Development of GPS game machine of space and a position information system

Dae-Young Lee, Kil-Hwan Choi, Sang-Hyun Bae

375 Seosuk-Dong, Dong-Gu, Gwangju, Korea 501-759
**Department of Computer Science & Statistics, College of Natural Sciences, Chosun University*
Tel : +82-062-230-7962 Fax : +82-062-234-4326
E-mail: cssna01@hotmail.com ckhplc@hanmir.com shbae@chosun.ac.kr

Abstract: This system is unionized form about GPS and a pocket game machine. This game machine of the use only for the game with an existing system but the function of various purposes which carries out service relevant to a user's position information. This system have the game function, the function to offer space guidance service by the theme interlocked with a user's position, and the traffic safety education function.

***Keyword**: GPS ,pocket game machine, system of the space and a position information, the traffic safely education function*

1. Introduction

This study analyzes and arranges industrial data related to customers in business administration, applies CRM theory (Customer Relationship Management : (1) Subject - (2) Customer - (3) Future Vision - (4) Analysis and Strategy - (5) Behavior) which is to plan, support and evaluate marketing activities based on customers' characteristics and deals with development cases of traffic safety system for mobile education which can be easily applied to children. Modern children in the age of information have a portable game machine and are absorbed in playing games whenever they have a time. Therefore the researcher focuses (1) the subject of this research on developing traffic safety education system for children with (2) children who have a portable game machine, and makes system building and service development which make traffic safety education possible with sense of game as its future vision. Also this research conducts (3) analysis of situation of children's use of game machine and current mobile game machine industries, mounts GPS on existing game machines and installs program and related data for traffic safety education to detachable and exchangeable cartridge in other that children can have traffic safety education with their usual game machines. On one hand, it uses Wonder Swan Model made by Bandai as (5) behavior and develops exclusive GPS for this model as a pilot product.

2. Research Methods and System Development

Conventional game machines are mainly for children's amusement. This study uses existing portable game machines and develops a game machine combining GPS and portable game machine based on results of CRM analysis in order that users (children) can take part in traffic safety education program spontaneously.

2.1 CRM and GIS

This study begins with recomposing existing system (a form of system maintaining existing function and adding new function) and conducts traffic safety system development for children's mobile education applying CRM theory, CRM theory is centering around individual in the age of information (Fig. 1) and brings about integration of marketing theories according to the request of the times (Fig. 2). This study designs model of Fig. 3 merging Product-centric (Product-oriented) view and Customer-centric (customer-oriented) view in the process of grasping historical situation and current system and embodies this system.

2.2 Features of System

This system adds location information retrieval function (longitude, latitude, speed, altitude, acceleration, azimuth, current time) to function of existing game machine. That is, it is "GPS game machine" adding GPS measuring system to portable game machine. It can process location information received from GPS measuring system for portable game machine by geographical information system software for portable game machine and develops the following system with three functions by exclusive geographical information system processing of portable game machine with location information received. The three functions are as follows. (1) Educational functions including traffic safety experience learning and traffic safety operation education (2) Game function practicing existing game programs (3) Traffic information guide system function giving space guide service by themes including mountaineering, tour, fishing, hiking, driving, jogging and taking a walk In particular, development of traffic safety education functions (traffic safety education and operation simulation game) embodies system connecting virtual space given in this system software and location of this system user and it is very meaningful in that it gives a great availability to our society with the development of educational system performing a joyful experience learning of traffic safety for children. On one hand, since one of great features of this system adds GPS to portable game machine, it seeks addition of high technology to existing game machine and makes the general public use it for traffic safety education and traffic information guide system. And what is more important to remember is its maintenance of functions of existing portable game machines.

3. Contents of This System

There were vehicle mounting type, portable and computer connection types in measuring systems using GPS. It was only for informing users of location information from measuring geographical information. Portable game machines were used only for games. This system is an

epochal system combining the above two functions by adding GPS to existing game machines and has the functions of game machine + navigation system which gives information of user location within game machine, route retrieval to target position and space information service . It is three-function system.

3.1. Virtual Space Simulation Game System Using Game Functions and GPS

It detects user's position in GPS, calculates user's position in virtual space of game machine with relative coordinate and gives users the same sense as if they exist in virtual space of game software in reality.

