Real Time Shift Tracking Using RSSI Technology

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Abstract- *This work presents an overboard localization system based on measuring the received signal strength indicator (RSSI) between smart lifejacket tags and one interrogator station mounted inside an unmanned aerial vehicle (UAV). Localization is based on weighted least mean squares (LMS) algorithm. Simulations that study the effect of the UAV search path on the localization accuracy are presented and it shows that the parallel tracks search path gives better localization results compared to other search paths. Measurements are carried out in a search area of 500 m x 350 m, where tags are localized with a mean error of 37.5 m. The measurement results show better localization accuracy compared to other RSSI based localization algorithms.*

Keywords— *RSSI, least mean square algorithm, wireless sensor networks.*

I. INTRODUCTION

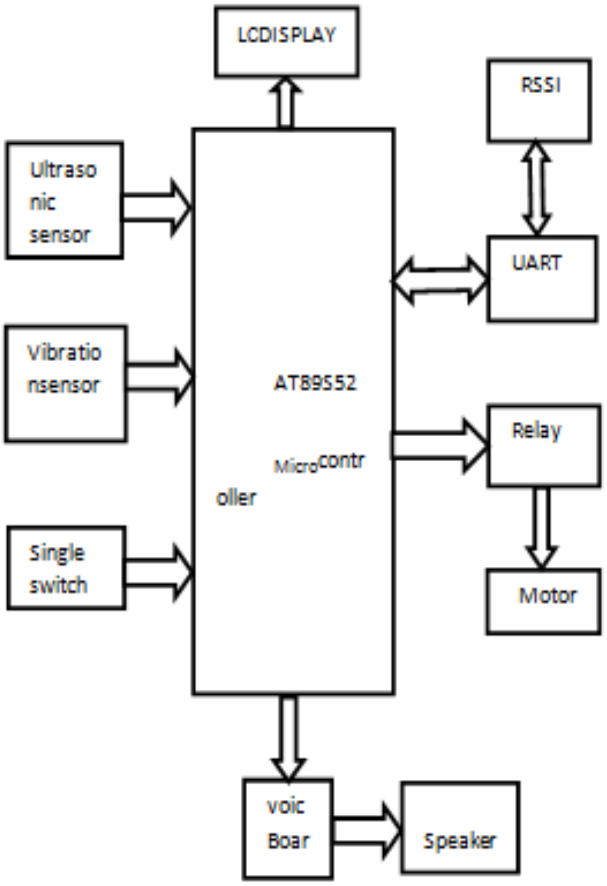
The development of a safe evacuation system of large passenger ships is a vital need for the maritime industry. Due to recent maritime disasters, a localization system that can be easily installed on both cruise ships and search and rescue(SAR) vessels is needed in order to locate simultaneously a larger number of passengers during emergencies. In the Lynceus2Market project an innovative overboard localization system is developed. This system aims at improving the response time for people localization by SAR operations when several passengers go overboard a cruise ship. Some overboard localization solutions already exist in the market but they either depend on GPS for passenger localization or on a Wi-Fi network around the cruise ship where location data are sent in regular bursts. The use of GPS is an expensive solution and the use of a Wi-Fi network requires the placement of several nodes around the cruise ship. The overboard localization system implemented here provides smart tags that can be easily integrated into life jackets and localized using a UAV equipped with an interrogator station.868 MHz Zigbee modules are used for measuring the RSSI between the smart tags and the UAV interrogator. Through implementing the weighted least mean squares algorithm presented in smart tags localization is performed and data is sent for SAR operations. The UAV can be launched from shore, a cruise ship or a SAR vessel.

II.LITERATURE REVIEW

This work presents a low power outdoor localization system that implements a power management technique in order to control the wakeup and sleep of the different modules in the system. Through this technique, the system achieves 6.7 μA in sleep mode. A new weighted least mean squares solution algorithm that is based on received signal strength indicator (RSSI) measurements is introduced. Both simulation and measurement results are presented. It is shown that over 50% improvement in position estimation is achieved using the proposed weighted least mean squares algorithm

Localization in wireless sensor networks gets more and more important, because many applications need to locate the source of incoming measurements as precise as possible. Weighted centroid localization (WCL) provides a fast and easy algorithm to locate devices in wireless sensor networks. The algorithm is derived from a centroid determination which calculates the position of devices by averaging the coordinates of known reference points. To improve the calculated position in real implementations, WCL uses weights to attract the estimated position to close reference points provided that coarse distances are available. Due to the fact that Zigbee provides the link quality indication (LQI) as a quality indicator of a received packet, it can also be used to estimate a distance from a node to reference points

III. HARDWARE CONFIGURATION



ULTRASONIC SENSOR :

Ultrasonic sensors emit short, high-frequency sound pulses at regular intervals. These propagate in the air at the velocity of sound. If they strike an object, then they are reflected back as echo signals to the sensor, which itself computes the distance to the target based on the time-span between emitting the signal and receiving the echo. Microsonic ultrasonic sensors are suitable for target distances from 20 mm to 10 m and as they measure the time of flight they can ascertain a measurement with pinpoint accuracy. Some of our sensors can even resolve the signal to an accuracy of 0.025 mm.

VIBRATIONSENSOR :

The two basic piezoelectric materials used in vibration sensors today are synthetic piezoelectric ceramics and quartz. While both are adequate for successful vibration sensor design, differences in their properties allow for design flexibility. For example, modern "tailored" piezoceramic materials have better charge sensitivity than natural piezoelectric quartz materials.

MICRO CONTROLLER :

Circumstances that we find ourselves in today in the field of microcontrollers had their beginnings in the development of technology of integrated circuits. This development has made it possible to store hundreds of thousands of transistors into one chip. That was a prerequisite for production of microprocessors, and the first computers were made by adding external peripherals such as memory, input-output lines, timers and other. Further increasing of the volume of the package resulted in creation of integrated circuits. These integrated circuits contained both processor and peripherals. That is how the first chip containing a microcomputer, or what would later be known as a microcontroller came about.

IV. PROPOSED SYSTEM

In this proposed system, to detect the locations and borders with the help of RSSI. Here weconfigured the border B1 area details are stored in the controlling unit. If a vessel crossed B1, the controlling unit will provide an alert by voice alert via the radio frequency transmitter and vessels will located by soldiers. The usage of vibration sensor is to determine whether the soldier crossed the border limit or not, if he crosses the alarm rang up and IR sensor is used to find he is alive or not when he crossed the border and monitor the heartbeat of the soldier, it is used to detect the soldier's status and to rescue him.

V. CONCLUSION AND FUTURE WORK

In this work, an end-to-end overboard localization system was presented. System simulations that study the flight paths and the effect of noise on the localization accuracy showed that the parallel tracks search path when adopted gives lower localization errors. Measurements were done and compared to other RSSI localization methods, and it was shown that the weighted LMS algorithm used here gives a better FOM of 20.95dB.

The future work is described as follows:

- Future work will include large-scale measurements.
- System evaluation with 200 smart life jacket tags.

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