

Geoskica - Android OS Based Software for Real-Time Creating of Field Sketches

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SUMMARY

Geoskica is an applicative solution based on the idea of mass acquisition of surveying field data and their recording in digital form. The goal of such a form of data acquisition is to fully substitute the traditional method of surveying data acquisition, and to preserve the traditional approach in the digital data acquisition procedure to the largest possible extent.

Geoskica is developed in Eclipse software, Java development environment. The used hardware platform is tablet PC with Android OS which is not connected by communication means to surveying instruments during the sketching process. Sketching is performed by tablet screen touch, thus providing for simple data recording. The software solutions provide the user with functional and simple work environment which enables fast and reliable work with a sufficient number of visual geometrical and attributive images with represent standards of particular thematic units. It is possible to import in Geoskica environment various formats of raster files which may present an auxiliary tool for detail sketching. Functions targeted towards solving particular mathematical exercises in the process of data acquisition are designed to be simple. An input datum from surveying instruments into Geoskica displays the name and coordinates of a recorded point in textual format. When importing files with coordinates, Geoskica offers Plan mode which displays a realistic image of the recorded detail. All geometrical objects contain 2D and 3D datum and, as such, may be used for 3D terrain modeling. Data collected in Geoskica software are exportable to templates of various CAD and GIS environments, with a well-designed method of data layering per geometrical and attributive conditions into desired layers.

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1. INTRODUCTION

Field data acquisition in common practice so far has been a procedure performed on paper which serves as the basis for data processing in the office. The experience shows that, as it is now, translation of collected data into digital form in the office takes the same time as field data acquisition. Out of those reasons, the idea of electronic field data recording was born. It comprises various concepts of the present practice: field data reliability, use of applicable rule books, speed of topographic plan preparation, simplicity of work, possibility to expand requests.

2. REQUIREMENTS

Digital sketching software engineering implies preservation of the traditional concept, adjusted to new technologies and their features. From this aspect, it was necessary to fulfill the following requirements:

- Reliability
 - Data storage
 - Data storage independent of operator's will
 - Creation of backup data copy during data storage
 - Data transmission via Internet network
- Functionality
 - Provide simplicity of work
 - Sketching must not take longer than the traditional sketching method
 - Apply effective standards of surveying data recording
 - Reduce the amount of data processing in the office by 85%
- Possibility of expansion
 - Fitting of new requirements into the existing concept
 - Update of existing functions

Apart from the above requirements, within project implementation, we tested the existing hardware, a tablet PC on which the Geoskica program operates. Hardware characteristics necessary for reliable field work are: minimum tablet size 7", screen backlight (IPS+ option), battery duration 6h or more, possibility of battery charging in field, data transfer via Wi-Fi network or USB, Android OS.

3. PROGRAM FEATURES

Drawing of lines, points, symbols, creation of object polygon, lot and lot part and text writing in Geoskica are performed tablet screen touch in “sketch” mode. When a function is activated, its name is displayed on the screen to let you know it is active. To deactivate an active function, there is a “stop” function intended to stop any active function. Such a concept was applied in order to avoid “pen” for sketching on the tablet screen. When sketching field details in Geoskica, the number of the point surveyed by a surveying instrument is recorded. This number represents the link between the detail sketched in Geoskica and the number recorded on the surveying instrument. After import of coordinates in Geoskica, we are able to see the image of recorded detail in “plan” mode in real coordinate system. There are two modes in Geoskica – “sketch”, where detail sketching takes place, and “plan”, where data are only displayed in real coordinate system. By application of three colors of geometrical objects, we visually control whether the objects are: defined, undefined or directly measured in field (by laser distance meter, tape line, meter, etc.). Geoskica enables enlarging of sketched detail up to 1:1 level and thus provides fully comfortable work.

Main features of the Geoskica program are described through three units: Parameters, Functions and Data Export (Fig. 1).

