iHome——
Tele-immersive Interaction Platform
And its Application

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2015. 3. 31
1. Motivation and Case Study
2. Research and Technology
3. Application
The Institute of Computing Technology of the Chinese Academy of Sciences (hereafter ICT) was founded in 1956. It is the first academic establishment to specialize in comprehensive research on computer science and technology in China. The ICT has successfully built China's first general-purpose digital computer and now has turned itself into an R&D base for...
The 2010 annual "statistical bulletin of human resources and social security" shows, the national amount of rural migrant workers is 240 million, while the number of rural migrant workers employed outside their hometowns is 150 million.
Due to long-term separation with their family, migrant workers tend to have all sorts of problems.

Emotional and psychological health problems
- The survey shows that 26% of migrant workers have mental health problems, women being more vulnerable (the website of the people's daily)
- the psychological tendency of inferiority
- the psychological tendency of discontent
- the psychological tendency of deprived and

Social security problem
- In Beijing, transients of criminal cases have accounts for about 80% of the criminal case.
- The new generation of migrant workers crime rate is on the rise, the crime rate from 2006 to 2010 up 21.7% over 2001 to 2005.

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<th>2007年</th>
<th>2008年</th>
<th>2009年</th>
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<tbody>
<tr>
<td>犯罪人员在街村居住</td>
<td>58.71%</td>
<td>63.28%</td>
<td>59.66%</td>
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<td>犯罪人员在街村居住</td>
<td>8.31%</td>
<td>7.29%</td>
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<td>犯罪人员在街村居住</td>
<td>56.33%</td>
<td>50.92%</td>
<td>51.23%</td>
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<tr>
<td>犯罪人员在街村居住</td>
<td>14.09%</td>
<td>16.16%</td>
<td>16.69%</td>
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<tr>
<td>犯罪人员在街村居住</td>
<td>57.19%</td>
<td>62.04%</td>
<td>69.68%</td>
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At the same time, 56.4% of migrant workers' children stay at home, more than 70% of left-behind children see only once a year with parents.

The learning situation and growth problems of the Left-behind children are worrying.
In 2011, ICT proposed—iHome innovation project.

If we can use our frontier technology of the human-computer interaction and pervasive computing to solve interaction problem among left-behind children, the elderly and the family.

Such as: using TV and broadband network to realize simplication, the state of nature, low cost video interaction and the family interaction and so on.
2. The limitations of existing video solutions and the positioning of the iHome

**Based on the PC devices**
- low cost, but poor video quality
- users are not free (can’t walk with headset)

**Video conference equipment**
- users are free, high video quality
- but high cost, high requirements for the deployment environment
iHome---a low-cost, immersing, easy to operate, Hi-Fi remote natural interaction platform
Core function

Remote interaction, HD communication
Virtual-reality composition, Remote group photos

Remote interaction, HD communication

Virtual-reality composition
Remote group photos
3 Core function

Paper material, super resolution transmission

Electronic text, multi screen sharing

The details are also clear

Paper material, high-definition transmission

Electronic text, Multi-screen sharing
Core function

collaborative interaction, face-to-face tutoring

gestures of touching, natural operation

Collaborative interaction, face-to-face tutoring

Gestures of touching, natural operation
Key technology

Technology Architecture

Remote immersive video and audio interaction

Heuristic natural human computer interaction interface

Hi-fi collaborative computer-object interaction

Natural eye contact

Remote immersive video and audio interaction

Precise object extracting

Dual-channel information based robust fingertip detect

Multi-screen sharing presentation across devices

Users’ experience adaptive video transportation

Vivid virtual reality fusion scenario

Collaborative control interface

Super-resolution image reconstruction

Users’ experience adaptive video transportation

Immersive audio interaction

Motion-feedback sensors interaction

Multi-light collaborative controlling high quality video
1. **QoE-driven Video Adaptive Model**

**Research**

Develop an adaptive transmission framework and devise a provision model for heterogeneous QoE video services.

**Publication**

2. Cooperative Video Transmission Model

Research

Build a transmission model with heterogeneous devices support, including Max-Min fairness, proportional fairness and distributed resource allocation for cooperative transmission in heterogeneous wireless networks.

Publication

iHome has four types of device

- The business version
- The software version
- The mobile version
- The ultimate version
Family interaction pattern between the rural migrant workers and left-behind children in big business

System has completed pilot application in Henan, Shandong, Jiangsu, Guangdong, Zhejiang and other provinces
Application I— Family interaction

Left behind children and iHome

全国首家“留守儿童爱心小屋”落户河南

留守儿童（河南电视台记者李明、张文祥）全国首家“留守儿童爱心小屋”前天（6.28）落户商丘，在这里通过互联网，让孩子们与外出打工的父母、祖父母进行视频互动聊天，帮助留守儿童 Accept the other.
The city government service department and all the countryside

Covering 13 suburban counties and 60 villages in Beijing
Three levels including remote city, district and village petition together

Petition rights application pattern between the city government service department and all the countryside
Radio remote one-click legal aid

Petition rights application pattern between the city government service department and all the countryside
5 Application II—Remote legal assistance
Luyong, the director of China Disabled Person’s Federation, praised highly of the system after watching the presentations.

The city government service department and all the countryside
5 Application IV—Remote real-time sign language translation

- Hard to describe patients’ condition to doctors
- Hard to obtain evidence for the police

Emergency communication mode between the deaf and the society (the public security and hospitals, etc.)
Real-time synergetic sign language translation system

Tripartite real-time conversation video system

National real-time sign language translation tele-serving center

Experts on sign language translation

Sign language

Hospital

Police office

Oral Language
Colin Allen, the chairman of the World Federation of the Deaf, and Sibajipanda, the committee chairman of SIGN, speak highly of the system exhibited at the 7th International Conference of Sign Language users (SIGN7).
Application III——SmartGlasses

Your Glasses My Eye

- Mobil e
- PC
- AXXW system

Call center

Internet

wifi
Next Generation Wearable AR system

Remote Service Center

Context Aware
Video Comm

AI
NUI

Cognitive Computer
5 Application V—Tele-Rehabilitation
In future, our system is expected to realize “Zero distance” interacting, and bringing advanced technology into everybody’s life.

Any time, any where,
“Zero distance” interact with relatives and friends together!
Thanks for your attention!