COMMUNICATION AND RADAR TECHNOLOGY CONVERGENCE FOR INTELLIGENT TRANSPORTATION SYSTEM

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By

ARGHYA GUCHHAIT

Regi No.-NITD/PhD/ECE/2013/00406

Under the Supervision

of

DR. BANSIBADAN MAJI

Professor, Department of Electronics and Communication Engineering, National Institute of Technology, Durgapur, West Bengal.

&

DR. DEBDATTA KANDAR

Associate Professor, Department of Information Technology, North Eastern Hill University, Shillong, Meghalaya.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

National Institute of Technology Durgapur

West Bengal – 713209

India

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Abstract

This thesis presents a unique approach to integrate communication and RADAR sensing technology used in an intelligent transportation system. Existing vehicular communication technology is facing various challenges as the number of users is increasing day by day. Diversified geographical road distribution and architectural construction also make it very difficult to establish vehicular communication with roadside communication nodes or other moving nodes. Modern smart vehicle users also demand a series of other services with technological development. Basic voice communication, data communication, and emergency information broadcasting are going to be very necessary for vehicular communication applications on move. Vehicle users are also very concerned about their safety features while moving in a car. Few smart cars also take advantage of various remote sensing devices (RADAR, sensors) to analyze the surrounding of the vehicle to avoid collision and other necessary features required during heavy traffic. Hence, Vehicle on move demands an efficient approach for both communication and remote sensing technology. The author motivates himself to develop a novel methodology for the convergence of communication and RADAR technology. The author proposes a hybrid communication technology for intelligent transportation systems. The author also proposes a digital RADAR as a remote sensing device on the vehicle. The author also develops a unique methodology for the convergence of RADAR and communication technology.

Vehicular communication technology undergoes a lot of upgradation day to day. Communication based on Dedicated Short-Range Communication (DSRC) needs to be improved to support fast-growing vehicular users on road. One of my major contributions has successfully improved the performance of various communication onboard using the proposed hybrid communication system. The implementation of an efficient smart algorithm is also a major contribution to support seamless data connectivity through the hybrid vehicular communication system.

The need for seamless data exchange with vehicular sensing technology has been reviewed. Integration of communication and remote sensing system is also a major outcome of this research. The development of the Whale Optimization Algorithm (WOA) is another integral part of this work to handle the integration in a single hardware platform.