**Introduction**

Ocean covers 70% areas of the earth and waits for being explored for a long time. With the advances of techniques, underwater wireless sensor networks (UWSNs) become a powerful tool to explore oceans. UWSNs deploy a large amount of static and mobile sensor nodes underwater to sample, detect, collect and transfer information. A wide range of applications for UWSNs can be described as follows:

* **Environmental monitoring**
* **Oceanographic data collection**
* **Offshore exploration**
* **Disaster prevention**
* **Assisted navigation**
* **Distributed tactical surveillance**
* **Mine detection**

Communications and localization are two fundamental techniques to support UWSNs. Underwater communications facilitate the information exchange among sensor nodes. Meanwhile localization tags position information for sensor nodes to signify their collected information. Since acoustic signals are the only carriers to enable underwater long-distance communications, our research focuses on communications and localization based on acoustic signals for UWSNs. Our main research topics are listed but not limited to

* OFDM based underwater acoustic communications
* Underwater acoustic localization and synchronization
* Implementation of underwater acoustic modem

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随着人类对海洋战略地位、海洋资源开发、海洋科学研究价值认识的深化，世界各国都将对海洋的关注度提高到前所未有的战略高度。尽管我们可以通过卫星、舰船和潜艇等手段来实现海洋资源勘测、海洋环境监测和海域安全保障等重要任务，但是这些手段都无法长时间、近距离、无缝隙和实时地完成这些任务。近来随着科技的发展，水下传感器网络为完成这些重要任务提供了可能的解决方案。水下无线传感器网络主要以声波为无线传输的物理载体，通过散布在广阔水域的各类静态动态传感器节点收集信息，集数据获取、传输、处理和融合等功能为一体，是分布式智能化的网络系统。通信和定位是支撑水下传感网的两大核心关键技术。水声通信为节点间的信息交互提供链接渠道。水声定位为节点提供位置标定。另一方面，水下无人潜航器作为水下传感网的动态节点，可以搭载多种设备执行水下任务，其机动灵活性大大扩展了水下传感网的应用领域。由此，我们的研究方向主要聚焦于水声通信、水声定位跟踪和无人潜航器三大方向。