

Residential District Security Using Home Computers

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Abstract: We are promoting a novel concept “the e-JIKEI Network”: a community will have a strong ability to prevent crime only if some residents keep watch on what happens around their houses with the aid of their own home computers, commercially available cheap cameras, and free-software. Under this scheme, residents would view their surroundings using cheap cameras as their own eyes and home computers as their own brains with altruistic spirit. Community safety would thus be realized by the voluntarily cooperation and altruism of ordinary citizens using widespread modern technology. In this paper, an attempt for realizing the residential district security using the e-JIKEI Network is described.

Keywords: security, Internet, crime prevention, network camera, ubiquitous network, homeland security, autonomic system, network sensing

I. Introduction

A community with some residents keeping watch around their houses has the strong potential to inhibit crime. In days gone by, there were many communities like this. However, in our times, when individualism, selfishness and busy-life become increasingly common, there are very few communities like this. This often results in a lack of eyewitnesses of crimes in our modern communities.

On the other hand, security camera systems are now widely used and have an important role in reducing crime and identifying suspects. As for the typical usage of the security cameras systems, many problems seem to arise from the fact that they are introduced only for the benefit of the owners. One problem is that it is expensive to obtain a complete surveillance of an owner’s property. A second problem is that a typical system usually keeps watch only inside the owner’s property, so it cannot help with the safety of the community around it. A third problem is that it sometimes gives the unpleasant feeling to the neighbors in case the system watches outside the owner’s property. The authors argue that these problems can be almost solved if the camera systems are introduced within an altruistic community-minded framework.

We contend that a community will have a strong ability to prevent crime only if even a portion of residents keep

watch on what happens around their houses with the aid of their own home computers, commercially available cheap cameras, and free-software. There are many types of software for capturing video image available, however we could not find out a free one that is suitable for the concept. Therefore, we have developed one with the minimum necessary functions and distributed it free of charge through our web site [1]. The software is written in English and in Japanese. The software simply selects relevant pictures and saves them to hard disk [2]. The concept has been discussed from the viewpoints of the social science [3,4] and the homeland security [5].

If the system of security cameras connected to computers and to the Internet spreads nationwide, it could result in a very powerful and flexible social structure. In addition, the software installed in each system could be easily upgraded. This means that this social structure could lead to very interesting subjects and applications for researchers and companies. In the near future, more intelligent functions could be achieved, such as the detection of doubtful motion, the sending of danger messages to the police, and facial comparison with the photos of wanted persons. Real-time chasing of suspected persons will be possible if the crime is very bad and most of the citizens give the police permission to access their own surveillance system. A country with many local communities having this facility will obtain good homeland security. For homeland security, our project [5] and all the other projects, such as the usual security camera systems and the US Home Guard [6], in which registered ordinary citizens watch the critical infrastructure facilities in the United States from their homes through internet-cameras, should be complementary to each other.

In this paper, an attempt for realizing the residential district security based on the concept of the e-JIKEI Network is described.

II. The e-JIKEI Network

Fig. 1 shows the concept of the e-JIKEI Network [1-5]. The project intends to recreate the mutual watching system, which had usually functioned in old communities, in the present days but in a much more powerful and flexible form with the aid of the information technologies. The project intends to enable ordinary individual persons to introduce, possess, and operate a high performance home security

system using already-holding home computers connected to the Internet, a variety of cheap cameras, and free-software provided at the homepage of the Society of the e-JIKEI Network (www.e-jikei.org), which has been established by the authors for promoting the concept nationwide and worldwide. The first version of the free software has been provided with some manuals since December 2004. Even if the e-JIKEI Network System is introduced separately, it will be useful as a usual home security system. However, if the system spreads out in the community in relatively-high density within an altruistic community-minded framework, the effectiveness of the watching system on community security will be much more significant than the history has ever experienced.

