

Ultrasonic Sensor System for Ecology Observation and Timing Synchronization of ZigBee Network

Atsushi MORIKAWA, Hiroshi YAMAMOTO, Maki YAMAMOTO, Katsuyuki YAMAZAKI

Nagaoka University of Technology, 1603-1 Kamitomioka, Nagaoka, Niigata 940-2188 Japan

morikawa@stn.nagaokaut.ac.jp

Abstract—Timing synchronization is essential in case where multiple sensor nodes with ultrasonic sensors are deployed on the same place. This is because the ultrasonic sensors should be powered at an appropriate timing so as to prevent ultrasonic interference. In this paper, we propose a harmful bird attack system and a new timing synchronization method for ZigBee sensor network. In this timing synchronizing method, by concentrating the processing load to the server, the amount of calculation on each node can be minimized and is unaffected by the increase in the number of nodes. Evaluation of the proposed method has shown that it sufficiently fulfills the timing requirement for the proposed harmful birds attack system.

Keyword— Sensor Network, ZigBee, Ultrasonic Distance Sensor, Timing Synchronization, Reference Broadcast Synchronization



Atsushi Morikawa received B.E. degree from Nagaoka University of Technology in '12. He is currently a graduate school student in Nagaoka University of Technology. His research interests include computer networks and sensor networks.



Hiroshi Yamamoto received M.E. and D.E. degrees from Kyushu Institute of Technology, Iizuka, Japan in '03 and '06, respectively. From April '06 to March '10, he worked at FUJITSU LABORATORIES LTD., Kawasaki, Japan. Since April '10, he has been an Assistant Professor in the Department of Electrical Engineering, Nagaoka University of Technology. His research interests include computer networks, distributed applications, and networked services. He is a member of the IEEE.



Katsuyuki Yamazaki received B.E. and D.E. degrees from the University of Electro-communications and Kyushu Institute of Technology in '80 and '01, respectively. At KDD Co. Ltd., he had been engaged in R&D and international standardization of ISDN, S.S. No.7, ATM networks, L2 networks, IP networks, mobile and ubiquitous networks, etc., and was responsible for R&D strategy of KDDI R&D Labs. He is currently a Professor of Nagaoka University of Technology.