Abstract:
The security of wireless systems is becoming increasingly important as wireless devices are more and more pervasive and adopted in critical applications. In this seminar, I will introduce two of my recent research efforts towards providing security guarantees for wireless systems. The first effort is related to the security of cognitive radio networks. In this research, I proposed a novel proximity based authentication technique that allows a secondary user to distinguish between a legitimate primary user and an attacker. Essential to my approach is a helper node placed physically close to a primary user. The helper node serves as a “bridge” to enable a secondary user to verify cryptographic signatures carried by the helper node’s signals and then obtain the helper node’s authentic link signatures to verify the primary user’s signals. A key contribution of my research is a novel physical layer authentication technique that explores the geographical proximity to enable the helper node to authenticate signals from its associated primary user.

My second research effort is about vulnerability analysis of the state-of-art wireless link signature authentication technique. I discovered new attacks against existing wireless link signature schemes. It is assumed that an attacker cannot “spoof” an arbitrary link signature and that the attacker will not have the same link signature at the receiver unless it is at exactly the same location as the legitimate transmitter. However, I demonstrated that an attacker can forge an arbitrary link signature as long as it roughly knows or can estimate the legitimate signal at the receiver's location, and the attacker does not have to be at exactly the same location as the legitimate transmitter in order to forge its link signature.

Bio:
Yao Liu is a doctoral candidate in the Cyber Defense Laboratory in the Computer Science Department at North Carolina State University. Her research efforts lie primarily in the area of computer and network security, with an emphasis on designing and implementing innovative defense approaches that can effectively prevent wireless systems from being undermined by malicious attackers. Her research efforts also include the security of electric power grids and the smart grid.