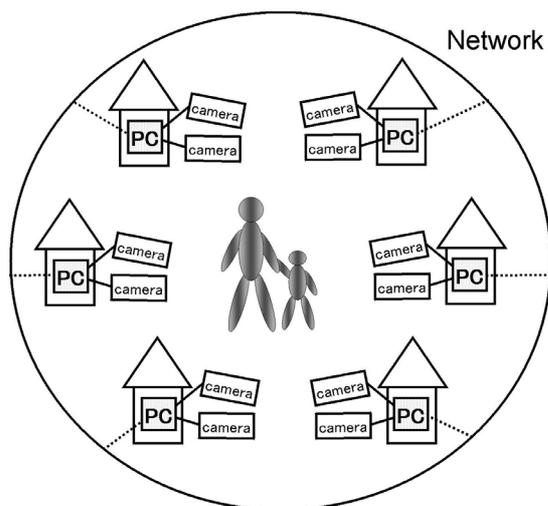


Figure 1. Concept of the e-JIKEI Network

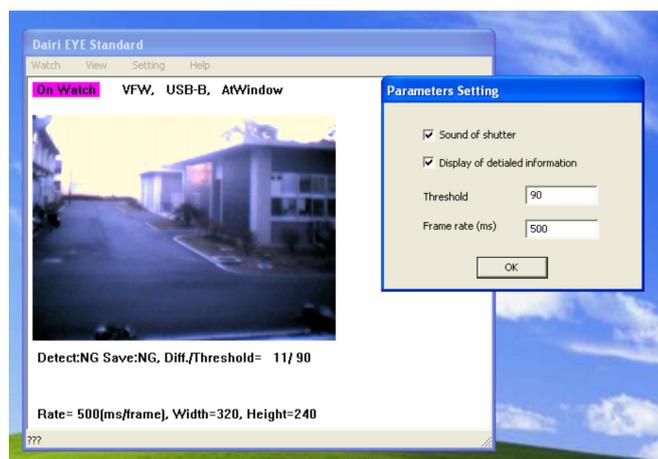


Figure 2. Window of "Dairi-EYE Standard"

III. Free Software

3.1. Free software "Dairi EYE standard"

The society for e-JIKEI Network has provided free software since December 2004. The following functions are implemented to the software "Dairi EYE Standard". The

software has the minimum necessary function to realize "watching around the house 24 hours", in other word "taking care around the house 24 house not for the security of own house but for the security of surrounding community". The major function of the software is as follows,

- (1) High stability with Windows XP. Continuous operation over a few months is achieved under usual conditions.
- (2) The system can use two kinds of cameras; one is a VFW cameras or adapter (VFW mode). The other is a network camera (FTP mode and HTTP mode).
- (3) The system always acquires pictures several times in a second from network or USB camera.
- (4) If the acquired picture is different from the picture acquired immediately before, then the system saves the acquired picture. Otherwise, the system does not save it.
- (5) The system user can designate the threshold of the difference between the acquired picture and the picture acquired immediately before.
- (6) The saved picture files have time and location information as attributes. For example, the file name and its path express time and location information, such as "C:\e-JIKEI\Location-A\2006\Apr\05\H04M12S11_4.jpg", which means that this picture file was taken at 04:12:11 on the 5th April 2006 at Location-A.
- (7) The system can command two or more cameras with one PC.
- (8) The saved pictures are automatically erased at the time, which the system user designates.
- (9) The system monitors the remaining disk space. When the disk space is less than 3 GB at the time of 0:00, the system shows the instantaneous value of the remaining disk space every time the picture saved.
- (10) Every time the number of the picture saved in one day exceeds the set value, the system shows the warning message and the value of the threshold is set to be 50% larger.
- (11) The sensitivity of motion detection can be arbitrarily set by arbitrary rectangular area. Up to 10 arbitrary rectangular areas for sensitivity adjustment can be set.

Fig.2 shows the window of "Dairi-EYE standard". More than 1500 downloads have been conducted since December 2004. The Kiryu City has decided to introduce the system to all the public school. We are proposing to the city that if the school system is used as the reference, the parents' house intruding the system to their houses by their own expense, and the area surrounding the school has the watching eye of the parents house, the strong security of the school district will be realized without any additional cost taken by the city.

Fig.3 shows setup examples of cameras. The left pictures in Fig.3 show a network camera placed inside a plastic box. The right picture in Fig.3 shows a USB PC-Camera attached on the window frame with a tape. A 5-m USB-extension cable is used to connect to a PC. In both cases shown in Fig.3, all the engineering work were done by home carpentry. In our concept, the low cost and easy operation are the essential factors for diffusing the system based on

the concept to the ordinary citizens houses worldwide. So it is important to develop easy and low cost way of realizing the home system for ordinary citizens.

