KEYNOTE TALK Monday, Nov. 30th, 2009 1.30 PM – 2.30 PM/ / Ballroom 4-5

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Robust Visual Perception for Robotic, Mixed Reality and other Applications

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Abstract

In this talk, I will discuss technologies and systems being developed at Sarnoff that can be used for interaction and collaboration between robots and humans. As robots become more ubiquitous, it is critical that groups of robots can interact amongst themselves and with humans with a higher level of autonomy than is feasible today. The robots also need to provide a higher level of situation awareness to humans controlling them. First, I will present techniques for visual odometry and landmark matching developed for navigation of robot moving seamlessly from outdoors to indoors in GPS denied, unstructured, non-instrumented environments. At Sarnoff we have used these capabilities to demonstrate robot behaviors such as robot follower and autonomous retro-traverse. I will present highlights of a real-time pedestrian and obstacle detection system from moving vehicles in cluttered environments. The movements of the detected pedestrians are classified into threatening or non-threatening behavior. Intuitive user interfaces will enable an operator to function effectively. We have developed technologies for 360 deg. visualization of fused multi-sensor data for day and night operations. The 360 degree video sensors can also be used to do long range mapping while on the move. Finally, the techniques presented above have broad range of applications beyond robots. They can be used for augmented reality applications, drivers aids in vehicles, surveillance etc. The talk will touch on these applications.



Speaker Bio-Sketch: Dr. Rakesh "Teddy" Kumar is currently the Senior Technical Director of the Vision and Robotics Laboratory at Sarnoff Corporation, Princeton, New Jersey, USA. He received his Ph.D. in Computer Science from the University of Massachusetts at Amherst in 1992. His technical interests are in the areas of computer vision, robotics, computer graphics, image processing and multimedia. He has been one of the principal founders from Sarnoff for multiple spin-off and spin-in companies: VideoBrush, LifeClips and SSG (Security and Surveillance

Group as part of Pyramid Vision Technologies). He received the Sarnoff Presidents Award in 2009. He was an Associate Editor for the IEEE Transactions on Pattern Analysis and Machine Intelligence from 1999 to 2003. He has served in different capacities on a number of computer vision journals, conferences and NSF review panels. He has co-authored one book on Video Registration, more than 50 research publications and has received over 25 patents, with numerous others pending.