Biologically Inspired Multi-Agent Systems for Information Technology

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<table>
<thead>
<tr>
<th>ANALOGY</th>
<th>ANT COLONIES</th>
<th>INFORMATION TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Members</td>
<td>Ants</td>
<td>Information Agents</td>
</tr>
<tr>
<td>Gather</td>
<td>Food/Building Material</td>
<td>Information/Data</td>
</tr>
<tr>
<td>From</td>
<td>Environment</td>
<td>Communication &amp; Data Networks</td>
</tr>
<tr>
<td>Build</td>
<td>Ant Hills</td>
<td>Individual User Knowledge base</td>
</tr>
<tr>
<td>Communication</td>
<td>Chemical Trails</td>
<td>Information Beacons</td>
</tr>
<tr>
<td>Goal</td>
<td>Serve the Colony/Queen</td>
<td>Serve the Colony/User</td>
</tr>
<tr>
<td>Interaction</td>
<td>Cooperation &amp; Competition</td>
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</tr>
<tr>
<td>Intelligence</td>
<td>Individual Members Simple Colony Complex Superposition Principle</td>
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</tbody>
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Applications:
• Intelligent information technology (storage, sharing, and retrieval)

Research Issues:
• Multi-agent interaction & communication
• (local vs. Global) & (implicit vs. Explicit)) (competition & cooperation)
• Recognition, gathering and storage of “useful” knowledge
Tele-Communication for Tele-Presence

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Tele-presence as an alternative, when real presence is:

- Hazardous
- Costly (Time & Money)
- Not possible due to physical properties

More “real” than virtual reality.

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Applications:
- Education & training
- Entertainment
- Search & rescue
- Surveillance

Research Issues:
- User interfaces
- Multimedia
- Intelligent control & robotics
- Telecommunication & networking
Augmented Reality & Enhanced Multimedia

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Augmenting and enhancing the human interface with the computer and the world.

Building intelligence into multimedia devices.

Current limitation of multimedia (images & sounds).

Adding the medium of touch (force, haptic) to multimedia.
Applications:

• Enhanced multimedia incorporating the feeling of touch
• Augmented reality with visual cues
• Understanding of user’s implicit commands
• User interfaces for the visually impaired

Research Issues:

• Force feedback
• Image processing
• Networking of Multimedia data
• Telecommunication of touch information

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Distributed Shared Virtual Reality

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Applications:
- Tele-conferencing
- Entertainment

Research Issues:
- Telecommunication of user sites
- Real-time networking of all users
- Multimedia interfacing tools
- Interactions among users & interactions between users and the world
- Real life “quality” of virtual worlds
- “Feeling” of presence

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