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## Augmented Reality in Security Systems

S. Suganya, N.R. Raajan, M.V. Priya, A.J. Philomina and G. Shiva

Department of Electrical and Computer Engineering, School of Electrical and Electronics Engineering, SASTRA University, India

*Corresponding Author: S. Suganya, Department of Electrical and Computer Engineering, School of Electrical and Electronics Engineering, SASTRA University, India*

### ABSTRACT

In this study, we have proposed a method which combines the overlaying of 3D graphics in computing world by means of Augmented Reality (AR) technology. Our paper provides the security for the data's in the database through the QR codes. This technology is mainly used for applications like security protection for military details, student information and also in medical fields, etc. The main objective of this is overlaying of the virtual object into the real world with the help of system and web camera, which gives sensitive vision to the researcher and which makes the object as a 3D projection in a real time processing technology. By using this technology it is used for security applications like Biometrics, QR codes also. It is used for high security applications like student document verification, military database, etc. Some profits in this can also be improved by QR codes as they are used in tracking and enemies prevention security systems also. Since, it is an emerging and well growing technology, AR applications requires some special devices. Because of the special devices it is very expensive generally. But in our dissertational work, we have proposed an AR methodology for the 3-Dimensional contest with a very low cost by using AR and QR codes.

**Key words:** Augmented reality, information security, marker, QR codes, tracking

### INTRODUCTION

Computers are more and more used to improve the co-operation between people. Though a new 3D interface descriptions such as virtual reality (Li *et al.*, 2006) will defeat these limitations. Virtual Reality (VR) looks like an expected standard field for 3D Computer Supported Collaborative Work (CSCW). One of the most recent advancement in the well growing technological world is augmented reality, but it was around for over fifteen years, at present, in real time applications it exists only for the history of three years. Presently, this Augmented Reality (AR) (Suganya and Raajan, 2011) technology is popularly growing because of our mounting systematic technological lives. For the past few years only, it has become very important growth in this world. Augmented Reality (AR) means overlaying of some information into the real world circumstances and hence the term augmented is referred as a view of the real world which contains even more information. It gives more natural and co-operative. AR is a more advanced technological application nowadays, so only it is very easily reasonable and also utilizable. AR, by means, is a way to increase our researcher's perception about the surroundings by superimposing virtual data sequences. It may be anything that is animation, 3D substances (Raajana *et al.*, 2012), messages and video on top of the real environment, which was captured through the web camera or camera on our mobile phones.

In recent years, progress of computer vision technology involves an innovative role in 3D visual media industry. One distinctive influential study was Virtualized Reality which gives a new path towards the Augmented Reality (AR). AR deals with a real environment (Prince *et al.*, 2002) with elements being added to the feed obtained in real time, whereas in AV a virtual environment is present and real objects are overlaid on it.

Capturing the 3D (Bhaskar Raj, 2007) content of a live feed with the help of a web cam is a sequential process that involves several steps.

The web cam of the system is integrated with the software application using appropriate commands.

The appropriate view of the live feed is generated. The view is rendered into the scene possible taking into account the occlusions.

AR is the one way to give practical and positional based learning to researchers providing obtainable world rather than by creating new environment. The researchers believed that augmented reality (AR) is the subsequently large example application in this world. When connecting the global networks with the tangible world and many substances, places and people it has, AR contains both a distracting technology and thrilling eyesight of the future.

## **SECURITY**

Security provides the safety for important database. It will prevent against criminal activities like terrorism, theft, or spying. Security categorization plays a vital role in integrating security in various fields like the government business sectors and information technique system and it establishes the basis for safety standardization amongst the information security systems.

**Information security:** Information Security is classified as labels preferred and it depends on the environment of the society. Some of the examples are:

- In business organization, we can label such as: Municipal, Perceptive, Confidential and Private
- In government organization, we can label such as: Uncertain, Perceptive but Uncertain, Limited, Private, Top Secret and their non-English equivalents

In this growing technological world, information security (Khosrowpour, 2006) has well developed and evolved for recent years. It is specialized in many areas such as, security systems, security applications and databases, testing in security systems, forensic sciences, etc. Actually information security means protecting data and data systems from unused accessories, disclosure, modification, recording or destruction. It deals with three common goals for protecting the data are:

- Confidentiality
- Integrity
- Availability

Confidentiality is the term which will prevent the discovery of data's to illicit individuals or systems. Consider one example, when a person is purchasing some materials in a big shopping mall, where he uses his debit card for that shop owner must have an internet facilities to access the debit card number so that the amount will be transmitted from the buyer to the shop owner and from the

shop owner to the transaction processing network system. The system enforces confidentiality by encoding the debit card number during transmission. It is very necessary to maintain the privacy of the user where the personal information is protected.

Integrity is the term where the information cannot be modified. This is different from referential integrity in databases. Information Security system provides both message integrity and data confidentiality. If a data is actively modified to transmit the integrity is dishonored.

The major important role in information security is availability. The information should be available, then only the information security will protect the data's which is stored already. That is the computer system stores and process the data information, the security controls will protect the data and the channels will access the computer system to function properly. The system computer for storing the data should have high availability at all times, which prevents from service disruptions, power failures and system updates.

Here the data will be protected because of its data assurance. It has a privacy which can be overviewed in different manner in different directions. The information security can also be called as computer security and also information assurance.

