Ancile: Soldier-in-the-Field Geographically Targeted Early Warning and Personnel Tracking System

Technology Problem

There is a need to be able to warn soldiers that are geographically located anywhere within a battle zone of potential dangers from incoming mortar shells, missiles, and other munitions that would be lethal to a small subset of soldiers. Many of these types of ordinances can take 1 to 2 minutes to reach their target. Base wide warning systems and sirens have proven to be ineffective since multiple attacks within a large base that only affect a few soldiers, result in many soldiers eventually ignoring the warning. The issue is to be able to first identify a legitimate threat from incoming munitions, calculate the predicted region of impact from trajectory data, and send out an early warning signal only to those soldiers in the region determined to be at risk. All this would need to be accomplished preferably using COTS (Commercially Off The Shelf) components that would operate in real time or near real time.

Technology Solution

For an early warning system to be effective, each soldier would need to have a personal pager/tracking system in contact with a central command unit. The central command unit would need to be in contact with the appropriate sensors and radar that would identify possible incoming munitions threats. The central command unit would need to identify the threats and the specific coordinates that are at risk, and then communicate an early warning signal only to the soldiers' pager units that are located in the area of risk.

The Information Technology and Operations Center of the Department of Electrical Engineering and Computer Science at the United States Military Academy, West Point has developed the necessary software and algorithms along with the required COTS hardware and modified COTS hardware such as pagers, servers, communications links, etc. to provide such an early warning system. A diagram of the overall system and the required communication links is provided below in figure 1. The developed software is adaptable, flexible and programmable in the field such that individual soldiers can program their pagers to type of warning (beep, vibrate, etc.), links can be established via a local area network or wireless communications, and pagers requisitioned in the field can be easily programmed to a specific soldiers ID. All of this is done using secure software techniques with multiple password protection options to ensure that pagers that are captured and are in enemy hands cannot be used to the advantage of the enemy. A prototype system that uses relatively inexpensive, readily available components and operates in near real time has been preliminarily tested and shown positive results.

Potential Technology Transfer Opportunities

Any situation that requires warning announcements/signals for individuals or systems in regard to natural or human related potentially harmful events that are geographically

specific can be readily addressed utilizing West Point's developed Soldier-in-the-Field Early Warning and Personnel Tracking System.

