WEATHER FORECAST PRESENTATION BASED ON LEADING EDGE MOBILE PHONES AND JAVA TECHNOLOGIES

Prezentacija vremenske prognoze temeljena na vodećim tehnologijama mobilnih telefona i Jave

MARIO ŽAGAR[1], LOVRO KALIN[2] and KRISTIJAN MODRIĆ[3]

[1]Faculty of Electrical Engineering and Computing, Zagreb University,
Unska 3, 10000 Zagreb, Croatia
[2]Croatian Meteorological and Hydrological Service, Grič 3, 10000 Zagreb, Croatia
[3]Pliva d.d., Vukovarska 49, 10000 Zagreb, Croatia
mario.zagar@fer.hr

Abstract: The paper presents a new method of weather forecast presentation, which was developed as a project during the course of postgraduate study. So far, the use of mobile phones in the presentation of weather forecasts was limited and non-interactive. This application provides an interactive access to meteorological products in Croatia. It has been developed in the MicroJava programming language and successfully tested in an emulator and on real mobile devices. The rapid development of mobile technologies will allow for intensive application of such products.

Key words: Java, weather forecast, MIDlet, J2ME, MicroJava, mobile device, wireless, GPRS

Sažetak: Rad predstavlja novu metodu u prezentaciji vremenske prognoze, koja je razvijena u okviru poslijediplomskog studija. Dosadašnja primjena mobilnih telefona u prezentaciji prognoze vremena bila je ograničena, neinteraktivna (statični SMS, MMS i sl.) Aplikacija omogućuje interaktivan pristup dobivanju meteoroloških proizvoda o vremenu u Hrvatskoj. Aplikacija je izrađena u programskom jeziku MicroJava i uspješno testirana na emulatoru i na mobilnim uređajima. Nagli razvoj mobilne tehnologije omogućit će sve veću primjenu ovakvih i sličnih proizvoda.

Ključne riječi: Java, prognoza vremena, MIDlet, J2ME, MicroJava, mobilni uređaj, bežično

1. INTRODUCTION

This paper describes a new method of weather forecast presentation based on modern mobile communication technologies – at the moment the fastest-growing industry in the world. Recent studies show that every fifth person in the world owns a mobile device, and in Croatia more than 80 percent of households have at least one; at the same time, only 37 percent have a personal computer (GFK, 2003).

2. TECHNOLOGY

In June 1999, Sun Microsystems announced a new edition of the Java 2 platform: the Java 2 Micro Edition – J2ME (Muchow, 2002). The purpose of the Micro Edition is to enable Java applications to run on computing devices with limited computer power, memory and display, such as mobile phones, PDAs, pagers, etc. It is based on the popular Java programming language, and the application is called MIDlet.

MIDlet is an abbreviation composed of two words: MID for Mobile Information Device, and "let" is the suffix of "applet", which means mobile application (Piroumann, 2002).

Over time, this technology has become standard with the new generation mobile devices, so that almost all new models support it, independently of who produces them.

Thanks to the Java technology, mobile phone features can be enhanced through interactive, dynamic applications which can be downloaded and stored in a mobile phone. And when a user does not need them any more, they can be easily erased. Examples of different Java applications include interactive games, utilities, organisation and travel programmes, etc.

3. APPLICATION IN WEATHER FORECAST

In Croatia, as well as abroad, current technologies (radio, TV, newspaper) have been exploiting weather forecast presentations for a long time already so that there are limited possibilities left of further development (specialised TV-stations etc.)

In the last decade, the rapid development of mobile technology has introduced a significantly new way of communication and living.

So far, the weather forecast in mobile devices was mainly presented through SMS (short message service) and MMS (multimedia message service), WAP pages etc.

The disadvantage of such an approach is that the user always gets the same product.

The Java technology, on the other hand, allows the building of software that provides interactive access through the intuitive interface, at any desired time and in every place.

Besides weather forecasts, users can also retrieve real-time information, such as data from automatic synop stations, radar and satellite images (every 15 and 30 minutes, respectively), special warnings, nowcastings etc. As the application uses data from the Internet, independently of the mobile provider, users can access the desired information no matter where they are, whether in Croatia or abroad.

