Title of Project : Ambient Surveillance using a Wearable
Lenseless Omnidirectional Sensor
- Prevention of Crimes against Children -

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Research Area : Perception Information Processing / Intelligent Robotics

Keyword :   Pattern Recognition, Image Processing, Computer Vision

【Purpose and Background of the Research】

The world around us is increasingly becoming more dangerous. Various incidents such as stabbing incidents in public areas involving mentally disturbed persons, attacks in public schools, sex-related crimes, and terrorist attacks such as those typified by the 9/11 attacks in New York and the sarin gas release in the Tokyo subway a pose danger to all of us. One measure applied to prevent such incidents is the use of environmental embedded surveillance systems. Such systems resolve crime best in circumstances where there are crowds of people. However, such areas are not necessarily the most common place for the occurrence of many types of dangerous crimes; for example, random killings and sexual assaults that usually happened in relatively deserted areas. To facilitate responses in such cases, it would be necessary to create a portable surveillance system. While there are various other types of anticrime devices, what is needed is one that can also detect any approaching of danger; a device that is also complimentary to installations of more conventional systems embedded in various environments. For this project, we propose ambient surveillance using a wearable omnidirectional sensor.
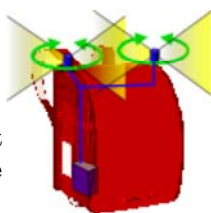
Figure 1 System for a schoolchild

【Research Methods】

In this project, we are planning six research items.
P1) Creation of a small, light-weight, lenseless and wearable omni-directional sensor
P2) Human detection under crowded environment
P3) Human tracking and segmentation from a wearable camera
P4) Threat detection utilizing human behaviour analysis
P5) Schoolchildren evaluate system for practical use

Figure 2 Clothes variation in gait database

【Expected Research Achievements and
Scientific Significance】

The results we expect from the project are to develop a wearable omnidirectional surveillance system. This small and light-weight sensor can be uses not only for surveillance but also in several application such as ITS and mobile phones.
Gait is a feature of human movement that can analyze human individuality at a distance. Our gait recognition system is a generalized technology for human analysis. We expect that in the future we will be able to use gait analysis technologies in fields of entertainment, medical treatment, welfare and marketing.

【Publications Relevant to the Project】

Y. Makihara, R. Sagawa, Y. Mukaigawa, T. Echigo, and Y. Yagi, "Gait Recognition Using a View Transformation Model in the Frequency Domain", Proc. of the 9th European Conf. on Computer Vision (ECCV2006), Vol. 3, pp. 151-163, 2006.
Ngo, Thanh Trung, Nagahara, Hajime, Sagawa, Ryusuke, Mukaigawa, Yasuhiro, Yachida, Masahiko, Yagi, Yasushi, "Robust and Real-Time Egomotion Estimation Using a Compound Omnidirectional Sensor", In Proc. 2008 IEEE Int'l. Conf. on Robotics and Automation, pp.492--497, 2008.

【Term of Project】   FY2009-2013

【Budget Allocation】   158,900 Thousand Yen

【 Homepage Address and Other Contact Information】
http:// www.am.sanken.osaka-u.ac.jp/