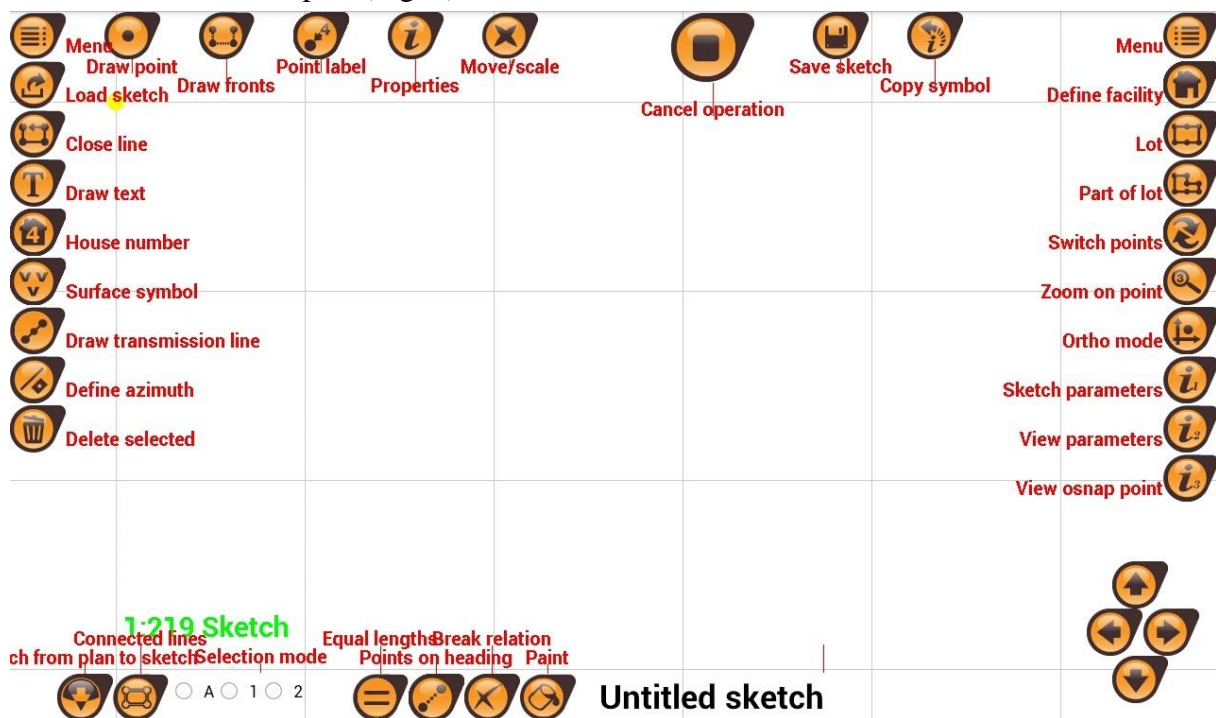


Figure 1 Geoskica main screen with description of controls.

3.1 Geoskica Parameters

Geoskica parameters define the thematic units for point and line (TK CODE) and parameters of display for point, line, text, point and line symbol in “sketch” (Fig. 2) and “plan” (Fig. 3) mode.

3.2 Geoskica functions

Geoskica functions are intended to embrace all works which can be possibly executed during traditional sketching and to use all the benefits of the computer technology. The functions may be divided into three categories:

- General functions
- Functions of geometrical objects and attributes creation
- Mathematical functions which define the unknowns of geometrical objects

The general functions include:

- Save
- Open
- Assign automatic number to a point
- Image parameters
- Switch from “sketch” to “plan” mode
- Save under a new name
- Close active files
- Information on selected object
- Sketch parameters
- Cancel active function

During operation, Geoskica activates, in particular time interval, autosave of current project under its current name with extension auto.scr.

The functions of geometrical objects and attributes creation include:

- Draw line
- Create lot polygon
- Create object polygon with associated attributes
- Text writing
- Import raster files
- Translate “plan” to “sketch”
- Rotate selected object
- Move selected objects
- Draw lines for underground utilities
- Create point
- Create lot part polygon
- Define symbol: point, line and area
- Write house number
- Import point coordinates
- Select objects
- Scale selected objects
- Copy geometrical and attribute variables onto another object of the same type

The mathematical functions which define the unknowns of geometrical objects include:

- Function of equal lengths and
- Function defining belonging of points to a line or line extension
- Function which breaks mathematical equalities

3.3 Geoskica Data Export

Data export from Geoskica may be performed into CAD and GIS environment by means of adequate formats. For the requirements of data export from Geoskica, it is necessary to define adequate templates for data export into CAD and GIS environment. Geoskica offers a very good concept of sorting geometrical objects with associated attributes into adequate layers. Each geometrical object contains data in 2D and 3D form. This enables us during data export from Geoskica into the desired software to make a proper 3D terrain model in a relatively short time. During data export from Geoskica, it is possible to select the desired scale in which the data shall be displayed.