4. PRESENTATION

A MIDlet, named *CroWeather*, with a complete weather forecast, has been created as a University project. Forecasts are given for the present and the following day, textually and in picture format. As for actual data, besides satellite and radar images, this MIDlet also provides textual data on current weather conditions as temperature, pressure, humidity etc. Users can choose among different Croatian cities and the main regions.

The programme is a so-called MIDlet application. It should be installed on Java-enabled mobile devices, and is written in the Micro Java programming language. The server side scripts providing files and data are written partly in PHP and Fortran 90, mainly in a Unix environment.

The application was developed using Sun's Wireless Toolkit (-, Java 2 Micro Edition, 2000) that emulates Java-enabled mobile devices, and was successfully tested on several mobile phones (Nokia 7650, Nokia 3650)

In 2001, mobile phones of the 2,5 generation were just being introduced to the Croatian market. At first, it was difficult to find a mobile phone that would comply with the features required (Java-enabled, GPRS, colour display desirable), so that at the time only one type actually matched our criteria.

Although the application worked successfully on the emulator, we experienced some difficulties when testing it on a real device: insufficient implementation of Java in the actual device (during http requests the application would stop and would not work in a single thread, so we used multithreading), and the mobile provider did not support the transfer of data files larger than 5 kB.

As every other, this Java MIDlet also consists of two files. One with a .jar extension (Java archive), which is the actual MIDlet, and another with a .jad extension (Java application description), a plain text file that contains some general data about the application, version, authors, producer etc. The total size of the files is cca 30 kB, so they can be easily downloaded to a mobile phone via an IR (infrared) or Bluetooth connection, or otherwise directly from the WAP pages (OTA - over the air). Once the files are downloaded, users can

simply install the MIDlet through the Java application manager, depending on the mobile device type (Topley, 2002).

The following presentation consists of screen-shots taken on the Nokia 7650 mobile phone.

FEATURES:

Select City:
- ⦿ Zagreb
- ○ Zg-Sljeme
- ○ Slavonski Brod
- ○ Osijek
- ○ Bilogora
- ○ Daruvar
- ○ Gradiste

Options ▾   Exit

Select City:
- Zagreb
- Zg-Sljeme
- Slavonski Brod
- Osijek

Get
Exit

Select   Cancel

ZAGREB   04 PM
cloudy
T= -3°C hum= 57%
wind 5m/s NE
press= 1029.2 hPa
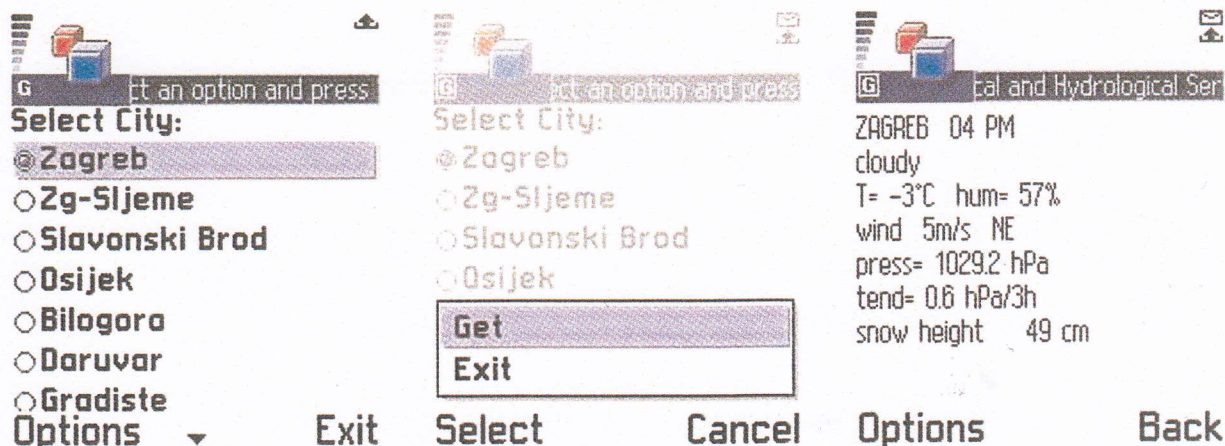tend= 0.6 hPa/3h
snow height   49 cm

