

Improved Acoustic Source Sensing and Localization Based On Robot Locomotion

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Abstract : This paper presents different methodology for an acoustic source sensing and localization in an unknown environment. The developed methodology includes an acoustic based sensing and localization system, a converging target localization based on the recursive direction of arrival (DOA) error minimization, and a regressive obstacle avoidance function. Our method is able to augment the existing proven localization techniques and improve results incrementally by utilizing robot locomotion and is capable of converging to a position estimate with greater accuracy using fewer measurements. The results also evinced the DOA error minimization at each iteration, improvement in time for reaching the destination and the efficiency of this target localization method as gradually converging to the real target position. Initially, the system is tested using Kinect mounted on turntable with DOA markings which serve as a ground truth and then our approach is validated using a FireBird VI (FBVI) mobile robot on which Kinect is used to obtain bearing information.

Keywords : acoustic source localization, acoustic sensing, recursive direction of arrival, robot locomotion

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