Development of an Information Platform for Training Graphic Construction Abilities

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Abstract: - In clinical nurses, some of the examination tools of cognitive function are detection of the reaction for graphs. There are the examinations of visual recognition memory in the Mini-Mental State Examination (MMSE). The Bender Visual Motor Gestalt test (or Bender-Gestalt test) is a psychological assessment used to evaluate visual-motor functioning, visual-perceptual skills, neurological impairment, and emotional disturbances. This research seeks to import the RFID technology to do for the graphic training tools. The figures are composed by the tag. After the users read the tag by the RFID reader, the information will be passed to the server via the wireless communication module. Information can be immediately stored in the database to compare the data and computing operations, such as to obtain the tag location which the display to be read. The data are managed using database management systems, which store database contents, allowing data creation and maintenance, and search and other access. With the developed application, the user can see that the training course and test results, as a reference for medical personnel.

Key-Words: - RFID, Tag, Database, Server

1 Introduction

According to the scientists study, the human brain is used to pass the message by the radiated approach. If we could transfer the required knowledge into graphs, it is helpful of long-term memory. So, training the judgment for the graphic knowledge is to help people to play their potential instinct. This paper presents the use with the convenience of RFID and import the training mechanism from RFID technology in graphs. After the users read the tag by the RFID reader, the information will be passed to the server via the wireless communication module. The server with the information and record of every tag could be used for compare, data access and other purposes. A comprehensive database management system, which store database contents, allowing data creation and maintenance, and search and other access provides effective services. The information platform developed by this research can be completed the training course and test results for each user and provide medical staffs for the reference.

2 Methods and Procedures

In clinical nurses, the commonly used examination of cognitive function are and the Mini-Mental State Examination Form (MMSE) and the Short Portable Mental Status Questionnaire (SPMSQ). The MMSE test includes simple questions and problems in a number of areas: orientation to time, orientation to place, registration, attention and calculation, recall,

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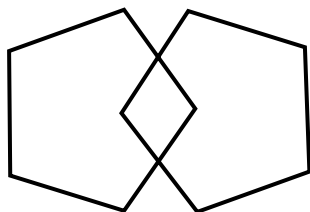language, repetition, and complex commands. Fig. 1 shows the examination theme of visuospatial ability.

Fig. 1. Two interlocking pentagons.

Fig. 2 shows the Bender Visual Motor Gestalt Test. The test is used to evaluate "visual-motor maturity", and the original test consists of nine figures. The brain is split into two hemispheres – the right and the left, both having specific functions. The left brain is verbal and processes information in an analytical and sequential way, looking first at the pieces then putting them together to get the whole. The right brain is visual and processes information in an intuitive and simultaneous way, looking first at the whole picture then the details. When these abilities are released, man becomes capable of seeing graphs as motion pictures.
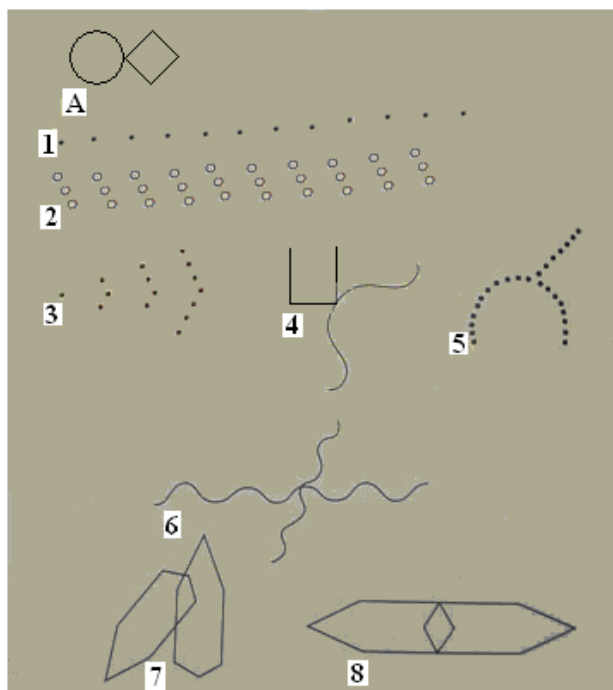

Fig. 2. The Bender Visual Motor Gestalt Test.

