

This paper presents a distributed multiple human tracking system based on binary pyroelectric infrared (PIR) sensors. The goal of our research is to make wireless distributed pyroelectric sensors a low-cost, low-data-throughput alternative to the expensive infrared video sensors in surveillance applications. With the help of coded Fresnel lens arrays, a binary pyroelectric sensor array can measure the angular displacements of up to two thermal targets. The distributed multiple target tracking scheme is achieved by using (1) joint probabilistic association and (2) consensus filtering. The former can facilitate each sensor node to fuse the measurements and states of nodes within its neighborhood. The latter can guarantee that a consensus will be achieved among those distributed sensor nodes. A prototype wireless pyroelectric sensor network system has been developed to demonstrate the scalability and performance of the proposed distributed multiple human tracking system