**Qr based security:** QR codes will also work in both offline and online connection world easier. The usage of QR code is increasing day-by-day. So in our methodology we have integrated QR code with AR. AR is having so many uses in real world. That's why it is very much attracted towards the research developers for creating real time applications. Since it combines the real world with virtual objects with a computer generated contents, researchers are doing research in AR technology which is very useful for the people. It has a combinational achievement of fundamental technologies and deployment to finish the required task.

It should follow some of the requirements:

- Recognition of Pattern by detecting its position and given material
- Displays the data information to the user or observer

In this study, methodology for using normal approach to recognize the pattern and it displays the virtual object into the real world. The virtual object may be additional information to the user.

**Camera tracking:** To solve the image registration problem, so we are using online reconstruction method and several maps. Here the map  $N_i$  consists of collection of  $L$  points in its world coordinate  $V_i$ .  $P_i$  is said to be the camera projection matrix. The  $N_i$  coordinates for the  $j$ th points are (Guan *et al.*, 2011)  $Y_{jv_i} = (Y_{jv_i}, X_{jv_i}, Z_{jv_i}, 1)^T$ .

Let  $y_{jv_i} = (y_{jv_i}, x_{jv_i}, 1)^T$  is said to be 2-D projection of:  $Y_{jv_i}$  on its plane image. So the relationship between  $Y_{jv_i}$  and  $y_{jv_i}$  is:

$$Y_{jv_i} = \alpha C [Q/S] Y = PY_{jv_i} \tag{1}$$

where,  $\alpha$  is said to be an arbitrary factor,  $Q = [q_x, q_y, q_z]$  and  $Q = [S_x, S_y, S_z]$  is said to be rotation and translation will relate the coordinate system of world and camera.  $C$  is said to be the camera intrinsic matrix.

An image from the camera or motion has received by the tracking (Raajan *et al.*, 2012a, b) methodology and it is maintaining the real-time estimation of the camera posture. By using this estimation, we are augmenting the existing video sequences with virtual objects.

**QR codes:** QR means Quick Response Code and it was invented by Denso Wave (a division of Denso Co. at the time) in the year 1994. The QR code is a two-dimensional (Chai *et al.*, 2010) matrix representation that will detect the position of the patterns at three corners (Bhaskar Raj, 2007). Initially this was designed only for ultra-high-speed and Omni-directional reading. In simple words, we can say that it is designed for improving the speed of difficult circuit structure. It has the capability of encoding the Chinese and Sino-Japanese Kanji-Kana letter sets.

The QR Code has some features like huge data capacity, massive data density and error correction ability. It consists of seven elements 0, namely, a finder pattern, a timing pattern, an alignment pattern and the quiet zone (making up the function patterns) and the format information, separator and data areas (making up the encode area). This QR code has also developed for mobile codes and MS-codes. The finder pattern is used for detecting the position of the patterns which are placed at three corners of the symbol. In timing pattern the broken line borders are placed in between the finder pattern. Every block in alignment pattern have remote cell in the center and it have fixed code area and positions. Every symbol is enclosed by the four module- wide quiet zone. In function patterns, first it detects the accurate symbol position, size of the symbol, its orientation and entire part of a symbol.

## EXPERIMENTAL RESULTS

When the QR code Fig. 1 marker pattern of a predefined dimension was tracked (Jiang *et al.*, 2000) in front of the webcam, it is detected and a corresponding database was displayed on the respective QR code marker (on screen). The database that is appeared on the system is not actually a part of the input fed into the webcam; rather it is just an augmentation (virtual object) (Raajan *et al.*, 2012b) in a real environment. The QR code patterns of the marker can be changed and the desired database can be overlaid. These virtual objects may be some databases like student information, military security databases, pictures, shapes, solids or others whose location path will be specified in QR code earlier. The results obtained are shown in Fig. 2-5.



Fig. 1: QR Input-multiple markers



Fig. 2: Appearance of a 3D object when a particular marker (QR code marker 1) is displayed



Fig. 3: Two QR code markers are displayed and the corresponding objects of corresponding color appearing on the screen

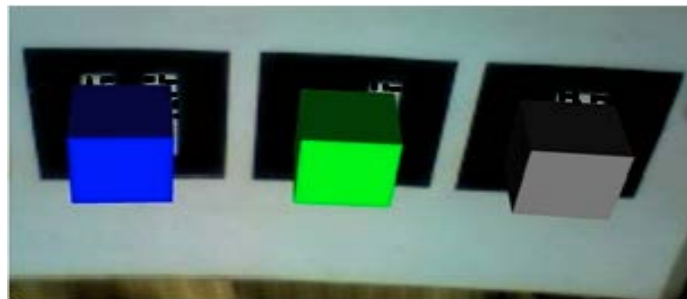


Fig. 4: 3 Markers are displayed and 3D objects appearing on the screen



Fig. 5: Output being displayed when the marker is in different orientation

## CONCLUSION

In this study, we conclude that, we had developed a new system which produces a secured QR code, which is very hard to decode the details of the information. This is obtained by storing some databases like student details, military database, etc, which is hard to retrieve or decode the database. For this system, we have selected the QR code for storing the database and when we retrieve that it will show as in 3D, perception view. The QR code has a high error resistant rate. Any damage or alternative's done on this QR code, which will surely affect QR decoding process also. In this paper, we have initiated by storing those database inside the QR codes. But QR code has more disadvantages like high storage capacity in future and it will be preceded by storing more databases and their personal information can also be strongly prevented for any duplication works or databases. In our future work, it can also be implemented in real time applications like face recognition (Suganya *et al.*, 2012), iris recognition and also we can integrate our pictures, logo, etc. into the QR code.

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