Part I

Ambient, Collective, Cognitive and Social Intelligence

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Ambient, collective, cognitive and social intelligence technology gives artificial entities the capabilities normally only represented in human beings. The abilities to quickly gather, discern and manage knowledge about the human ambient environment. The ability to work together as a team, organization, society or collective is another high level human-like capability. Cognition is an application of higher order mental use. Social intelligence imparts the trait of working together and in many ways, enables collective capability. The theory, development and realization of technology to create a more human-like robot depends on the at least rudimentary mastery of ambient, cognitive, collective and social intelligence. This section demonstrates new efforts to achieve this technological development with a total of 27 papers.

**Ambient and Collective Intelligence** represents a group of 13 papers covering various research areas. Several papers focus on localization of robots using sensors, complex cameras or magnetic field interpretation. Another area complementary to localization is mapping and there are entries that use laser range finders to map using glass walls. A new area of research is using directional antennas as sensors for robotic following and communication is also represented. Larger scale systems, such as swarm systems and those using an inverted robotic space for agriculture are also within this section.

1) Feature-based 6-DoF Camera Localization using Prior Point Cloud and Images.
2) Programming an E-Puck Robot to Create Maps of Virtual and Physical Environments.
3) A method to localize transparent glass obstacle using laser range finder in mobile robot indoor navigation.
4) Robotic Follower System using Bearing-only Tracking with Directional Antennas.
5) Oscillator aggregation in redundant robotic systems for emergence of homeostasis.
7) Aeroponic Greenhouse as an Autonomous System using Intelligent Space for Agriculture Robotics.
9) Multi-Directional Weighted Interpolation for Wi-Fi Localisation.
10) Visual Loop-Closure Detection Method Using Average Feature Descriptors.
11) Mobile Robot Localization using Multiple Geomagnetic Field Sensors.
12) GA-based Optimal Waypoint Design for Improved Path Following of Mobile Robot.

In the collection of papers representing Cognitive Intelligence, there are 9 papers in the areas of path planning with high-dimension lattices, artificial creature composite behavior organization, brain wave identification for robotic arm control, word recognition using learning, action verification in manufacturing, intention recognition for human performance, knowledge representation for orthopaedic surgery and dynamic environments and kit building using sensor networks.

1) Combined Trajectory Generation and Path Planning for Mobile Robots Using Lattices with Hybrid Dimensionality.
2) Organization and Selection Methods of Composite Behaviors for Artificial Creatures. Using the Degree of Consideration-based Mechanism of Thought.
3) Brainwave Variability Identification in Robotic Arm Control Strategy.
4) Acquisition of Context-based Active Word Recognition by Q-Learning Using a Recurrent Neural Network.
5) An Ontology Based Approach to Action Verification for Agile Manufacturing.
7) Knowledge and Data Representation for Motion Planning in Dynamic Environments.
9) A Survey on Biomedical Knowledge Representation for Robotic Orthopaedic Surgery.

Social Intelligence has a total of 5 papers approaches social robotic intelligence in the applications of human to robotic interfaces for fire-fighting robots and behavior recognition. Also, a direct connection using direct brain machine interface is contained. Using configurable modular robotics for learning and explorations of using robotics for artistic creation are also demonstrated.

2) Lessons Learned in Designing User-configurable Modular Robotics.
3) Playware Explorations in Robot Art.
4) Navigation Control of a Robot from a Remote Location via the Internet using Brain-Machine Interface.