This paper presents an information-gain-based sensor selection approach as well as a sensor sensing probability model-based calibration process for multihuman tracking in distributed binary pyroelectric infrared sensor networks. This research includes three contributions: 1) choose the subset of sensors that can maximize the mutual information between sensors and targets; 2) find the sensor sensing probability model to represent the sensing space for sensor calibration; and 3) provide a factor graph-based message passing scheme for distributed tracking. Our approach can find the solution for sensor selection to optimize the performance of tracking. The sensing probability model is efficiently optimized through the calibration process in order to update the parameters of sensor positions and rotations. An application for mobile calibration and tracking is developed. Simulation and experimental results are provided to validate the proposed framework.