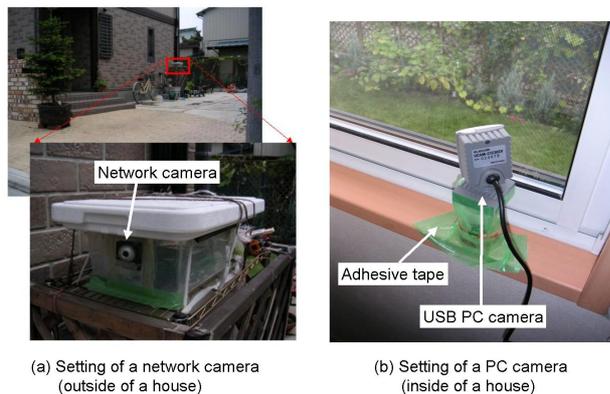


Figure 3. Examples of camera setting

3.2. Security camera usage guideline

The system is very simple but very strong. Ordinary residents can easily obtain the strong ability to observing and memorizing what happens around their house. As far as the system is used within an altruistic community-minded framework, the introduction of the concept, the e-JIKEI Network, yields much benefit and less loss. However, due to the lack of the experience of having such a strong ability of sensing, this might result in the unexpected and unnecessary troubles. Therefore, the rule and guidelines are necessary for avoiding the unexpected and unnecessary troubles. The followings are the guidelines made by the society for e-JIKEI Network and used as the essential part of “Software Use Agreement”.

Security Camera Usage Guideline (Introduction)

Security camera systems including the free software distributed by e-JIKEI Network Project Team is developed for those who feel that they would like to contribute local area security with the mind of mutual help. We do not hope that the people without this mind use this security camera system. The system has much ability and we think that if we use it rightly, then we can improve local area security. However, because of this ability, it is feared that if you make bad use of this system, you would cause the social big issues. It is also feared that if you innocently reveal information obtained by this security camera system, then you would cause serious results such as invasion of other’s privacy. We make the following strict terms a part of usage agreement so that e-JIKEI Network Project Team Software contributes social security which is our purpose.

(Object)

ARTICLE 1

The object of this guideline is to provide the teams that security camera system administrator must obey. We mean that security camera system is the system which consists of e-JIKEI Network Project Team software, computer in which the software is installed, equipment displaying or storing the picture taken by camera.

(Primary principle)

ARTICLE 2

You must use security camera system for realizing the secure and peaceful local community and preventing crime and accident.

(Prevention of the illegal invasion of other’s rights)

ARTICLE 3

Security camera system users must prevent the illegal invasion of other’s privacy or rights in the usage of the system.

(Safekeeping of pictures)

ARTICLE 4

Security camera system users must safely keep the pictures obtained by the security camera system and the storage media of the pictures and prevent leak of the pictures.

(Limitation of providing the pictures)

ARTICLE 5

Security camera system users may reveal the pictures obtained by security camera system only for criminal investigation or social common idea or legal reasons. However, in any cases, decision of revealing the pictures obtained by security camera systems depends on the user who owns the pictures.

(Duty of confidentiality)

ARTICLE 6

Security camera system users must not leak the secrets of others that the users know by the picture of security camera system.

(Limitation of software distribution)

ARTICLE 7

No one must provide this software to those who would use security camera system against this guideline.

(Interview and confirm of security camera system usage)

ARTICLE 8

Section 1: e-JIKEI Network Project Team have the right to send out questionnaires to the security camera system users about security camera system usage situation by e-mail and so on.

Section 2: Security camera system users must reply the questionnaires as much as possible, however, the users have the right to deny the questionnaires.



Figure 4. The residential district “MIZUKINO” under construction

IV. Introduction to residential district

We have decided to conduct an attempt to introduce the e-JIKEI Network in a residential district with 200 new houses that are developing by the Gunma Housing Supply Corporation. In the first stage of the development, 63 subdivided plots have been created. Fig.4 gives the partial view of the area developed in the first stage. The society of e-JIKEI Network have cooperated with Gunma Housing Supply Corporation for the attempt.

The main target of the attempt is to make the residential district that is a good example for the rest of district in the nation and to introduce it to worldwide.