The experiential learner is more right-brained, and the rational learner is more left-brained. Such as instant-reading, mental arithmetic, etc. are all right

brain ability to process information. This graphic examination is indeed one of the important tests. The graph spatial concept consists of spatial analysis, including the analysis of location and spatial relationships. This research uses the interlocking pentagons as the material to simulate in Fig. 1.

2.1. Overall diagram

Radio Frequency Identification (RFID) technology is derived from World War II. The techniques were based on the assumption that aircraft were allowed to identify themselves to other friendly aircraft and commanders on the ground. U.S. retail giant Wal-Mart recently announced that it wants its top 100 suppliers, by 2005 to begin fitting their cases and pallets with RFID tags – tiny microchips that can automatically transmit to a special scanner all of the information about a container's contents or about individual products. Wal-Mart's other 12,000 suppliers would be expected to follow suit by 2006.

A number of those suppliers are tempted to do more than just affix chips to the goods they ship to Wal-Mart; they are also looking to implement RFID technology more broadly within their own organizations in hopes of cutting their own supply chain costs. Retailers and consumer products manufacturers, aware of Wal-Mart's interest in RFID, have also begun eyeing it as the next supply chain technology to invest in.

Fig. 3 shows the overall diagram in this research. Any legitimate user and management with a unique personal tag number, when it's close to the device system, the identity can be identified by RFID technology(Fig. 3①). When RFID reader read the user's tag number, the tag number will be passed into .NET platform of the host server via the wireless communication module. The .NET platform will capture data to determine the identity of the user or administrator from the database (Fig. 3②).If the user or administrator recognized as legitimate by the identity that is allowed to carry out relevant follow-up action. Otherwise, you need to add new users from the administrators to apply for a

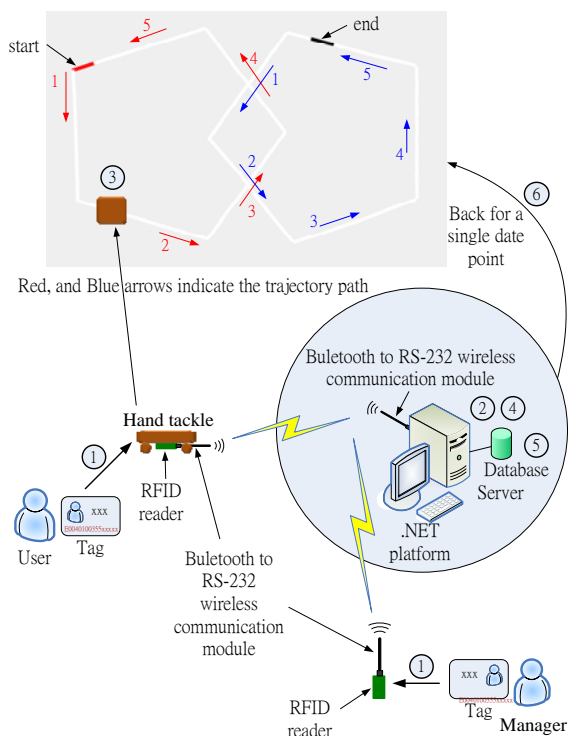new account to build log in, and be involved in the use of the system.

Fig. 3. The overall diagram

The dynamic read device in this research is composed of the RFID and hand tackle. The RFID reader is set up in the bottom of the hand tackle and connected to the server by the wireless communication module. We use 48 tags arranged in an interlocking pentagonal cross-path shown in Fig. 1. The starting point for interlocking pentagonal path is marked in red, and the end point is marked in black. The left pentagon in red arrows indicate the path trajectory of progress, right pentagonal trajectory of the blue arrows indicate the path forward. The user with the hand tackle is from the starting point of order along the path moving until the end (Fig. 3③). When the hand tackle reaches the finish line, the training and testing time will be terminated and RFID system will shut down. The relevant information will be stored during that time (Fig. 3④).The data is stored by using SQL Server database. When the managers run the application, the related data can be obtained after the integration and analysis results.