Options   Back

Figure 1. Textual information about current weather conditions in 32 Croatian continental and coastal cities (weather description, temperature, humidity, pressure, time change of pressure, wind, sea temperature, snow height – all updated hourly)

Slika 1. Tekstualne informacije o aktualnim vremenskim prilikama u 32 kontinentalna i obalna grada u Hrvatskoj (opis vremena, temperatura, vlažnost, tlak, tendencija promjene tlaka, vjetar, temperatura mora, visina snijega – osvježeno svaki sat)

Select language:
- ○ English *
- ⦿ Croatian
- ○ German *
- ○ Italian *
----
* forecast for Adriatic only

Options   Exit

Odaberite:
- ☐ hr danas
- ☒ hr sutra
- ☐ zg danas
- ☐ zg sutra
- ☒ jadran
- ☐ pomorci

Options   Back

HRVATSKA SUTRA:
U unutrasnjosti vecinom oblacno ponegdje sa slabim snijegom, i to uglavnom u drugom dijelu dana.
Na sjevernom Jadranu djelomice suncano.
Na srednjem i juznom umjereno do znatno oblacno mjestimice s kisom, a
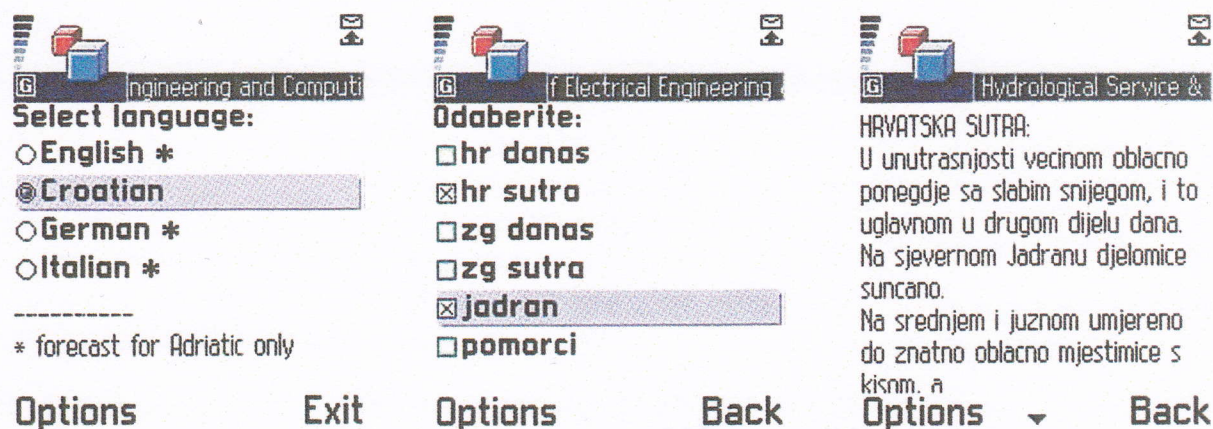
Options ▾   Back

Figure 2. Textual forecasts for Croatia and the city of Zagreb for the present and the following day

