USER INTERFACE ON FLEXIBLE ELECTRONIC MOBILE DEVICE

A case study of user interface used by police officers during their road policing duties

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Abstract. The study aims to design a user interface of the flexible mobile electronic device for Taiwanese police officers to perform their road policing duties. Firstly, the investigation into the road policing duties by police officers was conducted. Secondly, according to the investigation results: (1) Develop scenarios for the user interface used by police officers during their road policing duties; (2) Reconstruct the systematic process of their road policing duties; (3) With the hierarchical task analysis method, analyze the results collected from the interview with the police officers to clarify the interrelations among the road policing duties. Finally, the user interface used by police officers during their road policing duties is designed based on the scenarios, system process and analytic results.

1. Motivation and Purpose

The flexible mobile electronic device will become the mainstream products in the near future, due to its lightweight, slimness, and portability. The special service personnel gradually rely on the mobile electronic device to accomplish their missions. Taiwan has planned to set up the “Traffic Law Enforcement Management System” since 2005 so it is expected that police officer have to rely on the mobile electronic device to accomplish their

missions. For the study, a user interface was designed for the flexible mobile electronic device, depending on the requirements of the road policing duties by police officers.

2. Research Framework

As shown in Figure 1, the research process consists of three phases. In the first phase, an investigation into how the Taiwanese police officers handle traffic violations was carried out to know their needs. The following three tasks were undertaken in the second phase, according to the interview with the police officers:

(1). Develop scenarios for the user interface used by police officers during their road policing duties.
(2). Reconstruct the systematic process of their road policing duties.
(3). With the hierarchical task analysis method, analyze the results collected from the interview with the police officers to clarify the interrelations among the road policing duties.

In the third phase, a user interface was established for the police officers to use during their road policing duties, based on the scenarios and analytic results.

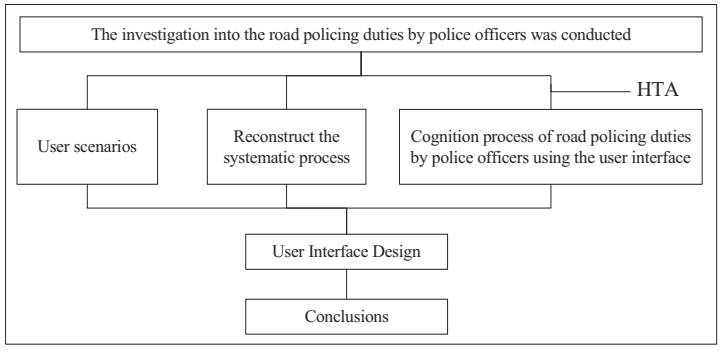


Figure1. Research Framework.

3. Policing Duties Investigation

The process and requirements of handling traffic violations by police officers were obtained by interviewing 6 entry-level police officers at Zhongshan

Police District, Zhongshan 1st Police District, Daan Police District, Liuzhangli Police Station, and Wolong Street Police Station in Taipei City.

3.1 THE WORK FLOW OF REPORTING TRAFFIC VIOLATIONS BY POLICE OFFICERS

The work flow of reporting traffic violations by police officers is described as follows:

(1). Stop violators and ask them to present Personal and vehicle relevant papers.
(2). Perform personal and vehicle data query via radios to check if violators are wanted criminals or missing people and if their vehicles are stolen vehicles.
(3). Write a traffic ticket.
(4). Hand the counterfoil of the traffic ticket to the related traffic agency to complete the reporting procedure.

3.2 POLICING DUTIES PROBLEMS AND REQUIREMENTS

In the whole process of reporting traffic violations, the main tasks include "personal and vehicle data query" and "writing a traffic ticket."

1. Personal and vehicle data query:
   (1). Query can't be performed quickly and efficiently through voices and texts.
2. Writing a traffic ticket:
   (1). It may take some time to look for the appropriate laws and regulations.
   (2). Too many words need to be written down.
3. Requirements resulting from the surroundings:
   (1). For emergency events, police officers should stay alert when handling traffic violations.
   (2). The system should be easily, quickly, and accurately operated to accomplish jobs.

4. Development of scenarios for the user interface used by police officers during their road policing duties.

In this phase, a system is developed based on the work flow of handing traffic violations by police officers, to increase efficiency and reduce the

number of the bookings a police officer should perform. Develop scenarios for the user interface used by police officers during their road policing duties:

1.) Personal and vehicle data query:
Type the data based on the relevant papers presented to check if the violator is a wanted criminal or his/her vehicle data corresponds to the registered data.

2.) Writing a traffic ticket by police officers:
Specify the violations, what laws and regulations the violator breaks, and where he/she should report for duty. The police officer should print the traffic ticket and transmit data to the traffic agency where the punished person should report for duty after the violator signs his/her name.

