

# A Method Integrating Human Visual Attention and Consciousness of Radar and Vision Fusion for Autonomous Vehicle Navigation

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*Abstract*—This paper attempted to construct an robust method for real-time guidance and navigation for autonomous mobile robot, combinedly using both millimeter wave (MMW) radar and vision sensors. Vision sensor integrated with MMW radar of all-weather application is a prospective arrangement for autonomous ground vehicles (AGV), unmanned aerial vehicles (UAV) or even planetary rovers. Platform of AGV moving under urban road environment was utilized for our research. To decrease the computational loads and be convenient for hardware or algorithm implementation, a three-level fusion strategy was provided based on the visual selective attention

mechanism and priori knowledge on visual consciousness during human driving for the millimeter wave radar and vision sensor fusion, which including point-alignment, region searching and visual tasks. Here according to the knowledge ont the given environments, shadow and edge were used as the key visual clues for target body fixed. The adaptive threshold for shadow or edge detection was derived from statistical histogram. In the end, through experimental data acquired from urban road environment, the method was verified to be effective, which is simple but feasible.

*Keywords*-multi-sensor fusion, visual attention, millimeter wave radar, autonomous ground vehicle, shadow, edge detection, precise navigation