After being recognized as legitimate by the identity of managers, they can view information on users or running applications with the obtained results. Managers have rights to build on the basic data on .NET platform. The SQL server could be used to data insert, query, update and delete, schema creation and modification, and data access control (Fig. 3⑤). For viewing and analyzing the user's data, the system will look back upon a single date point. The managers select the user's card number at first. Based on the tags number, the managers can capture the user's test date in the SQL server. Then after the managers select a single test date and the test time, the managers can look back upon the time when the user's situations is by tracking the case (Fig. 3⑥).

2.2. Flowchart
The flowchart of this research is shown as Fig. 4. Everyone who wants to enter this system should be based on identification. This system uses the RFID reader to indentify the user or the administrator. If the entrants do not pass the identification, they must re-enter or apply the new data from the managers. When the entrants pass the identification, the system will identify the user or administrator separately. If the entrant is identified as the user, the system will enter the .NET platform with the interlocking pentagons. When the user moves the hand tackle with the RFID reader, the RFID reader will pass the tag number along the trajectory of the path into the server. At the meantime, the system will judge whether it is the end of the path. If not, the system will judge and capture the tag number continuously. If yes, the system will stop, show the using time, and store the using time and the tag number. If the entrant is identified as the manager, the system will enter the .NET platform with all functions. The SQL Server database is available on the basic information like data insert, query, update and delete, schema creation and modification, and data access control. Furthermore, the .NET platform and SQL Server database could be look back upon a single date point. The manager could view and analysis the user's data.
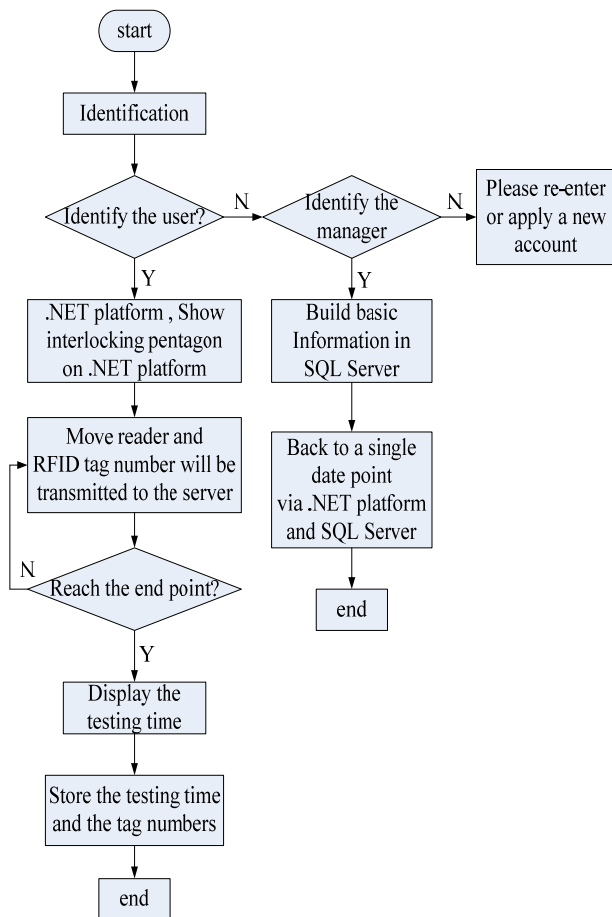
Fig. 4. The flowchart

2.3 Data Base Management System

A database management system (DBMS) consists of software that operates databases, providing storage, access, security, backup and other facilities. Database management systems can be categorized according to the database model that they support, such as relational or XML, the type(s) of computer they support, such as a server cluster or a mobile phone, the query language(s) that access the database, such as SQL or XQuery, performance trade-offs, such as maximum scale or maximum speed or others. Some DBMS cover more than one entry in these categories, e.g., supporting multiple query languages. Examples of some commonly used DBMS are MySQL, PostgreSQL, Microsoft Access, SQL Server, FileMaker, Oracle, RDBMS, dBASE, Clipper, FoxPro, etc. Almost every database software comes with an Open Database Connectivity (ODBC) driver that allows the database to integrate with other databases.