5. The system process of road policing duties by police officers using the user interface

According to the road policing duties content, the handling process for traffic violations by police officers is reconstructed, as shown in Figure 2.

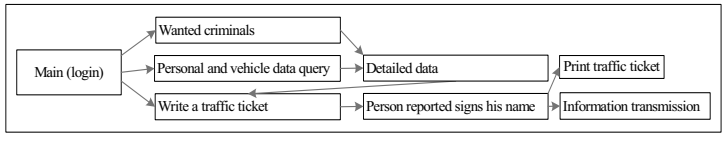


*Figure 2.*The road policing duties content diagram.

6. Cognition process of road policing duties by police officers using the user interface

With the Hierarchical Task Analysis (HTA) method, the process of road policing duties by police officers consists of the personal and vehicle data query, wanted criminals list, input of the personal identification number and vehicle data, writing a ticket, looking for laws and regulations, input of the traffic agency, printing the ticket, transmitting ticket data, and complete the whole procedure. Figure 3 shows the interrelations among each part.

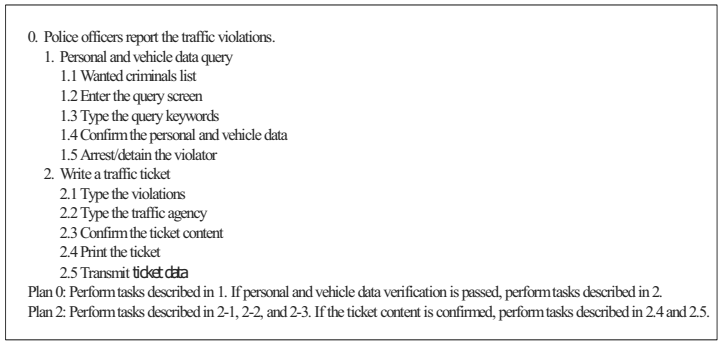


Figure 3. Application of Hierarchical Task Analysis (HTA) method to analyze the process of road policing duties.

7. User Interface Design

When police officers write a traffic ticket, the two main tasks are "personal and vehicle data query" and "writing a traffic ticket." The user interface is designed based on these two tasks to meet the requirements of road policing duties (table 2).

According to the previous investigation, police officers may encounter the following problems.

(1) Query can't be performed quickly and efficiently verbally and through texts.
(2) It may take some time to look for the appropriate laws and regulations.
(3) Too many words need to be filled in the traffic ticket.
(4) Stay alert during road policing duties.
(5) Each task should be done easily, quickly, and accurately.

In this phase, the following solutions were devised in terms of the presentation of the user interface and ways of operating.

(s1). Photos are used to help police officers to identify during personal and vehicle data query.
(s2). The task-oriented menu is used for group information to reduce the amount of time required by looking for laws and regulations.
(s3). Simple, clear, and intuitive design is used to facilitate operations.
(s4). Contents are presented page by page and selections are made with less buttons to reduce mental loads during services.

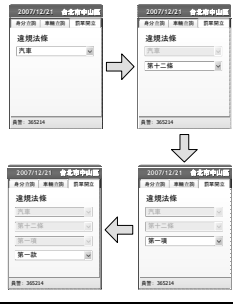
(s5). Brief data is offered first and the detailed information will not be presented after the user selects it.

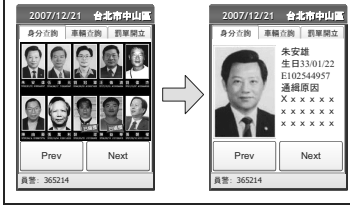
Refer to Table 1 for relations between problems and solutions during road policing duties.

TABLE 1. Relations between problems and solutions.

Problems \ Solutions	s1	s2	s3	s4	s5
1	O			O	O
2		O			
3		O	O	O	
4				O	O
5	O	O	O	O	O

TABLE 2. Interface Design.

	(s1)Photos are used to help police officers to identify during personal and vehicle data query.
	(s2). The task-oriented menu is used for group information to reduce the amount of time required by looking for laws and regulations.

	(s3). Simple, clear, and intuitive design is used to facilitate operations.
	(s4). Contents are presented page by page and selections are made with less buttons to reduce mental loads during services.
	(s5). Brief data is offered first and the detailed information will not be presented after the user selects it.

8. Conclusions

In this study, the user interface is designed by analysis and reconstruction of the road policing duties content to meet police officers' requirements.

In the next phase, this conceptual design will be used to make a complete operating system for analysis and inspection. In addition to the suggestions that will be brought up later, interaction patterns of this user interface and its components will be inspected through the evaluation factors, such as the operating performance, workloads, and satisfaction.

Acknowledgements.

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