Auvergne.

In order to continue developing my expertise in wireless communications, I chose to pursue my engineering diploma at ISEP in Paris, where I am now specializing in Wireless Communication and IoT Systems.

Over the past seven years, my training has covered IoT network, ML, AI, programming, etc. These experiences have built a solid foundation that is directly relevant to the PhD topic.

4 Slide 5 ($\approx 40-45s$) — Research Experience

During my Bachelor's studies, I published my first paper as first author on introducing TDMA into Wi-Fi networks. The results demonstrated reduced delay and improved reliability, with only a minimal effect on throughput.

At ISEP, with Professor Wafa, I worked on a comparative study between Graph Neural Networks and Deep Neural Networks for Wi-Fi RSSI fingerprint localization. Our results showed that GNN achieved lower localization error and faster runtime, demonstrating stronger robustness. This work is now under preparation.

5 Slide 6 ($\approx 60-70s$) — Graduation Internship

I am completing my graduation internship at Orange Innovation on energy optimization in open-source 5G Core Networks, comparing free5GC and OAI, the overall structure is in the Figure.

Although theory suggested that free5GC should consume more energy, our measurements showed that OAI consumed significantly more due to frequent heartbeat signaling.

After extending the heartbeat cycle, OAI's energy use dropped without affecting stability, and these findings were integrated into Orange's AI assistant for future deployment.

6 Slide 7 ($\approx 5-10s$) — Transition

Now I will introduce the context and plan for this doctoral research program.

7 Slide 8 (≈40–50s) — Research Context

In hospitals, indoor localization systems need to meet four main requirements.

They must provide accurate positioning for staff, patients, and equipment, enable behavior analysis of activities, improve operational efficiency, and ensure patient safety and quality of care.

However, current methods are still limited.

Accuracy remains low, behavior analysis is often narrow, and localization and analysis are rarely integrated.

That is why my research focuses on developing a system that can address these needs.

8 Slide 9 (≈40–50s) — Research Objectives

My research objective is therefore to enable real-time localization, monitoring, and behavior analysis in hospitals.

To achieve this, the proposed solution is a multimodal indoor localization system with integrated behavior analysis.

And the main constraint is to ensure reliable behavior analysis while balancing accuracy, latency, and energy efficiency.

9 Slide 10 (≈50–60s) — Challenges

To reach these objectives, several challenges must be addressed.

From a technical perspective, we need to handle the coexistence of different wireless technologies, adapt to dynamic and complex hospital environments, and support multi-floor and three-dimensional localization.

At the same time, we must balance accuracy, latency, and energy efficiency, and ensure reliable behavior recognition across heterogeneous sensor data.

From an operational perspective, we must ensure efficient calibration and database updates, scalability and robustness in large hospital deployments, and seamless integration with existing IT systems.

Finally, from a security and safety perspective, it is essential to protect patient privacy, guarantee system reliability in emergencies, and ensure the ethical management of behavior-related data.

10 Slide 11 (≈ 2.5 min) — Roadmap

To achieve these objectives, I propose the following research steps.

First, we define the scenarios, metrics, and sensors. For example, in Wenzhou Hospital, we need to specify the required accuracy and latency for localization, identify which patient behaviors should be analyzed, and select the appropriate sensors.

Second, we collect multimodal data in real hospital environments. At this stage, data fusion and integration with IT systems are essential to ensure consistency and reliability.

Third, we focus on data transfer and modeling. Using advanced AI and machine learning methods, heterogeneous signals will be preprocessed and transformed into unified representations, and predictive models will be developed.

Fourth, we perform data analysis. The goal is not only to achieve high localization accuracy but also to uncover activity and mobility patterns that support behavior analysis. The results will then be evaluated to provide useful insights for healthcare applications.

Finally, the system will undergo validation and deployment, including testing on hospital datasets, targeted performance optimization, and preparation for large-scale real-time use.

Overall, the goal is to build an intelligent healthcare indoor localization system with integrated behavior analysis.

11 Slide 12 (~10s) — Transition

Finally, I'd like to do a summery.

12 Slide 13 (~25–30s) — PhD Timeline

For the PhD, the project is planned over three years.

In the first year, I will build the foundation through preliminary research, technology and sensor selection, and initial data collection.

In the second year, I will focus on developing the proposed approaches and presenting the first results.

In the third year, I will complete system integration and validation, and finalize the PhD thesis.

Across these three years, I plan to publish at least three papers based on the outcomes.

13 Slide 14 (~25–30s) — Strengths

I believe I will bring several strengths to this PhD project.

I have strong expertise in wireless and IoT, with hands-on experience in Wi-Fi, 5G core networks, and indoor localization.

I developed solid skills in AI and data, working with deep learning; Matlab for signal processing; and Python for modeling.

I worked with IoT devices and healthcare sensors such as temperature and fall detection.

I also have research publications and experience in teamwork-driven innovation.

14 Slide 15 (~25–30s) — Fit

Taken together, my background fits this PhD project very well.

My past experience covers energy-efficiency research, indoor localization, healthcare monitoring, and the foundations of behavior analysis, which are exactly the technical expertise required for this topic.

In addition, I bring complementary strengths such as multilingual skills and research publication experience in both China and France, which enable me to adapt effectively to international research teams.

Most importantly, I have a strong motivation and a genuine passion for wireless communication and IoT, and I want to keep pushing my research further in this area.

15 Slide 16 (~10s) — Closing

This concludes my presentation. Thank you very much for your attention, and I would be happy to answer your questions.