2.4 Relational Database

A relational database is a collection of relations. In a relational database, all data are stored and accessed via relations. Relations that store data are called "base relations", and in implementations are called "tables". Other relations do not store data, but are computed by applying relational operations to other relations. These relations are sometimes called "derived relations". In implementations these are called "views" or "queries". Derived relations are convenient in that though they may grab information from several relations, they act as a single relation. Also, derived relations can be used as an abstraction layer.

Relational databases, as implemented in relational database management systems, have become a predominant choice for the storage of information in new databases used for financial records, manufacturing and logistical information, personnel data and much more. Relational databases have often replaced legacy hierarchical databases and network databases because they are easier to understand and use, even though they are much less efficient.

This research uses a total of three tables: (1)tbname (Basic table), (2)tbdate (Date / Time table), and (3)tbdatetag (Tag number table). Table 1 shows the above three tables and its relationship. The ntagid (identification number) in the tbname and the ntagid (identification number) in the tbdate are associated. The sdate (test date) in the tbdate and the sdata (test date) in the tbdatetag are associated. Table 2 shows the formats of above three tables.

Table 1. The above three tables and its relationship.

tbname (Basic table)	tbdate (Date/Time table)
sno (Series number)	sno (Series number)
ntagid (Tag identification)	ntagid (Tag identification)
identity(Identity category)	sdate (Testing date)
name (Name)	stime (Testing time)
Nameno (ID number)	tbdatetag (Tag number table)
bithday (Birthday)	sno (Series number)
	ntagid (Tag number)
	sdate (Testing date)
	tagid (Tag number)

Table 2(a). tbname (Basic table)

DATA NAME	DATA FORMAT	NULL
sno (Series number)	int	NO
ntagid (Tag identification)	nvarchar（96）	YES
identity(Identity category)	nvarchar（96）	YES
name (Name)	nvarchar（96）	YES
Nameno (ID number)	nvarchar（96）	YES
bithday (Birthday)	datetime	YES

Table 2(c). tbdatetag (Tag number table)

DATA NAME	DATA FORMAT	NULL
sno (Series number)	int	NO
ntagid (Tag number)	nvarchar（96）	YES
sdate (Testing date)	nvarchar（96）	YES
tagid (Tag number)	nvarchar（96）	YES

Table 2(b). tbdate (Date / Time table)

DATA NAME	DATA FORMAT	NULL
sno (Series number)	int	NO
ntagid (Tag identification)	nvarchar（96）	YES
sdate (Testing date)	nvarchar（96）	YES
stime (Testing time)	nvarchar（96）	YES