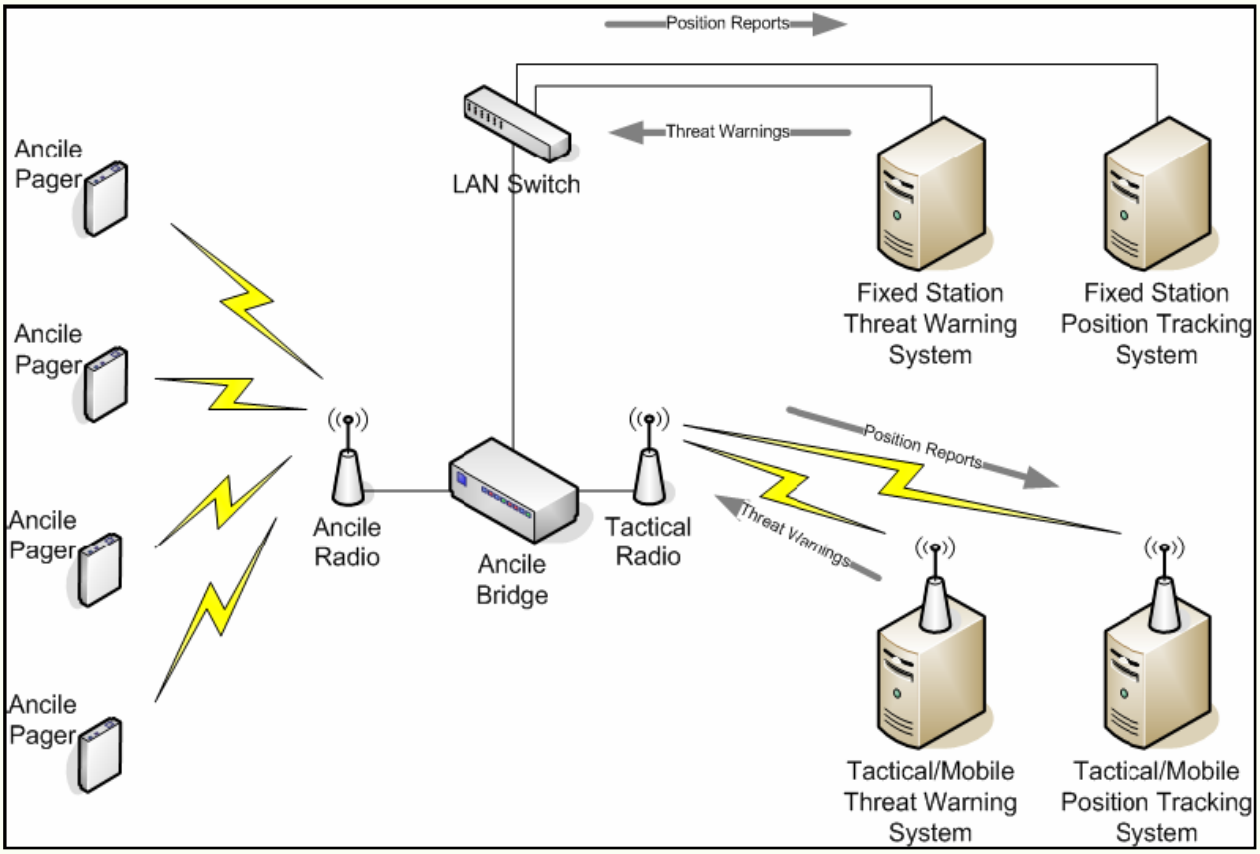

Figure 1. A schematic of the communication links between the soldiers' early warning/tracking ancile pager unit, the communication link or bridge, and the central command center computers which can be either mobile or fixed station.

Potential Commercial Uses

An early warning system that has been successfully developed and used by soldiers in the field has the potential of being used for applications in the commercial sector. A few of these possible uses are:

- Early warning systems for marine craft and pleasure boats to warn of quickly approaching storm and hurricane threats.
- Early warning systems for large and small aircraft, including EMS helicopters, to provide storm and airport alerts.
- Early tornado warning systems with pagers distributed to schools, public and private buildings, and individuals located in high tornado risk areas.
- Early warning tsunami wave alert systems.

- On going research being done has shown that earthquake warnings up to a minute may be possible, thus it is conceivable that this system could eventually be used as an early earthquake warning system.
- Railroads are currently looking to develop technology to improve upon the currently used block method for tracking trains and for ensuring against trains occupying the same track – thus avoiding catastrophic collisions. The block method is very inefficient in use of track. Railroads are now developing Positive Train Control systems for more precise location of trains. The West Point early warning system could be easily adapted for this application for not only precisely locating trains but also for warning the engineer of problems ahead on the track (derailed train, car on track, etc.). Commuter trains could also utilize this system.
- Traffic alert system for warning of accidents/road construction for drivers located only near the accident/construction site. Initial market to target, which would be a subset of all drivers, could be fleet drivers (i.e., delivery drivers such as UPS, Fedex, Postal Service; taxi cab drivers; trailer truck drivers, etc.). Later all drivers could be targeted through a subscription service.

Patent Status

Issued Patent**:** **US 7,283,045 BI**

Title: SYSTEM AND METHOD FOR SEMI-DISTRIBUTED EVENT WARNING NOTIFICATION FOR INDIVIDUAL ENTITIES, AND COMPUTER PROGRAM PRODUCT THEREFOR

Inventor: **Paul C. Manz, Matawan, NJ (US)**

Date of Patent: **Oct. 16, 2007**

Assignee: **The United States of America as represented by the Secretary of the Army, Washington, DC (US)**

Patents Pending: **Three patents have been submitted and are pending**

Patents to be submitted: **One patent application currently being drafted which is an updated version of current patent and prototype and is able to manage a much broader set of information than just warnings and position reports.**

Additional Information on Ancile

Additional information concerning Ancile (*Click Mouse on Item to Open*):

- Paper entitled: "**ANCILE: DISMOUNTED SOLDIER TRACKING AND STRIKE WARNING"**
- Presentation: "ANCILE: Dismounted Strike Warning and Position Tracking"
- Patent: US 7,283,045 Bl, "SYSTEM AND METHOD FOR SEMI-DISTRIBUTED EVENT WARNING NOTIFICATION FOR INDIVIDUAL ENTITIES, AND COMPUTER PROGRAM PRODUCT THEREFOR"
- Animated Demonstration of Ancile of Soldiers in the Field

Point of Contact

For questions, comments or more information concerning the licensing and use of this technology please contact:

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