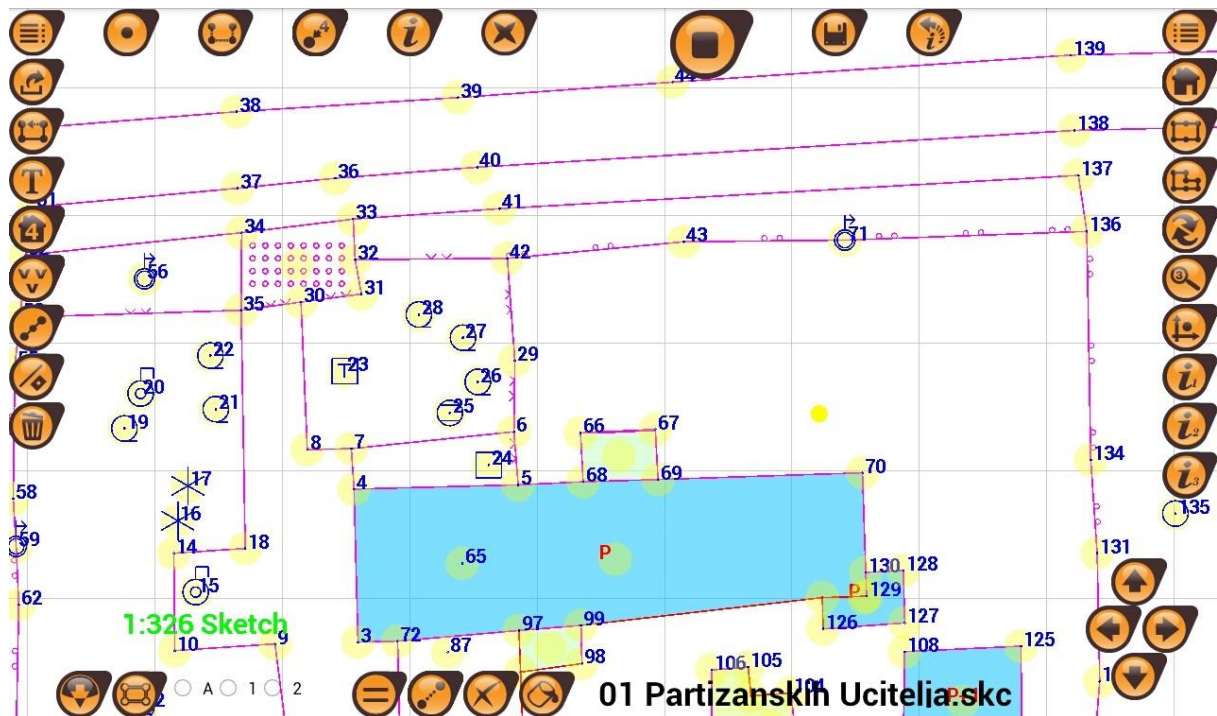


Figure 2 Sketched in detail mode "sketch"

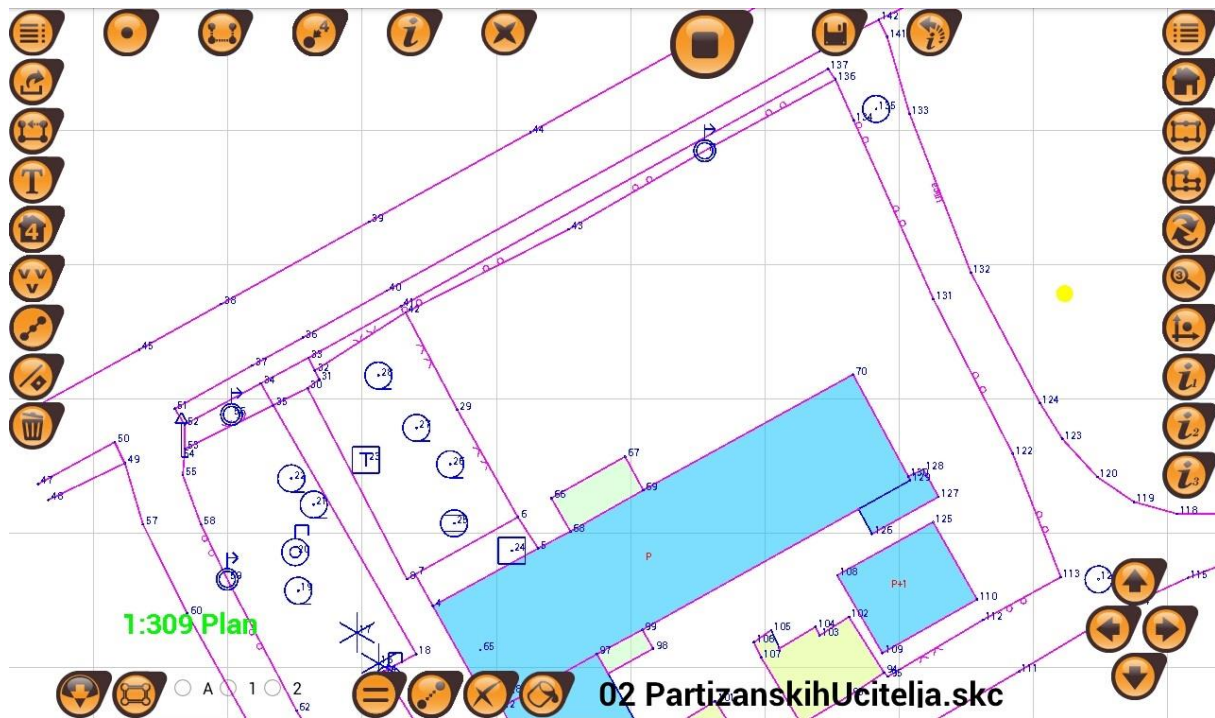


Figure 3 Sketched in detail mode "plan"

4. CONCLUSION

Based on initially set Requirements in the procedure of software engineering for mass field data acquisition and their recording in digital form, it may be stated that Geoskica fully meets the set Requirements. The conditions from the aspect of sketch creation speed as compared to the traditional method are fulfilled, the time required for survey mapping is reduced, data safety is solved through three levels of data storage, simplicity of work and possibility of sketched detail control are provided.

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