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G06K 9/00 (2006.01)

(54) Title: METHODS AND APPARATUS FOR AUTONOMOUS ROBOTIC CONTROL

(57) Abstract: Sensory processing of visual, auditory, and other sensor information (e.g., visual imagery, LIDAR, RADAR) is conventionally based on "stovepiped," or isolated processing, with little interactions between modules. Biological systems, on the other hand, fuse multi-sensory information to identify nearby objects of interest more quickly, more efficiently, and with higher signal-to-noise ratios. Similarly, examples of the OpenSense technology disclosed herein use neurally inspired processing to identify and locate objects in a robot's environment. This enables the robot to navigate its environment more quickly and with lower computational and power requirements.

FIG. 1

Camera full motion video
Microphones audio signals
Wireless sensors radio signals

system output (object detection, anomaly)
what multimodal semantic fusion
where multimodal spatial attention

100% 90% 80% 70% 60% 50% 40% 30% 20% 10% 0%
A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G06K 9/00 (2015.01)
CPC - B25J 9/1697

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
CPC: B25J 9/1697
IPC(8): G06K 9/00 (2015.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 382/153 or 382/293; IPC(8): G06K 9/00 (2015.01)
CPC: B25J 9/1697 or G06K 9/00201 or G05D 1/0242 or G05D 1/0246 or G05D 1/0272

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Patbase; Google Patents; Google Scholar; Google Web

Search Terms Used: Robot, foveated, object, track, recognition, metadata, item, location, position, ID, identify, name, label, layer, view, contour, shroud

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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</thead>
<tbody>
<tr>
<td>X</td>
<td>US 8,510,244 B2 (CARSON et al.) 13 August 2013 (13.08.2013), col 1, in 55- col 2, in 5, col 10, in 4-18, col 11, in 49-56, col 12, in 11-15, col 20, in 6-10</td>
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