Global Intelligent Sensor Networking System

N. Krishnan, CITE,

Manonmanium Sundaranar University, Tirunelveli, TN ,India

P. Vijayalaksmi, IT Dept,

R.K. Selvakumar, IT Dept,

Kamaraj college of Engineering and Technology,Virdhunagar, TN, India

***Abstract*-New media, new data type and ubiquitous access to high speed real time network applications are revolutionizing the whole Universe. In many critical applications, human performance is often a high risk element in the overall operational effectiveness of system. Many mishaps in mission critical applications are the results of wrong or delayed decisions due to poor perception of the computing environment by human. So, our effort is to propose a system to connect and coordinate the potential resources, human, computing systems and knowledge bases available on the earth, that are distributed across the globe, to develop a Global Intelligent Sensor Networking Systems (GISNS) using sensors. This system captures all human like senses vision, sound, voice, touch and smell around an application environment, drives the local and remote resources to take intelligent decisions to promote immediate action. GISNS facilitates all the resources that are wired and wireless and onboard and off board to feel and sense alike about the computing environment and assists to react quickly by connecting the domain experts, researchers –in the- machine-loop.**

I. INTRODUCTION

Tools that supported the modeling of human behavior were studied .These models directly represent processes such as goal seeking behavior, task scheduling, sensation an perception, cognition, and motor output [1]. Another research paper had focused on the main human-centered activities in multimedia when someone enter an elevator, approach an ATM, a photo booth, a sensor activates and there's a automatic greetings messages [2]. Another paper had concentrated on the notion of integrating space and time at a fundamental level in the operating environment and showed that enables a more natural working environment for humans [3]. Three factors are identified which forms the core of HCC system and algorithm design processes: Social and cultural aware; Directly augment and /or consider human abilities and Be adaptable [4]]. In another paper, a methodology had developed to enhance user centered and participatory design, and traceability of design decisions and were successfully tested on three main applications in the aeronautics domain.[5*]* However, as the way we usage of computers changes and Computing has become more pervasive and ubiquitous, largely due to advances in bandwidth and mobility, the present GUIs will not easily support the range of interactions necessary to meet users' needs. In order to accommodate a wider range of scenarios, a "Perceptive media" which are an interdisciplinary initiative to combine multimedia display and machine perception to create useful, adaptive, responsive interfaces between people and technology were studied in [6]. Works with goals, plans for achieving those goals, and the resources that are needed to implement the plans. A , work had done on user preferences as a key part of the decision making about "how to achieve a goal" in [7]. More work had done to propose a novel user-centered and application independent architecture for speech interfaces. A new generic and task-oriented dialogue manager built for facilitating user modeling and context awareness was studied in [8].

II. PROPOSED SYSTEM

Approximately two thirds of aircraft / space accidents are related to pilot error. Unfortunately, the traditional design process tends to put a disproportionate focus on the technical performance of equipment with little regard for the human component .The GISNS is intelligent system that is planned to connect the various resources in the planet together with computers, knowledge bases with the help of communication links . This system is complex, self configuring and self-organizing system. The architecture of GISNS is shown in the

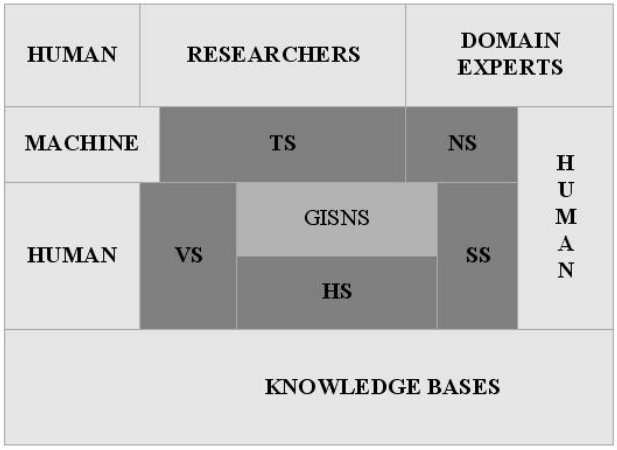

Figure 2.1 Architecture of GISNS

The new system can not only processes information but also can play the role of a human brain: making decisions, solving problems, learning new connections, and discovering new ideas. So, our work is to organize a single system GISNS to coordinate all these resources to make a sensor networking systems. In this system, each member of the resource is able to manage locally themselves and to manage globally. This network will sense all human like senses around the application environment and communicate that information to resources in the loop . The system are logically divided into vision systems(VS), sound system(HS), speech systems(SS), l touch systems(TS) and smell systems (NS) as shown in figure 1.2.

