

**ВИСОКА ТЕХНИЧКА ШКОЛА СТРУКОВНИХ СТУДИЈА У НОВОМ САДУ,
ОДСЕК ЗАШТИТЕ,
НОВИ САД, РЕПУБЛИКА СРБИЈА**

**ТЕХНИЧКИ УНИВЕРЗИТЕТ У ЗВОЛЕНУ
ТЕХНОЛОШКИ ФАКУЛТЕТ ЗА ПРЕРАДУ ДРВЕТА
ОДСЕК ЗАШТИТЕ ОД ПОЖАРА,
ЗВОЛЕН, РЕПУБЛИКА СЛОВАЧКА**

**УНИВЕРЗИТЕТ У НОВОМ САДУ, ФАКУЛТЕТ ТЕХНИЧКИХ НАУКА
ДЕПАРТМАН ЗА ГРАЂЕВИНАРСТВО И ГЕОДЕЗИЈУ
НОВИ САД, РЕПУБЛИКА СРБИЈА**

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**14. МЕЂУНАРОДНА КОНФЕРЕНЦИЈА
ЗАШТИТЕ ОД ПОЖАРА И ЕКСПЛОЗИЈЕ**

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Review paper

ANDROID-BASED DECISION SUPPORT IN ACCIDENTS INVOLVING THE TRANSPORTATION OF DANGEROUS GOODS

Abstract: Vehicles carrying dangerous goods are part of our everyday lives, because transportation by road has become the most common method in Europe due to its cost-efficiency and other reasons. Repeatedly, we can see tanker trucks or lorries marked with ADR orange plates. However, the majority of the population is not even aware of what these plates indicate. Our previous researches proved that civilian population tend to carry out primary intervention in road accidents, as they take part in road traffic as well. They are on the spot even before the arrival of the firefighters and they need to give help and intervene without any protective equipment or special skills. This research is about the development of the mobile Java software, UN-NUMBER, introduced in 2009 to keep up with technological progress. This software assists civilian population as well as professional firefighters and disaster managers to carry out interventions involving dangerous goods and to prevent further accidents.

Keywords: decision support, disaster management, fire brigade, UN-number, ADR, mobile phone, Android

АНДРОИД АПЛИКАЦИЈА КАО ПОДРШКА ОДЛУЧИВАЊУ У НЕСРЕЋАМА КОЈЕ УКЉУЧУЈУ ПРЕВОЗ ОПАСНИХ МАТЕРИЈА

Апстракт: Возила која превозе опасне материје су део наше свакодневице, јер је друмски транспорт постао најчешћи вид транспорта у Европи због економичности и других разлога. Често можемо видети камионе-цистерне или камионе означене са ADR наранџастим таблама. Међутим, већина становништва није ни свесна на шта оне указују. Наша ранија истраживања показују да су грађани ти који први интервенишу у саобраћајним незгодама, пошто су и сами учесници у друмском саобраћају. Они су на лицу места и пре доласка ватрогасаца, и они треба да пруже помоћ и интервенишу без икакве заштитне опреме или знања посебних вештина. Ово истраживање је о развоју Јава софтвера за мобилне телефоне, UN-NUMBER, који је уведен 2009. да омогући држање корака са технолошким напретком. Овај софтвер помаже грађанима, али и професионалним ватрогасцима и лицима која управљају катастрофама, да изврше интервенције са опасним материјама и да спрече даље несреће.

Кључне речи: подршка одлучивању, управљање катастрофама, ватрогасци, UN-number, ADR, мобилни телефон, Андроид

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1. INTRODUCTION

The development of the mobile phone application, UN-Number assisting the mitigation of accidents which occur during the transportation of dangerous goods started in 2007 and it was a great success in conferences both in Hungary and neighbouring countries, so in 2009 it was welcomed by fire fighters in Nyitra, Slovakia, too[1]. The programme was compatible with MIDP 2-based Java mobile phones, which were the most widespread at the time [2]. However, technological progress has not stopped and over just half a decade this type of mobile phone has become obsolete. As a result of the technological progress, smart phones and tablets have been ranked first place almost with every age group starting from the lower grades of primary schools. These devices are easily used even by young children, and the level of the applications, games is almost identical to those running on professional computers. They are also able to access the Internet almost without any restraint. These devices run Android operating system [3], their price is remarkably low and they are easy to use.