Slika 2. Tekstualna prognoza za Hrvatsku i za grad Zagreb za današnji i sljedeći dan
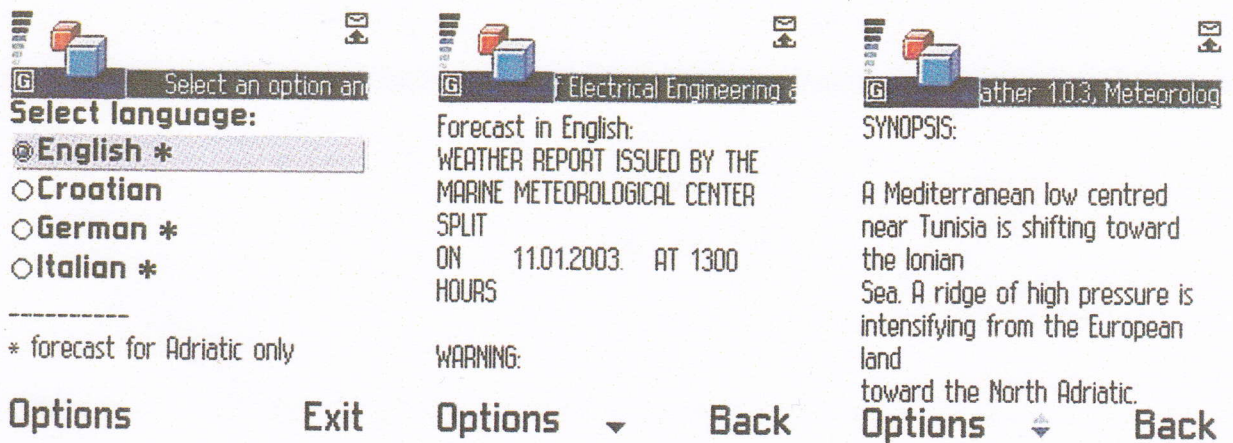
Select an option an

Select language:
- ⦿ **English** *
- ○ **Croatian**
- ○ **German** *
- ○ **Italian** *

----

* forecast for Adriatic only

Options　　　　　　　　　**Exit**

Electrical Engineering

Forecast in English:
WEATHER REPORT ISSUED BY THE
MARINE METEOROLOGICAL CENTER
SPLIT
ON　　11.01.2003.　AT 1300
HOURS

WARNING:

Options　▾　　　　　　**Back**

ather 1.0.3, Meteorolog

SYNOPSIS:

A Mediterranean low centred
near Tunisia is shifting toward
the Ionian
Sea. A ridge of high pressure is
intensifying from the European
land
toward the North Adriatic.

Options　⇕　　　　　　**Back**

Figure 3. Textual forecasts for the Adriatic for the next 12 hours in 4 languages: English, German, Italian and Croatian, updated at 6.00 and 13.00 hours

Slika 3. Tekstualna prognoza za Jadran za sljedećih 12 sati na četiri jezika: engleskom, njemačkom, talijanskom i hrvatskom, osvježene u 6 i 13 sati
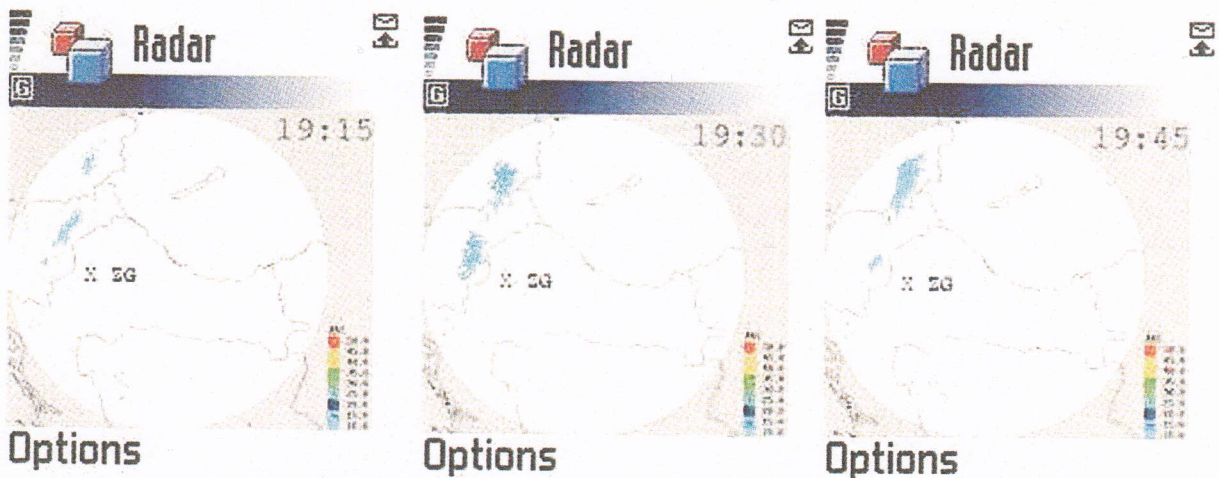
Figure 4. Radar image – current picture, last 4 animated pictures, last 8 animated pictures