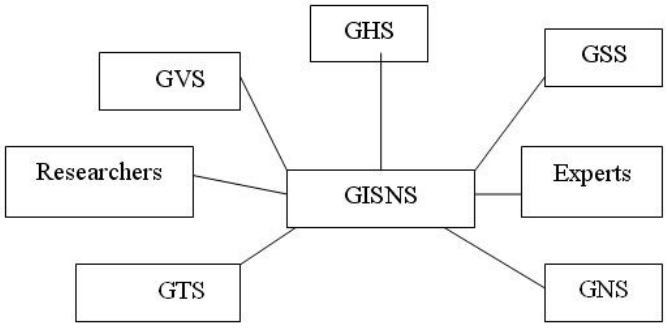

Figure 2.2 Subsystems of GISNS

III. SMART VIRTUAL ENVIRONMENT

Here, human beings act as main intelligent nodes and all others are communication interfaces. It becomes necessary for human centered computing to create a smart environment around the application environment connecting the machines, humans, agents and knowledge bases. In space mission applications, various resources as shown in the figure 3.1, Scientists, Engineers, Astronauts and Domain experts and others are available at different geographical locations. Hence a need for a new system GISNS to aid to create common knowledge and thinking about application environment among the resources. Virtual environment describes a wireless sensor network for safety systems. It is not only capable of integrating with remote and fixed-network grids for computation and modeling purposes, but is also capable of self organizing itself as a 'local grid'. Sensory data comes from multiple sensors at distributed locations from the application in different modalities. The data is processed and analyzed connected to the last mile for evaluation. They drive the databases and augment the knowledge base systems (VS/NS/TS/SS/BS) accordingly. Decisions from all resources are validated by using mining techniques with domain experts _in_ the machine loop.

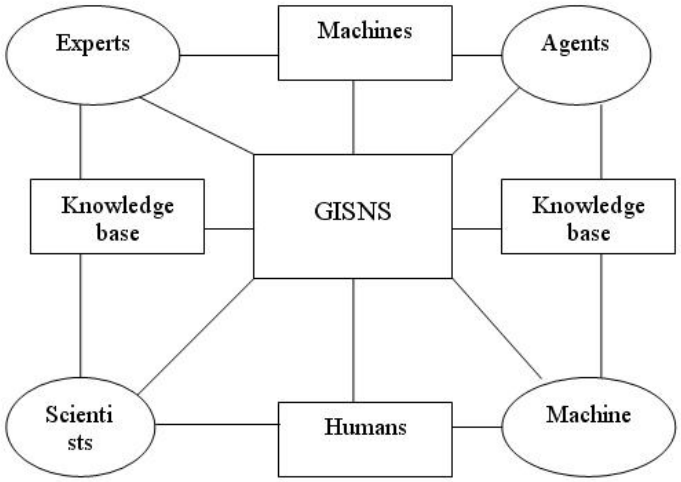

Figure 3.1 Potential resources in the Earth

IV HUMAN, MACHINE AND AGENT CAPABILITIES

Human:

- To do Detection and recognition from small amounts of visual or acoustic energy;
- To improve and uses flexible procedure;
- To store a large amount of information for long periods and to recall at appropriate time;
- To exercise judgment.

Machine:

- To respond quickly to control signals;
- To perform repetitive, routine task;
- To store in brief time and to erases it completely;
- To handle complex operations

Agents:

- To connect the system to the last mile and worldwide;
- To widen the access services and availability;
- To maintain directory services of resources and services

The hardware agent provides an interface for the resources which are remote to GISNS, like domain experts and young researchers. It supports the GISNS for identifying the resources and to extend the connectivity to exploit their expertise knowledge. Autonomous software agents will navigate the

sensors, machines, servers, and knowledge bases across the network to render process communications. They use the public network and wireless ad hoc networks to communicate and collect information at right time for making good decisions. Agent-based control transforms centralized operational algorithms to distributed, letting networked intelligent systems to operate on a management-on-demand or service-on-demand basis.

Intelligent user interfaces add human-like capabilities to the computer: For example, making the computers to listen the application domain and capture multimodal data to drive the resources. The multimodal interfaces are designed based on recognition of human speech, gaze, gesture, and other natural behaviors It represents computational interfaces capable to behave human-like sensory perception .It is shown in figure 4.1

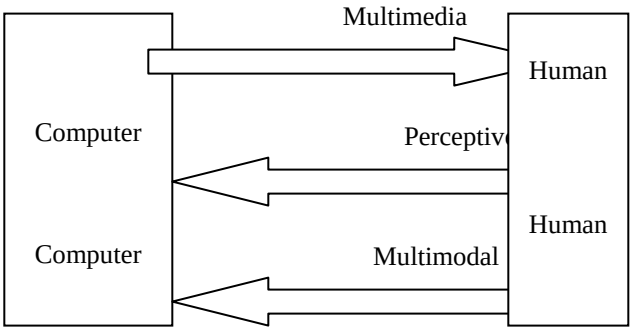

Figure 4.1 Multi modal Interfaces

V. KNOWLEDGEBASE SYSTEMS

All resources have the intelligence and rights to process the information and to manage the system either locally or globally through GISNS. VS (Visual Systems)is shown in the figure5.1 which is a global visual sensor networking system. It connects all visual sensors (human, machine, domain experts through agents) which are integrated in GISNS. A scene showing a flaw (break) in a module is captured and made available immediately to local and remote resources in the form of displays or alert messages to take decision and react quickly to the situation.