2.5 Sequence

Fig. 5 shows the sequence between the system administrator, the user and the reader, Bluetooth wireless transmission, the server, and the database in the sequence diagram, in which the reader and the server pass the information through a wireless transmission.
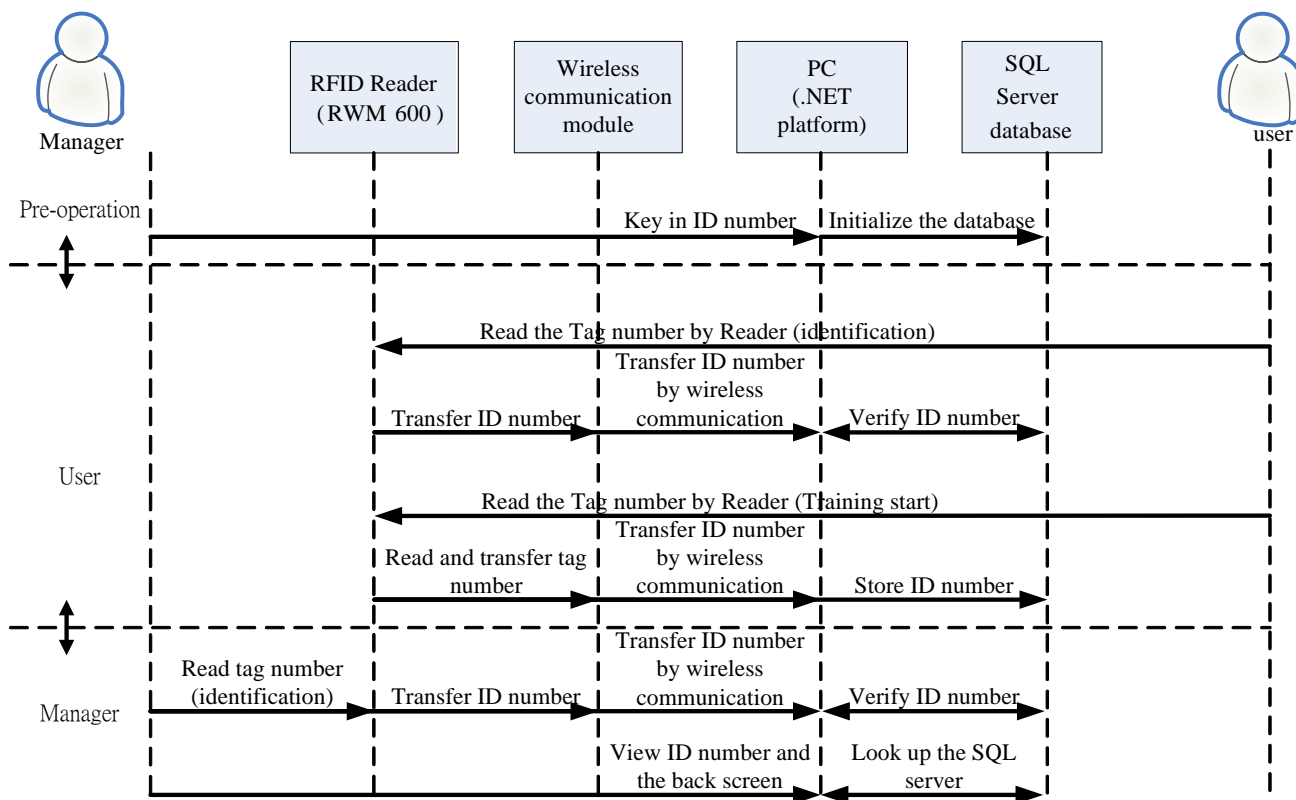

Fig. 5. The sequence

2.6. Transmission between the reader and the server

Fig. 6 shows the information transmission between the RFID reader and the host server. The system uses the Bluetooth wireless transmission. The RFID reader reads the tag number and then sends the tag number to the server via Bluetooth wireless transmission. The RWM600SK module is used in this research. This module can read the passive tag what is in the frequency of 13.56MHz and in accordance with ISO 15693. The farthest inductive distance is 200mm. In the data transmission, we use the E-P132-B wireless module (Bluetooth to RS-232). This module uses the Bluetooth technology and could replace the function of the RS-232. This module also includes the RS-232 interface itself; therefore, it could be applied to any device with the RS-232 interface.
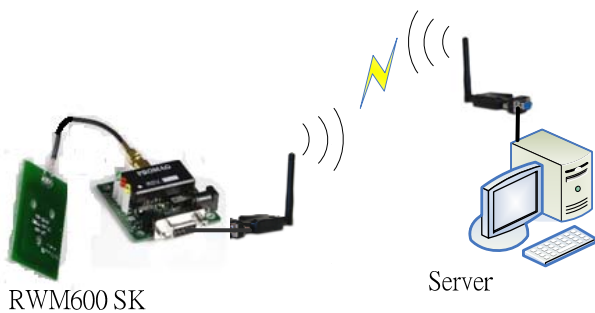

Fig. 6. Information transmission between the RFID reader and the host server

2.7. System Development Platform

Fig. 7 shows the Microsoft .NET Framework. The software development environment in this research is based on the .NET Framework 3.5. The .NET Framework is an integral Windows component that supports building and running desktop applications and Web services. It provides a managed execution environment, simplified development and deployment, and support for a wide variety of programming languages. Two key components are the common language runtime(CLR) which manages memory, code execution, and other system services, and the .NET Framework class library,