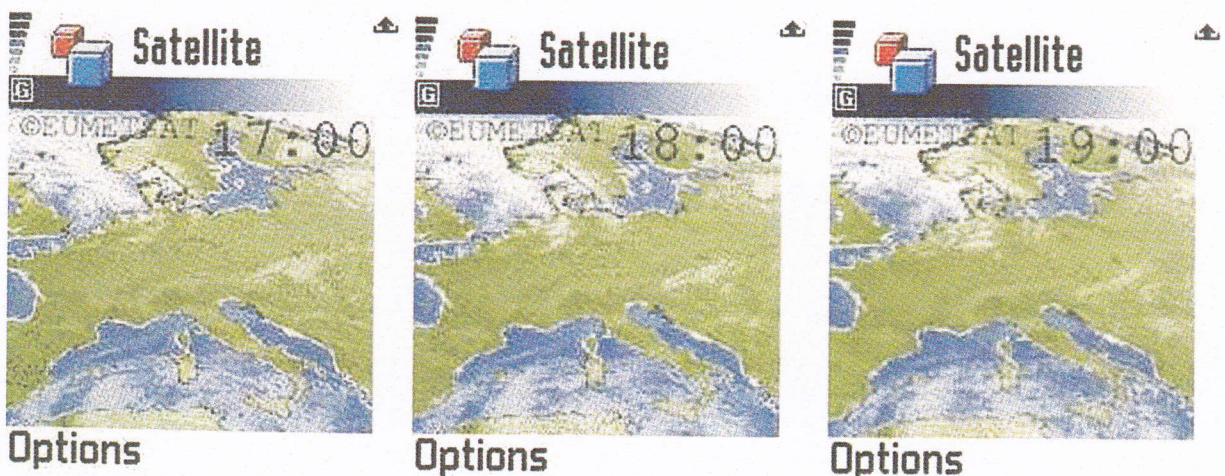Slika 4. Radarska slika – aktualna slika, animacija 4 posljednje slike, animacija 8 posljednjih slika

Figure 5. Satellite image – current picture, last 4 animated pictures, last 8 animated pictures

Slika 5. Satelitska slika – aktualna slika, animacija 4 posljednje slike, animacija 8 posljednjih slika
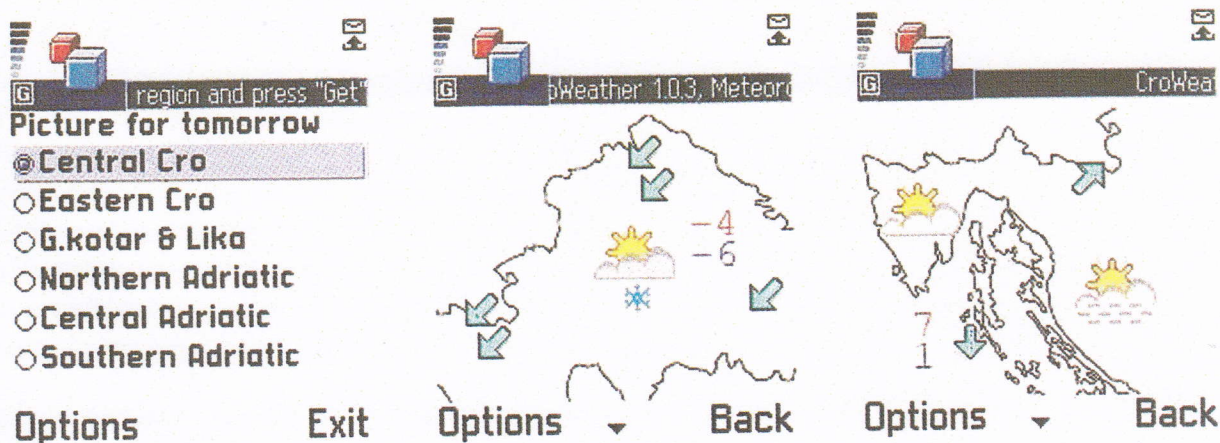
Figure 6. Graphic forecasts for 6 Croatian regions for the present and the following day

