The in-depth accident study to evaluate the advanced automatic collision notification system in Japan

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INTRODUCTION:

In Japan, an automatic collision notification service called “HELPNET” has been in operation since 2000. In addition to HELPNET, the pilot study on Advanced Automatic Collision Notification (AACN) and Helicopter Emergency Medical Service (HEMS) system, so-called D-Call Net, had started in several prefectures of Japan by the D-Call Net committee in affiliation with Emergency Medical Network of Helicopter and Hospital (HEM-Net) since November 2015.

Figure 1: Newly developed AACN and HEMS system in Japan.

Regarding D-Call Net pilot system, HELPNET infrastructures already developed for existing Japanese ACN service were used for sending vehicle data to HELPNET center. In the case of accident, Event
Data Recorder (EDR) data was added on usual HELPNET data and transmitted from a vehicle to HELPNET server at HELPNET center. D-Call Net server got vehicle data such as Delta V and seatbelt status, etc. and input them to the algorithm. The algorithm result was transmitted to “iPad” at the Trauma Center nearby the crash spot. Simultaneously, an operator of HELPNET made Emergency Call to the fire department. In case of severe injury, “iPad” indicated the serious situation and a doctor rushed to the accident spot by a helicopter. After the helicopter with a doctor and a nurse took off, verbal communications between the helicopter pilot and the fire department were started to decide a rendezvous point nearby the crash spot. After landing, the doctor and the nurse contacted the injured occupant who was curried by an ambulance there. This system is operated at about 30 trauma centers with Helicopter Emergency Medical Service in Japan, as of 17 November 2017.

AIM :

This paper is focusing on the in-depth accident study to evaluate the Advanced Automatic Collision Notification and Helicopter Emergency Medical Service system (D-Call Net) in Japan. For this system, the Occupant Injury Predict Algorithm newly developed by Nihon University was utilized. About 2.8 million of Japanese accident data, so called ITARDA Macro Data, were calculated to define logistic regression risk curves of fatal and severe injured drivers and front passengers. During the pilot study, accident cases should be collected and accident database should be established in order to evaluate D-Call Net algorithm and D-Call Net Helicopter Emergency Medical Service operation at both fire departments and trauma centers. The results will be feedback on the actual service planned to start in spring 2018.

METHOD :

In case of a collision involving a D-Call Net vehicle, the collision information and the vehicle EDR data are transmitted to HELPNET call center. An operator of the call center calls back the vehicle driver and if the driver needs Emergency Medical Service, the operator connects a fire department nearby. Simultaneously, collision information and the result of the algorithm are transmitted to the trauma center. HELPNET notifies the collision information to Toyota Technical Center using the D-Call Net accident report. After that, Toyota Technical Center forwards the report to ITARDA. After that, we contact a head quarter of a local police station nearby the accident spot according to an assistance of National Police Agency. Finally, we contact the driver involved and get his approval of in-depth accident investigation on his D-call Net case. Usually, we investigate his vehicle with the system, including EDR, the accident spot and the police station or highway patrol. Moreover, the interview of the driver is also carried out by our investigators. If the driving data recorder is equipped on the vehicle, the video data is also stored in case of the driver’s approval.
RESULTS:

The in-depth accident study jointed with HEM-Net had started since September 2016. During the first period of the study from September 2016 to February 2017, we investigated eleven in-depth accident cases, not only with HEMS operation but also without HEMS operation. In four cases of them, the driver or the front passenger sustained slight injuries and in the other case, they were not injured. Since April 2017, a new study period has started. As of the middle of November 2017, we investigated sixteen cases. Among these cases, there was only one case with HEMS operation. However, EMS on the accident spot cancelled HEMS because of the driver’s slight injuries.

![Figure2: The world first Helicopter take off by D-Call Net.](image)

On the other hand, one bug case also occurred in Saitama prefecture. Because of vehicle system bug, the vehicle did not sent the delta V values. Then the system predicted occupant injury risk as 0 %, however, the helicopter with a doctor took off. Fortunately, occupants suffered slight injuries only and no HEMS needed. The system was revised soon and such a case never occurred. It was very helpful before actual D-Call Net service in spring, 2018.

CONCLUSION:

In Japan, D-Call Net system was developed and the pilot study of the system was started. More than one hundred of D-Call Net cases occurred and the data was transmitted to HELPNET center. Among them, ITARDA carried out some in-depth accident investigations. The findings of this study will be feedback on the actual service planned to start in spring 2018. Japanese government has the high target that the number of traffic fatalities should be under 2,500 in 2020. The world's safest road traffic safety society will be established using D-Call Net.

This study is still on going by February 2018. Authors will add another finding on the presentation at the RS5C conference.
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REFERENCES