3.2 Space Information Service System By Themes

It detects and compensates current location through GPS attached to this system and three artificial satellites and gives guide information when users move to where he desires for the purpose of mountaineering, touring, fishing, hiking, driving, jogging and taking a walk by geographical information system built in this system.

3.3 System of Educational System Functions Related to Traffic Safety Education

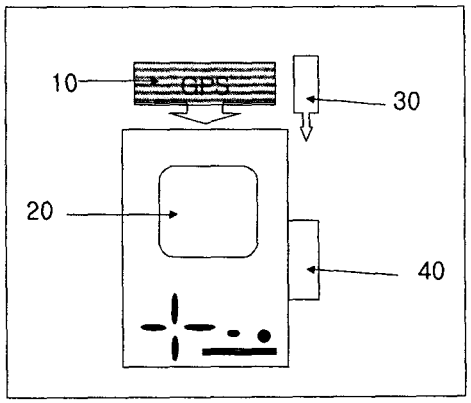
It detects user's position in GPS, calculates user's position in virtual space of game machine with relative coordinate and gives users the same sense as if they exist in virtual space of game software in reality. The educatee takes part in traffic safety education with game sense by using this system and has the education spontaneously and actively. In addition, it gives program evaluating user's own position movement to traffic safety education software, makes the educatee recognize their own problem of traffic safety accident and revise or improve their wrong behavioral habits. What is most important among purposes of traffic safety education is acquiring sufficient traffic safety knowledge and preventing traffic safety accidents by the educatee. This system is achieving goals of the above traffic safety education.

4. Form of System Embodiment and Configura -tion of System and Unit

As shown in Fig. 4, GPS measuring system has output part for connecting to portable game machine and outputs information to portable game machine. Portable game machine gives location information received from GPS measuring system such as route information service from detecting user's location and position to destination by information processing based on user's operation with stored program in geographical information system or game software.

GPS measuring system for game machine is composed of measuring part of user's current position and output part of location information from measuring it. User's location information is measured by GPS measurement in measuring part. Geographical information system software conducts actual location guide service and space information navigation service by user's operation.

4.1 Setting This System to Traffic Safety Education Related Education System



[The name of part of product]
10 GPS device
20 Carrying along game appliance main frame
30 game/ GIS connection/traffic education connection software/map data cartridge
40 Game software cartridge parenthesis

***Figure 1** Composition system do system chapter of these system*

Hardware environment for operating educational system which conducts experience learning of traffic safety connecting virtual space of this system and this system user by installing traffic safety education softwares (traffic safety education, operation simulation game, etc) is uniting main body of portable game machine with GPS system and inserting traffic education related software/map data cartridge into the inlet of game software cartridge of portable game machine.

That is, GPS + traffic safety education software (traffic safety education, operation simulation game, etc.) are installed in portable game machine. User locates in the map of traffic safety education software mounted on game machine, operates it up and down, left and right and conducts traffic safety education.

GPS is added to existing portable game machines, this system is given to users familiar to existing portable game machines and the educatee takes part in traffic safety education program spontaneously. Therefore, conventional geographical education or traffic education has been made by using educational materials such as books or video. Development of this system makes education of local geographical education and traffic safety education by the educatee's participation possible and it cab be also used for local geographical education and traffic safety education textbooks.

4.2 Setting Functional System Supplying Space Guide Service by Theme

For the operation of traffic information guide system supplying space guide service by theme, uniting GPS system with the main body of portable game machine, installing GPS in the main body of portable game machine and inserting GIS/map data cartridge are preconditions.

It is the system giving the guide service from detecting user's own location and position and guiding destination and it also conducts space guide service by themes such as mountaineering, touring, fishing, hiking, driving, jogging and taking a walk.

4.3 Setting Virtual Space Simulation Game System Using Game Functions Conducting Existing Games and GPS

When this system is used, GPS and game, GIS related traffic education software and map data cartridge are set in a corresponding way to the three functions mentioned in the above Chap 3.

In the above function 1), for accomplishing game system functions conducting existing games, game software is installed in the main body of portable game machine and basic hardware setting is completed. How to conduct follows existing method (operating function button). For operating virtual space simulation game system using GPS, basic hardware environment is set by installing GPS and game software to the main body of portable game machine and user corresponds his own position and up and down, left and right movement to relative coordinate in virtual space simulation of GPS + portable game machine and plays the game.

