Moving objects especially autonomous mobile robots require information of indoor self-location with high accuracy to reach its destination safely and correctly.
In this paper, we aimed to measure an indoor position of a moving object using SS (Spread Spectrum) ultrasonic waves, and discussed accuracy of the moving distance with an original hardware device.
In the case of unmoving object, we had shown that distances errors on the order of 1 centimeter between a transmitter and a receiver could have been measured less than 20 meters by noise tolerance of SS ultrasonic waves.
To detect the SS ultrasonic signals, correlation calculations are processed between a range of received waves and same range of replica signals, same as transmitted SS signals.
Popular positioning systems using SS electrical waves require signal acquisition to calculate coordinates of objects from correlation values and signal tracking to measure relative shift on distances of moving objects.
The speed of ultrasonic waves is slower than that of electromagnetic waves, therefore, it is difficult for the system with SS ultrasonic to keep tracking because of decreasing value of self-correlation from Doppler Effect occurred by a moving object.
To solve this problem, we proposed a tracking method for keeping correlation value by shortening range of correlation calculations.
From an experiment result in software simulation with this method, signal tracking could be realized under a speed of 1.167 [m/s].
In this paper, for realizing real-time update of positional information with the relative shift, an experiment of distance measurement was also conducted using an original hardware device including code acquisition and the proposed tracking method.
The result shows real-time signal tracking with our method could be realized, same as existing software between +/- 0.5 [m/s].
This paper presents that we can expect self-localization of robots using this system.