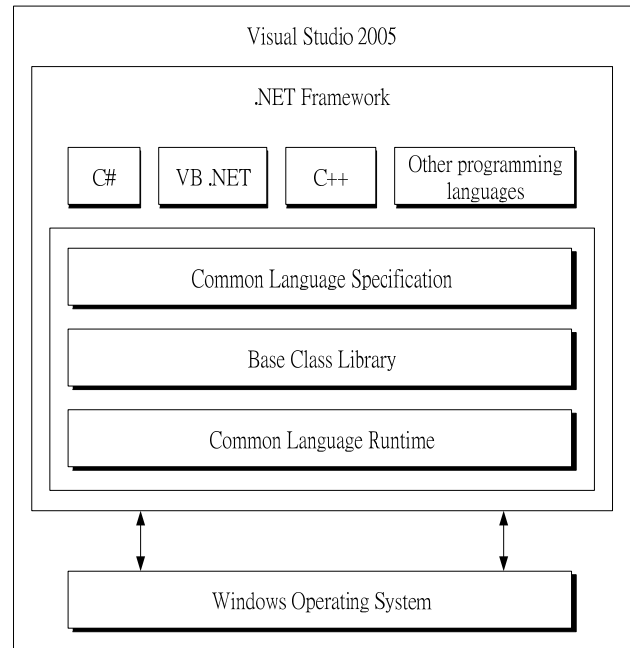which is a collection of reusable types the users can use to develop their applications.

Fig. 7. The Microsoft .Net framework

3. Result

The implementation of this research includes the tag, the hand tackle with RFID reader, Bluetooth wireless communication module, the database management in the server side, application development and testing.

3.1. The placement of the tag

Fig. 8 shows that 48 tags are arranged in an interlocking pentagonal cross-path where a reference for the users is when they use the hand tackle with the RFID reader to read the tag number. Fig. 9 shows the situation when the hand tackles with the RFID reader pass through the path.
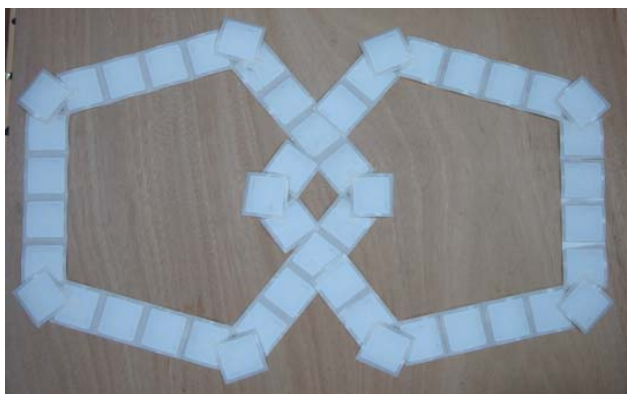
Fig. 8. 48 tags are arranged in an interlocking
pentagonal cross-path

Fig. 9. The situation when the hand tackles with the
RFID reader pass through the path.

3.2. User interface

Fig. 10 shows what the .NET platform screen shows when the user enters. At first, the users select the "start RWM600x" in the "Identification" to identify the user name and the personal identification number. The tag number will be passed to the server in order to identify. Fig. 11 shows that the actual motion when the user test through the interlocking pentagon path. The user moves counterclockwise from the red line. After tracking the left side of the pentagon, the user will track until the black line on the right side of the pentagon. When the corresponding tag number is read, the system will shows a little blue line on the screen. After a complete track, the detected tag number will be stored in the server to provide the managers viewing or analyzing the data.
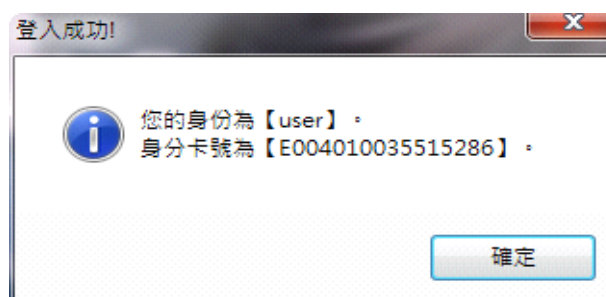
(a) Login successd
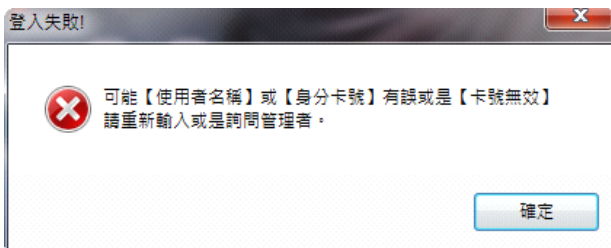
(b) Login failed
Fig. 10. The .NET platform screen shows when the user enters