5. System Functions and Configurations

Functions and processing means of this system are as follows. Macro-browser and path to jump to target program are installed to GPS portable game machine in order to perform a specific program in main processing unit. Destination is input and destination from current location is input with retrieval results by detect and electric retrieval means according to retrieval result from current position and electric detect means calculated with location calculation, memory including geographical or location information, transmit means defining destination in mobile terminal and transmitting it, and traffic information from current position to destination is displayed on screen. Also it has the function of presenting guide information from current position to destination and showing map of traffic surrounding destination.

5.1 Data Processor

As shown in Fig. 4, when user decides to start exploring theme in Step 10, GPS measuring is begun by GPS measuring system for portable game machine in Step 20. In Step 30, location information from GPS measuring system for portable game machine is input to the main body of portable game machine. In Step 40, geographical information system is driven and navigation service is conducted with location information from measuring system for portable game machine or information by user's operation.

5.2 Functions and Processing of System mplementation Means

Fig. 2 is configuration diagram of data processor in implementing GPS using system.

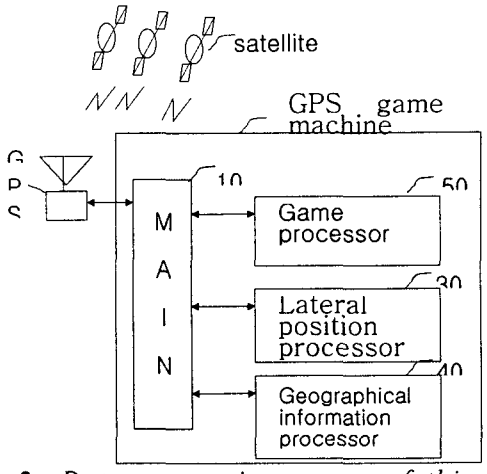


Figure 2 *Data processing means of this system*

GPS (Global Positioning System) receiver measures and calculates current position, position processor calculates the position of game machine through GPS and informs calculated position information to geographical information processor 40. And geographical information processor 40 designates current position of mobile terminal 10 and destination by user's key operation to input data and software for each purpose is operated. Output is indicated on the display part of this system.

6. Developmental Cases

Application of space information guide system of this study can be made to detecting user's position and location, navigation related service, virtual space game system service connecting virtual space and position data detected from this system, space information guide service by themes, traffic safety experience learning and traffic safety operation education.

Fig. 6 is a trial product of this development.

This research develops the system made of GPS receiver, software (program, map) cartridge and main body of game machine.

Since cartridge attachable and detachable to the main body has capacity limit, it must be exchanged by locations and uses. It also gives multipurpose services such as space navigation systems using space information data in real time. Fig. 4 is an example of fishing information guide service system.

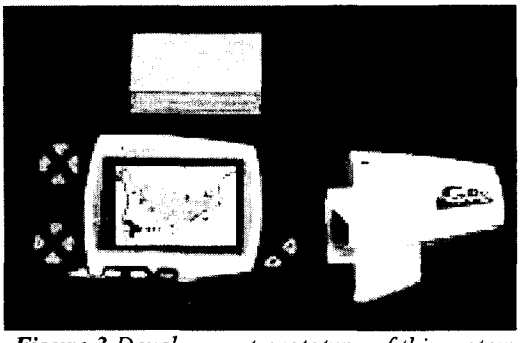


Figure 3 *Development prototype of this system*

***Figure 4** Theme(fishhook) space information guidance screen example*

7. Conclusion

This system attaches GPS measuring system to existing portable game machine, gives it to interface function, calculates user's position information and applies the calculated data to the various purpsoes for traffic safety education and geographical information system related software. That is, it reflects user's actual location moving information on virtual space of portable game machine by GPS and gives service of user's space or position movement. It converts existing portable game machine into multipurpose system including navigation function giving spatial location information by themes and brings about a result which creates absolutely new value.

On one hand, if traffic safety education related software is applied to this system, traffic accident education can be improved and since this system is operated in game machine, children can take part in educational programs spontaneously and it is meaningful in the side of social education and software development related to this should be made in future.

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