Slika 6. Slikovna prognoza za 6 hrvatskih regija za današnji i sutrašnji dan
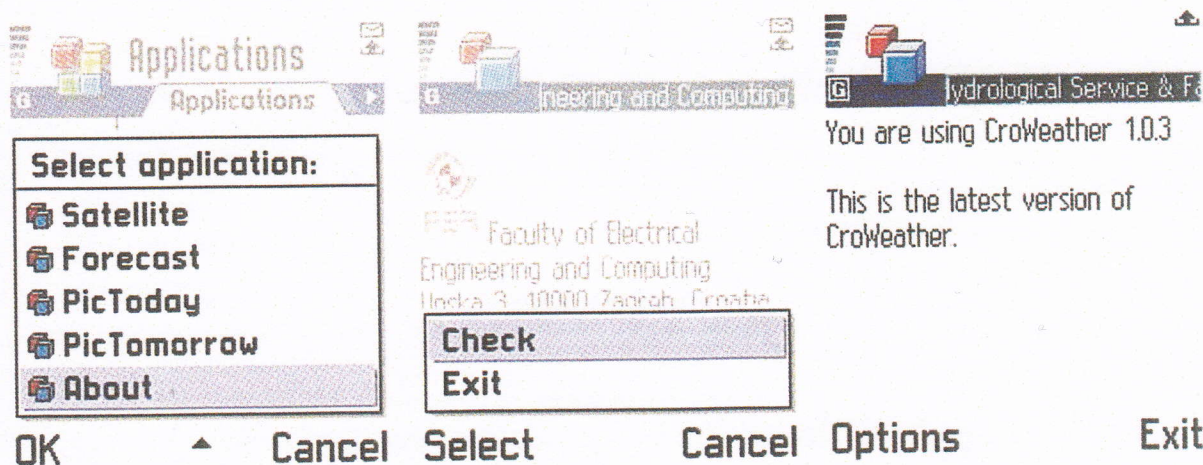

Figure 7. *About box*. Besides general information about the application, authors etc, users can check if there is a new version of the programme and download it.

Slika 7. *About box*. Osim općih informacija o programu, autorima i dr., korisnik može provjeriti postoji li novija verzija programa i skinuti ju.

5. CONCLUSION

CroWeather for Java-enabled mobile devices has been successfully tested on several types of devices. The application is small and is not computer-expensive, which makes installation and usage relatively easy. Modern wireless technology combined with Java technology provides advanced usage of products such as weather forecasts, so that the user can selectively and interactively access the desired data, no matter where he is. The authors believe that this and similar solutions, and their applications, will play a dominant role in modern weather forecast presentation, especially with regard to the newcoming generations of mobile devices.

REFERENCES

–, Java 2 Micro Edition, Wireless Toolkit User's Guide, Release 1.0. Palo Alto, CA: Sun Microsystems, November 2000.

Čukman, T., 1997: Java. *Alfej*, Zagreb, 520 pp.

GFK, 2003 - http://www.gfk.hr/press/hi-tech.htm

Muchow, J.V, 2002: Core J2ME Technology and MIDP. Prentice Hall PTR, NJ (The Sun Microsystem Press, Palo Alto), 710 pp.

Piroumann, V., 2002: Wireless J2ME Platform Programming, Prentice Hall PTR, NJ, 400 pp.

Sušanj, D., 1997: Java: Programiranje za Internet i World Wide Web. *Znak*, Zagreb, 722 pp.

Topley, K., 2002: J2ME in a Nutshell, O' Reilly, 478 pp.