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United States Patent [19]

Harris

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[54] **METHOD AND SYSTEM FOR RELATIVE GEOMETRY TRACKING UTILIZING MULTIPLE DISTRIBUTED EMITTER/DETECTOR LOCAL NODES AND MUTUAL LOCAL NODE TRACKING**

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[21] Appl. No.: **758,782**

[22] Filed: **Sep. 12, 1991**

[51] **Int. Cl.**[5] **G01S 13/06**

[52] **U.S. Cl.** **364/516**; 364/460

[58] **Field of Search** 364/460, 559, 516; 342/352, 457, 191, 356

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Assistant Examiner—Thomas Pesso
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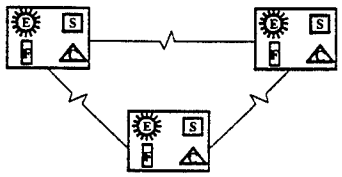
[57] **ABSTRACT**

A method and system for tracking various objects utilizing a plurality of sensors. Separate locations or platforms are provided with a number of sensors collocated with an energy generation/ reflection device, and also a communication device. Each of the platforms is termed local nodes of a multi-sensor fusion system, and possibly can experience relative translational and/or rotational motion in as many as three dimensions with respect to itself and with respect to similar local nodes. Each local node is capable of measuring some combination of bearing angles and/or range and/or respective derivatives from the local node to cooperative local nodes by generating or reflecting energy such that cooperative local nodes may obtain mutual sensor measurements. Information obtained or processed by each local node, including track data or track estimates, are possibly transmitted to one or more central nodes denoted as fusion centers provided with processing capabilities. In addition, when an object or multiple objects which are not local nodes are being tracked, at least one cooperative local node can measure bearing angles and/or range and/or respective derivatives from the local node to the other object. After undergoing a series of processes, sensor data from multiple local nodes are combined at the fusion centers to provide estimates of both the relative geometry and relative orientation of each cooperative local node with respect to other cooperative local nodes and the relative geometry of other sensed objects with respect to each cooperative local node. Estimated relative geometries are either range normalized or scaled with actual ranges depending upon sensor capabilities.

27 Claims, 11 Drawing Sheets



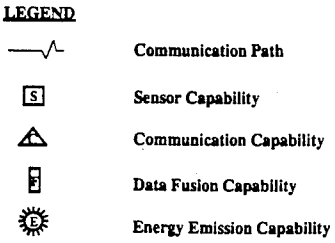


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FIG . 1 (Prior Art)

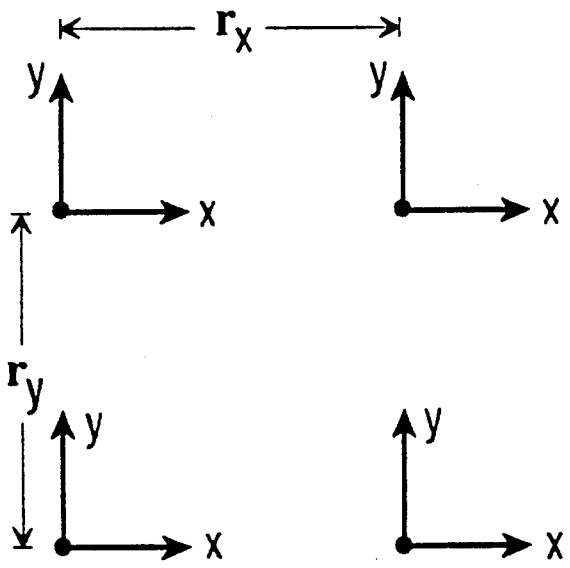

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FIG. 2 (Prior Art)