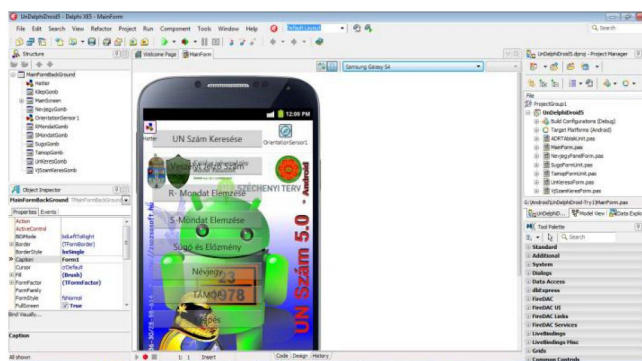


Figure 1. Android Development Environment

2. PROBLEMS

Although the Java-based UN-Number, which has already been mentioned, can run in Android-based systems under special circumstances, the majority of emulators [4] cannot run this application properly or only to a limited extent.

Keeping up with the technological progress, it has become inevitable to adapt this software to Android systems. Our purpose was to choose a development environment which allowed development to various platforms at the same time. (Figure 1) The size of the data base was already optimised and minimised during the previous developments. As a result, it occupies little space, although Android-based devices can be almost freely expanded with Micro SD memory cards. It was another important factor that the program should be available in further languages as well, so the core of the program, the data base itself was translated into Slovakian and English.

3. CURRENT AND EXPECTED NUMBER OF USERS

The application has been installed by 4000 Hungarian or foreign fire fighters speaking Hungarian and it is also used by employees of private transportation companies. As a result of the spread of Android-based mobile phones, we expect an increase of 50-100% in the number of phones capable of running this software. In addition, thousands more will be able to use this programme due to translations.

Although the program was primarily designed for the professional staff of the fire service, disaster management and police, its simplicity and clarity can make it a useful application for the civilian population as well. Both drivers and professionals dealing with the dispatch and control of the consignments found it helpful. Their opinions together with their recommendations and criticism facilitated the development of the application.

4. FIELDS OF APPLICATION

In the application of the software there are no limitations since it does not require Internet access or even mobile phone signal. The data base is stored on the device, so it can also function in closed spaces, basements, tunnels or other spaces which are shielded from mobile signal or radio frequency. Regular drills are held to prepare fire fighters for the dangers of fire fighting in closed spaces. They are indispensable to improve their skills and decision-making [5]. During these drills (Figure 2) the intervention crew is regularly presented with unusual circumstances, such as dangerous substances or waste “stored illegally”. The identification of the substance is generally assisted by the UN number shown on the package if it is really present there. These drills are also important for the management in order to acquire skills of decision-making [6]. With the help of the program they can continually check their own or their team’s activities. The application of the program in the drills or in our pastime as a hobby improves our competencies, which increases the speed of decision-making in actual interventions.

Some dangerous substances may become explosive when coming into contact with air, and mobile phones and other information devices intended for general use – similarly to radios using the Unified Digital Radio Communications System (EDR) – cannot be used nearby, though explosion-proof devices do exist. They were designed for working in the vicinity in dangerous materials and in extreme conditions.



Figure 2 Hazardous material practice - Kazincbarcika Source: www.langlovagok.hu

5. THE RELEVANCE OF THE PROBLEM

The transportation of hazardous goods is a dangerous activity by itself. The dangerous nature of the activity stems from the features of the goods transported and the transportation. Even a properly labelled and documented consignment can develop extreme cases, not to mention illegal or unlabelled goods. It is a well-known fact that traffic is one of the most dangerous activities, where the highest number of accidents and deaths occur, and a potential cause can be transportation by road. [7] The leader of the intervention crew is the person who is in charge of the tasks completed or to be completed related to the mitigation following the accident. Beyond possessing general knowledge, the leader of the intervention has to be quick to notice the unique features, which basically determine the nature of the emergency. During reconnaissance, he has to pay close attention to every detail in order to make the right decision. The "situation" in this case includes all the factors that have to be considered during the intervention in order to mitigate or eliminate the emergency. Different dangerous substances may cause entirely different problems at the scene of the intervention. The signs (markings, labels, placards) together with the specialist literature available (e.g. guides) provide initial information on the main dangers, but the correct identification of the substance is needed. [8] The software developed by us assists in completing these tasks, increases the speed of processing the data available, thus supports decision-making.

6. SUMMARY

As a result of the development, not only an Android-based adaptation of an already existing program was created, but an application containing an improved, faster and larger data base, which can run on almost every Android-based smart phone and tablet. Although Embarcadero Delphi XE5 development environment allows the development of Multilanguage applications, the various languages can be downloaded separately for the sake of convenience and smaller size. Thus, besides Hungarian, version 5.0 can be downloaded in English and Slovakian as well.

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