The sub-targets of the attempt are as follows,

- (1) Developing the procedure of forming the consensus of introducing the e-JIKEI Network within an altruistic community-minded framework.
- (2) Improving the system, that consists of PC, cameras and software, in conveniences for the developers of the residential district to introduce it and for the owners to operate it.

As for developing the procedure of forming the consensus of introducing the e-JIKEI Network within an altruistic community-minded framework, we have conducted the following steps,

- (a) The Gunma Housing Supply Corporation has explained the residents' association on the e-JIKEI Network and suggest them to introduce it.
- (b) The Gunma Housing Supply Corporation has asked the house owners at important positions for the security of the district to introduce and operate the system for the security of the whole district. The cost is paid by the Gunma Housing Supply Corporation as the part of the cost of the development of the whole district.



Figure 5. House with e-JIKEI system

Fig.5 shows a house inside the district with e-JIKEI system. Each system of the e-JIKEI Network is owned and operated by each resident, who lives in important places for the security of the district under the permission and the gratitude of the residents' association. During the attempt, the performance of the system, that consists of PC, cameras and software, is improved in conveniences for the

developers of the residential district to introduce it and for the owners to operate it.

The e-JIKEI Network has been operated and introduced in the district for several months. We have proved that the concept of the e-JIKEI Network can be accepted by the ordinary residential districts through the attempt described here.

V. Discussions

Comparing the usual security camera system for residential district, the system based on the e-JIKEI Network is very low cost. To introduce security camera system to residential district, a building for placing the controlling and monitoring facilities for the security cameras spread inside the district is necessary. On the other hand, the system based on the e-JIKEI Network is owned, operated and maintained by the voluntarily effort within an altruistic community-minded framework. This result in the extremely low cost for intruding, operating and maintaining the system.

We are now trying to promote the result of our attempt worldwide, using many types of medias, including this paper.

The required technology to realize the e-JIKEI Network is widely available these days but was not available a decade ago. With the technology available a decade later, the realization of the e-JIKEI Network will be much easier and its function will be much stronger and varied. For example, a wearable system and car system will be easily realized. Since the concept of the e-JIKEI Network is that citizens should remain vigilante and not miss children and criminals passing through the front of their houses, wearable systems and car systems are desirable. At this moment, the performances of computers inside houses and cars are rapidly increasing. In the near future, keeping watch around houses and cars will be very easy.

It has been proved that it is efficient for crime prevention and that widely available modern technology makes it easy to realize the e-JIKEI Network. That is, citizens have been informed of its possibility and the effects of using available technology. Then they have to think and decide what they want to do in the proposed possible new world realized using available technology. Moreover, improved technology in the near future will make it much easier to realize the e-JIKEI Network. Every person will have many cameras controlled by a high performance computers integrated in many locations such as cars, houses and cellular phones. Then every person will be able to keep watching around himself/herself on the base of the concept of the e-JIKEI Network only if he/her wants to do so without any additional cost. This means that each citizen will have the possibility of strong monitoring power and will have to be responsible for it. Careful consideration and clear decisions by all citizens will be required in the near future.

At the time of the decision of ordinary citizens, privacy protection will be a serious and delicate issue in promoting the concept. We have generated user guidelines as a part of the conditions of use of the software, in which a careful consideration of privacy issues is required. The users of the software are asked not to watch the obtained pictures

without appropriate reasons, so as to prevent them from knowing unnecessary information of neighbors' behaviors. When the concept becomes more widely spread across the nation, new laws will be required for defining the rights of and constraints on the owner of each system including large amount of the obtained information.

We are asking the citizens how they compare the responsibility on watching what happens around his/her house with the risk of the violation of privacy. We are now commencing tests on the true value of our concept.

VI. Conclusions

We contend that a community will have a strong ability to prevent crime only if some residents keep watch on what happens around their houses with the aid of their own home computers, commercially available cheap cameras, and free-software. Under this scheme, residents would view their surroundings using cheap cameras as their own eyes and home computers as their own brains. Community safety would thus be realized by the voluntarily cooperation and altruism of ordinary citizens using widespread modern technology. In this paper, an attempt for realizing the residential district security using the e-JIKEI Network is described. The concept of the e-JIKEI Network has been proved to be able to be accepted by the ordinary residential districts through the attempt.

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