

Smart Radar Motion Sensors for Biomedical and Civil Applications

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Smart sensors with embedded control and communication links have the potential to improve the quality of service in healthcare, infrastructure maintenance, and energy conservation. This presentation provides an overview of our research activities on smart radar sensors based on Doppler, interferometry, and frequency-modulated continuous-wave (FMCW) technologies. Starting from basic motion measurements, the scope of applications extends to sleep study, baby monitor, triage, and civil engineering. Specifically, our recent research efforts on smart house, tumor tracking, and structural health monitoring will be discussed.

In a smart house, radar provides localization, health condition, occupancy and human gesture information, benefiting the human well-being and energy efficiency.

In cancer radiotherapy, because lung tumors can move significantly with respiratory motion, it is difficult for radiotherapy to deliver sufficient radiation dose without damaging the surrounding healthy lung tissue. We investigate radar-based accurate tumor tracking, which provides a method to dynamically target tumors with the radiation beam.

In structural health monitoring, we use sensors with active transponders to advance infrastructure maintenance, as aging infrastructure remains a national concern with widespread impacts on the quality of our daily lives.