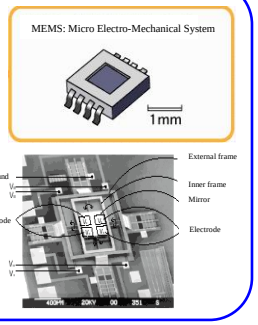
Integrated MEMS Technology (Micro Electro-Mechanical System)

Outline of Technology

・Integration of single function MEMS devices. Development of new/multiple functions, high performance and ultra-compact MEMS devices with multidisciplinary technologies

*MEMS: Microscale devices with integration of mechanical components and electronic circuits.



Superiority of Japanese Technology

・Japan leads the development of prototype devices with four layer integration of functional devices (wafer.)

・Japan leads the integration technology.

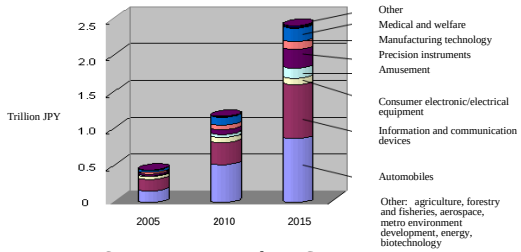
Impact on Society

・Higher functionality and added value manufacturing such as in ultra-miniaturization and improved reliability, which Japan is good at.

・Acceleration of social return with development of low cost manufacturing technology.

・Expected applications to various industries by developing various sensing devices etc.

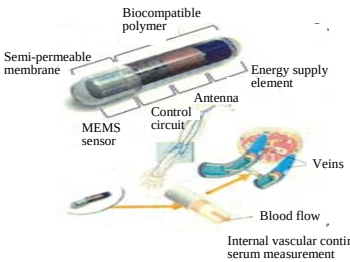
➡ Less than 10% of total share for medical and environmental fields in 2015 market forecast, and expected increase after 2016.



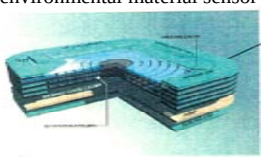
Source: Micromachine Center

(Ex.) Medical Field ➡ ・Commercialization of ultra-compact diagnosis devices with less stress to human body for diseases prevention and early stage diagnosis (Ex. Body implanted inspection devices such for blood sugar level measurement etc.)

Environmental Field ➡ ・Detection of environmental materials and viruses etc. with ultra-small chip, currently analyzed by using expensive instruments (Ex. On-site monitoring of environmental materials)



One-chip high-sensitivity environmental material sensor



Required Framework for Technology Development

・R&D collaboration of industry, academia and government with various background of human resources for targeting the early stage commercialization by sharing the outcomes.

・Development and improvement of manufacturing center/network with prototype production lines to enable participation of fabless new businesses including medium, small and venture companies.

Required Reformation in Social System

・Promotion of international standardization. (Standardization of evaluation schemes etc.)

・Scheme for integrated operation of research funds.

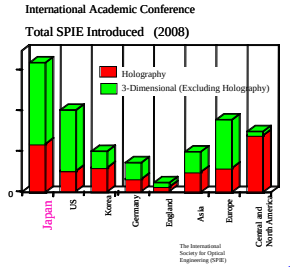
3-Dimensional Image Technology

Outline of Technology

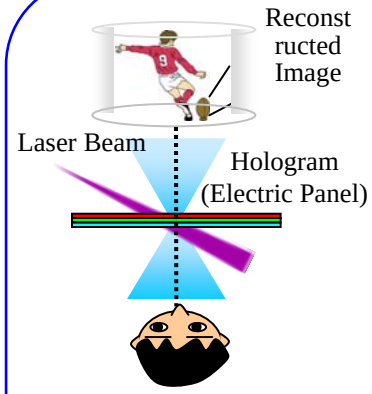
- Technology to reconstruct super realistic 3D spatial images for viewers by applying the law of holography.
- Inquiring interaction between human sensitivity and image technology and realizing natural and hand-edged communication for audience by enhancing feelings as if they are in the real world over limitation of displaying 2D image significantly
- More realistic through being combined with 3D sound technology.

Superiority of Japanese Technology

- Japan is proceeding with research and development on 3-dimensional image technology in cooperation with related bodies in industry, academia and government and is ahead of Europe, the United States and Korea.
- The focus has been on stereoscopic display that uses special glasses and multiple parallax visual display technology in Europe, the United States and Korea. However, the electrical holography technology Japan is working on has overwhelmingly superior realism compared to multiple parallax technology because it can generate light conditions that are exactly the same as light reflection of objects in the real world.



Impact on Society



Regeneration of rays in reconstructing 3D images using the law of holography.

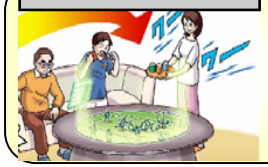
Various Services Enabled by 3D

Teleworking

- Realistic teleworking between work places and homes

(An approximate 14 % drop in of CO2 emission resulting from commuting and transportation by 2050.)

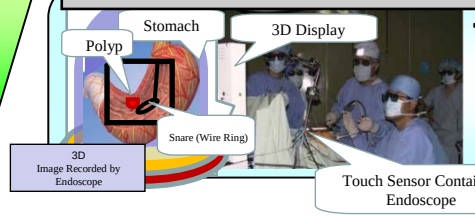
3D Broadcasting



- Realization of very realistic, multi-angle and optional zoom TV broadcasts in the future

(Less of a receiver cost through system development aiming at international diffusion and international standardization)

3D Viewing of Diseased Parts in Surgical Medicine

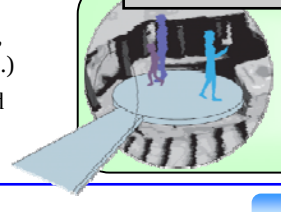


- Application of 3D image recording and display technology and upgrading of diagnoses (pre-ventrotomy diagnosis)

Upgrading of Handicapped Rehabilitation and Care of Hospital Patients

- Effective rehabilitation through virtual reality
- Reproduction of external environments in hospital rooms and mental care for bedridden patients

Application in the Arts and Scientific Education



- Reproduction of the interiors of important cultural heritage items such as ancient tombs that require entrance to be limited.
- Group-shared experiences based appreciation of space, events and art.
- Application of realistic audio-visual education in scientific education.

- New services and productions can be created in various fields such as communication/broadcasting, medical, education, business, and art (estimated market scale including related markets is 151 trillion globally in 2020.)
- Range of applications will expand through combining 3-dimensional image technology with new display and communication technology such as ‘3D sound technology’ and ‘multisensory communication technology’.

Required Framework for Technology Development

- Development of a wide ranging research and development system with a platform supplier such as communication or broadcaster and health specialists such as psychologists for dealing with the influence on users and audiences.
- International standardization promotion system in a collaboration of industry, academia and the government for international diffusion and to enhance cost the competitiveness.
- Target-oriented research centre function for integrating a wide range of elemental technology development policies.
- Early realization of ultra high speed network technology that can distribute ultra realistic content such as 3-dimensional images.

Required Reformation in Social System

- Elucidating what influence ultra realistic content such as 3-dimensional images will have on humans and establishing a ‘guideline for displaying 3-dimensional image.’
- Encouraging and promoting the teleworking that can be expected to be done with the increased diffusion of 3-dimensional image technology.