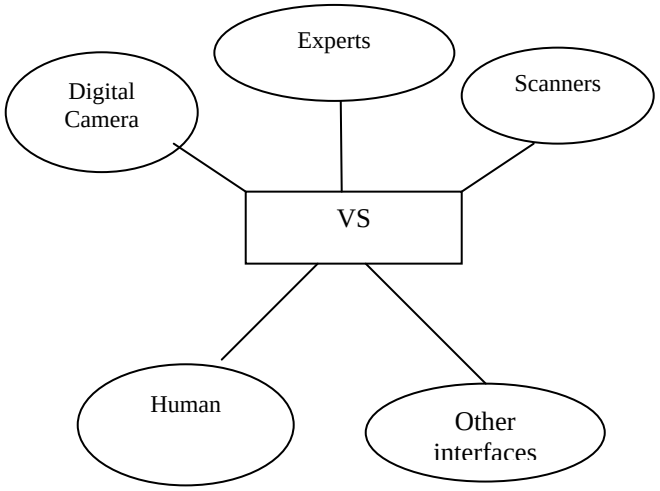

Figure 5.1 Intelligent vision Systems

Vision system include visual sensors like high resolution cameras, human eye, scanner, radar, and other distributed knowledgebase systems. Each sensor has a unique id. Sensor signal carries its ID, time stamp and location information in addition to sensor data.

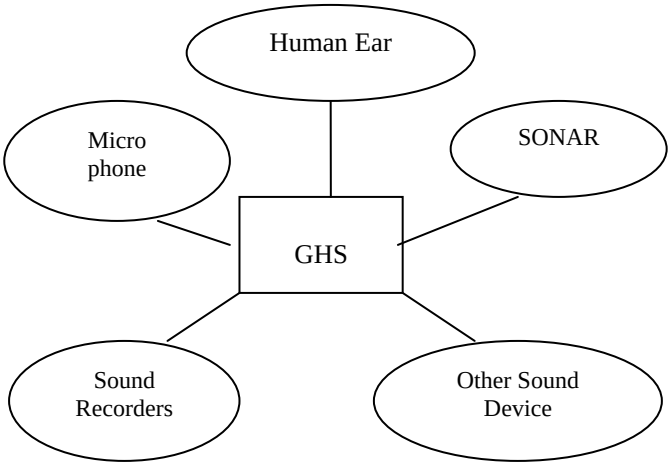

Figure 5.2 Intelligent Hearing Systems

HS (Hearing System) is a global hearing networking systems. It includes sound detectors and audio pick up sensors of various frequency ranges. They are monitored and controlled by GISNS which is shown in the figure 5.2

Similarly, there are Touch System (TS), Speech System (SS), and Smell Systems (NS) which includes respective sensor systems and are integrated with GISNS.

V. CONCLUSION

Cybernetics, neural networks and distributed knowledge systems can support to design concrete technologies and for a collective intelligence for implementing and testing GISNS. A new system proposal like GISNS can act proactively to tackle issues like Columbia space mission and can solve other emerging global space problems.

ACKNOWLEDGEMENT

Authors would like to thank the Almighty for his blessings to have opened up this opportunity to launch my ideas as a project proposal. I thank reviewers and Editorial team in advance for their suggestions which may improve the quality of the proposal.

REFERENCES

[1] Computer Simulation As A Tool For Studying Human-Centered Systems, Proceedings of the 1998 Winter Simulation Conference D.J. Medeiros, E.F. Watson, J.S. Carson and M.S. Manivannan, eds Ron Laughery Micro Analysis and Design Boulder, Colorado 80301, U.S.A.

[2] Principles Of Human-Centered Information Systems ,John J. Leggett, Peter J. Nürnberg, Erich R. Schneider Department of Computer Science, Texas A&M University College Station, Texas 77843-3112 USA.

[3] Human-Centered Computing: A Multimedia Perspective .Alejandro Jaimes FXPAL Japan, Fuji Xerox Co. Ltd. Ajaimes@ee.columbia.edu, Nicu Sebe University of Amsterdam, The Netherlands , ACM2006 .

[4] Cognitive Function Analysis For Human-Centered Automation Of Safety-Critical Systems Guy A. Boy European Institute of Cognitive Sciences and Engineering (EURISCO)

[5] Perceptive Media: Machine Perception and Human Computer Interaction,Matthew Turk Computer Science Department University of California, Santa Barbara, CA 93106 USA.

[6] End User Empowerment In Human Centered Pervasive Computing, Krzysztof Gajos, Harold Fox, and Howard Shrobe MIT AI Lab, Cambridge, MA, USA.

[7] A Human Centered Approach To Speech Interfaces In Mobile And Ubiquitous Computing Environments, Botond Pakucs CTT, Centre for Speech Technology, KTH, Royal Institute of Technology, Drottning Kristinas v ag 31, 100 44 Stockholm, Sweden,