

# Telepresence

Novel view generation using multiple omni-directional cameras on the Grid



The objective of this group is to provide a new telepresence system, where a user in a different place can look around a high quality virtualized real world generated from multiple omni-directional cameras by using the high performance computing facility of the Grid environment. This attractive application can be widely applied to entertainment, remote surveillance, and video conferencing.

## Image Generation from Any Point of View on the Grid

An omni-directional camera consists of an ordinary video camera and a hyperboloid surface mirror. A virtual camera is a software camera which provides an image from any point of view a user wants to see. The image is generated from three omni-directional images from different omni-directional cameras. To provide high-quality images for users in real-time requires a high performance computing facility. This group shows the capability of a new telepresence system which can be realized by connecting omni-directional cameras and a high performance computing facility provided by the Grid system via high-speed networks.

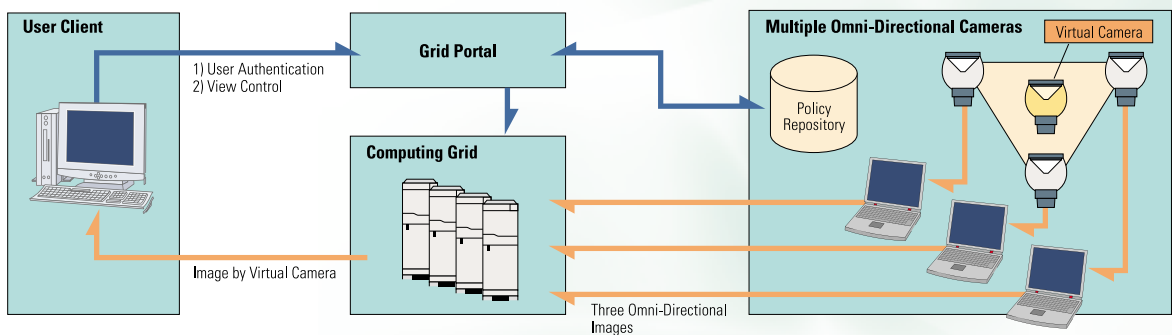


Omni-Directional Cameras



Omni-Directional Image

### Sensor Connectivity for Grid on JGN II



## Service-Oriented Integration for Sensor Applications

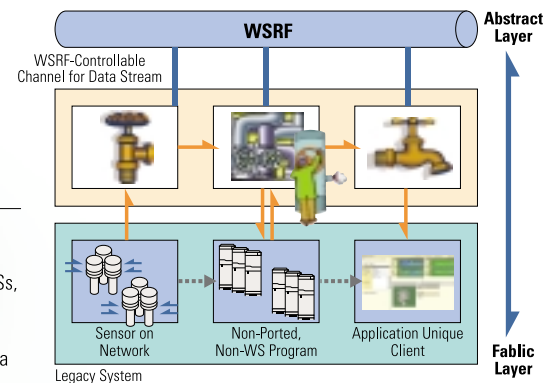
Sensors, such as omni-directional cameras, tend to be platform-dependent and have non-standard interfaces.

Integrating sensors into the Grid with Service-Oriented Architecture (SOA) realizes the construction of scalable systems which are compliant to the users demand and to a changeable market. SOA allows the following:

- ◇flexible system construction (avoiding system fixation) and,
- ◇reuse of service with interoperable interfaces and interchangeable units (reduction in development and running costs).

To achieve SOA, we are developing a WSRF-controllable adapter for sensors by giving consideration to:

- ◇Any Grid middleware that cannot be installed onto diskless devices and non-supported OSs,
- ◇Sensor functionality that cannot be directly controlled by an outer system (otherwise the data stream must be controlled).
- ◇Non-WS data transfer in need of high throughput even now (or including binary data into a SOAP message may cost much CPU resources).



## Policy-Based Access Control with Fine Granularity

Protecting privacy is a significant issue towards realizing a secure telepresence system. We are conducting research on policy-based and fine-grained access control mechanism for complex Grid environment. In the prototype, a camera owner is able to define rules to control user's view by storing policies into the PERMIS role-based policy repository. The Grid portal allows users to change virtual camera position through web browsers without thinking of complicated authorization tasks. When a user inputs coordinates of a virtual camera, the portal queries on the policy repository to check if the position is in his granted area.