Fig. 11. The actual motion

3.3. User interface

The managers enter into the .NET platform. After identifying by the system, the managers can choose the user identification, testing date and testing time. After clicking the search function, the data and the tracking path can be shown as Fig. 12.
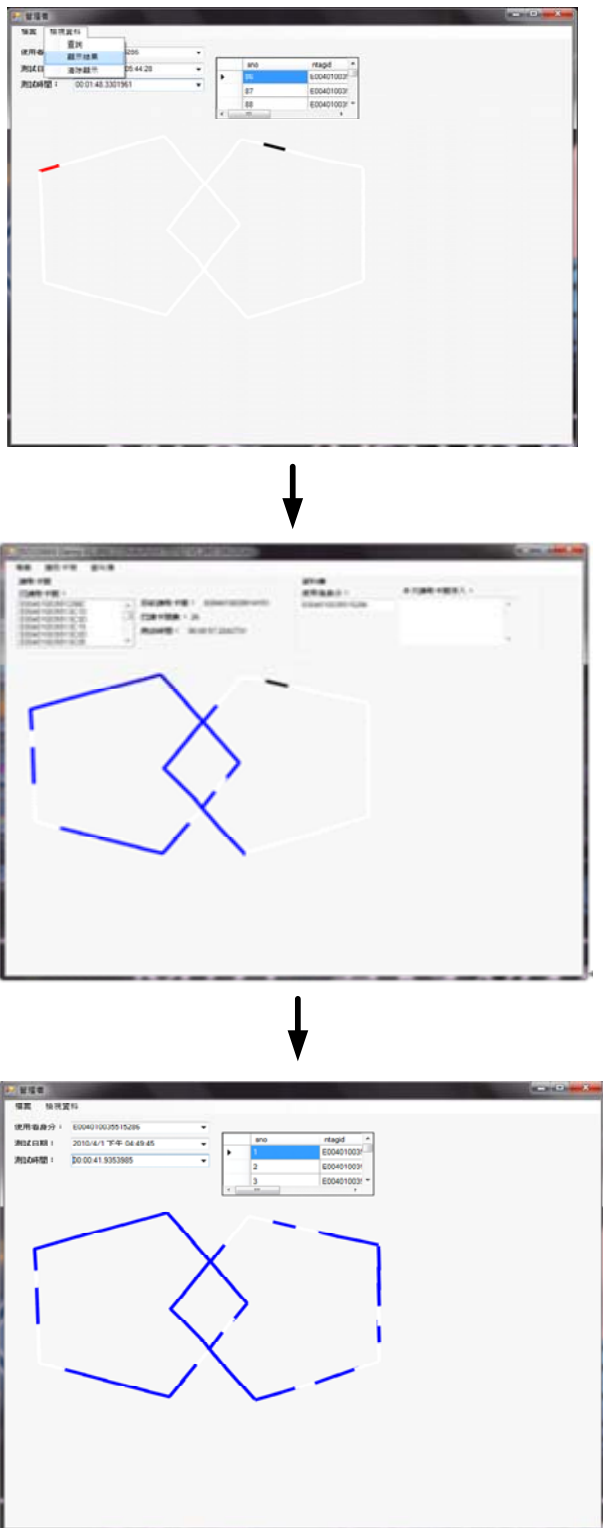

Fig. 12. The data and the tracking path.

3.4. Conclusion

The performance of the graphs in the perception is not only on the general performance of the physical process, but also the embodiment mode of motion and personality on people. Doing the training about the graphs is helpful to develop the potential instincts for people.

This research proposed the example of an interlocking pentagons path for practicing. In the actual application, it could be other graph according to differential proposes. As long as the managers establish the coordinate position of the graphs and the contents in the server, the system can do other training courses or testing results. The research also can be applied in the patients with mental retardation, head injury, chronic mental illness, and behavioral abnormalities, etc. for testing the response of graphs and as medical reference.

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