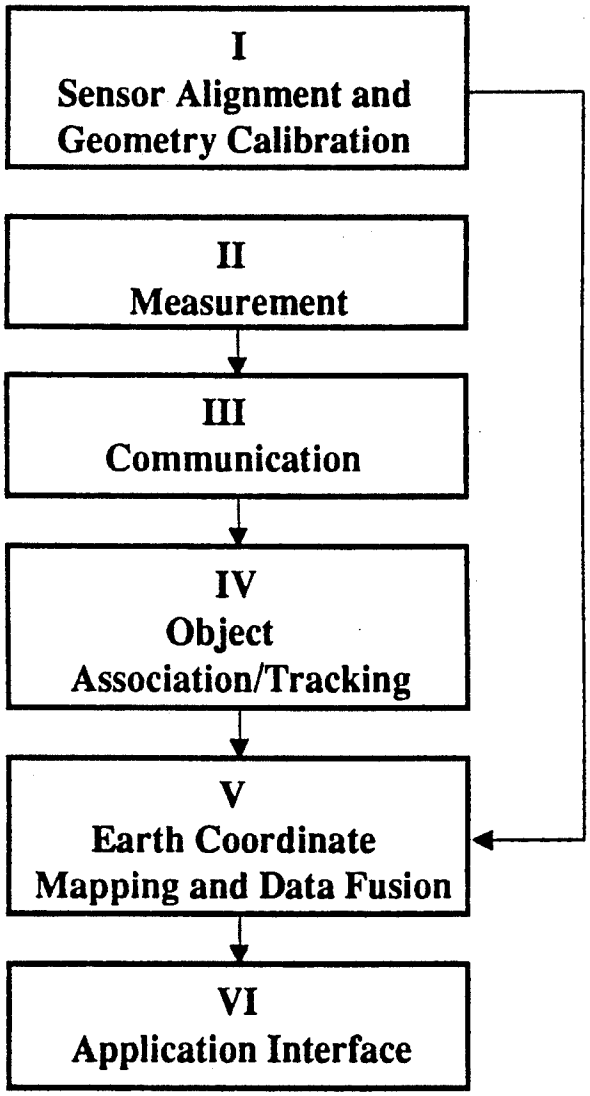

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FIG . 3

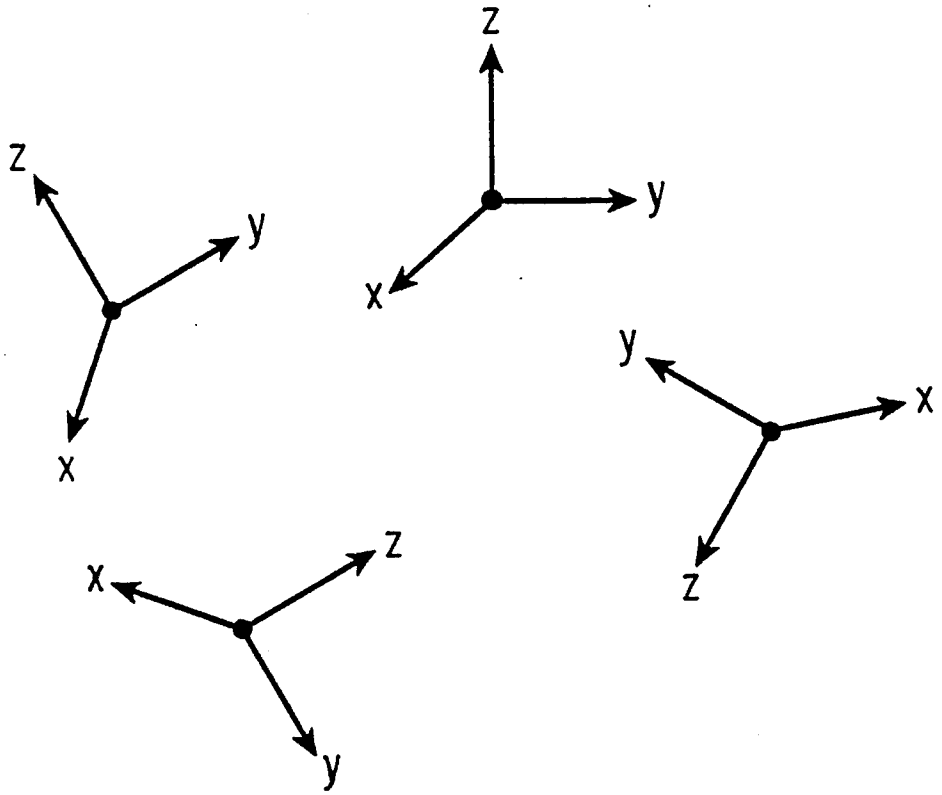

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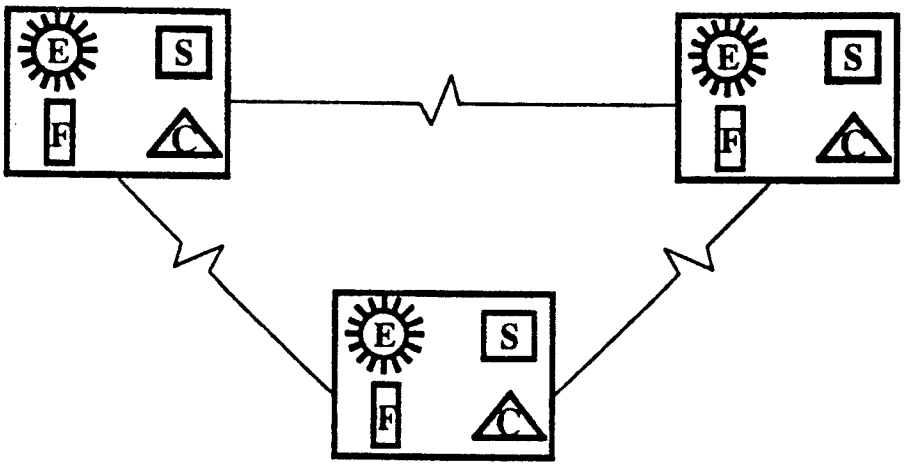
FIG . 4



LEGEND

	Communication Path
S	Sensor Capability
C	Communication Capability
F	Data Fusion Capability
E	Energy Emission Capability

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