



## Selection of the pointing device for elders

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Motivation

Measurement methodology

Data registration

Data processing

Results

Conclusions

Future work

Facts: Aging of society

Aging affects both perception of events and accuracy of manual operations.

Computer is almost a synonym of the information society

A computer with modern software can be helpful tool for elders improving quality of their life

Construction of a pointing device should take into account of user constrains

A set of tests should give a tool to compare their performance with others

Set of exercises have been developed and performed with use of a :

- 1 – traditional mouse Dell Optiplex 740
- 2 – Trackball Logitech TrackMan<sup>®</sup> Marble<sup>®</sup> T-BC21

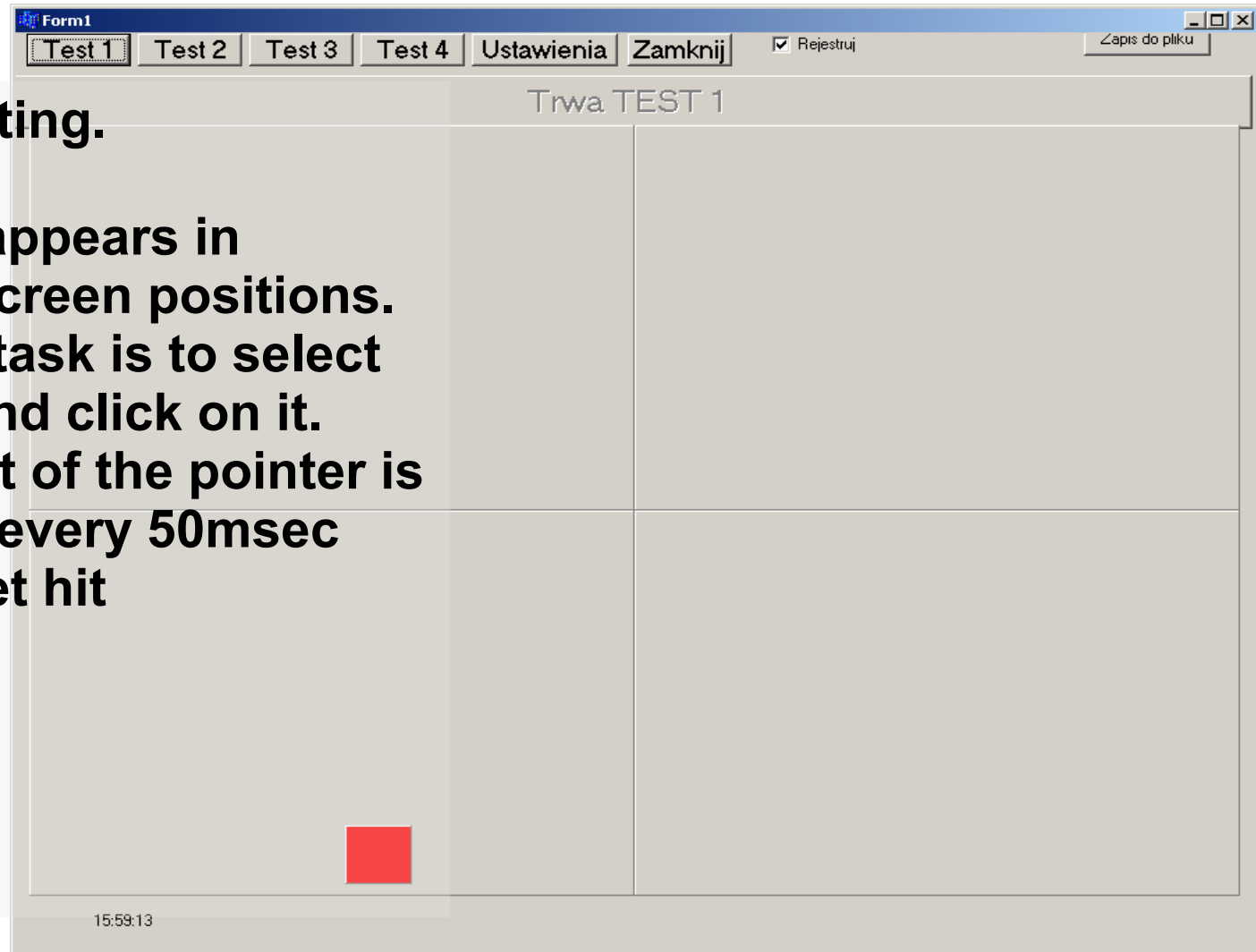
Group of volunteers:

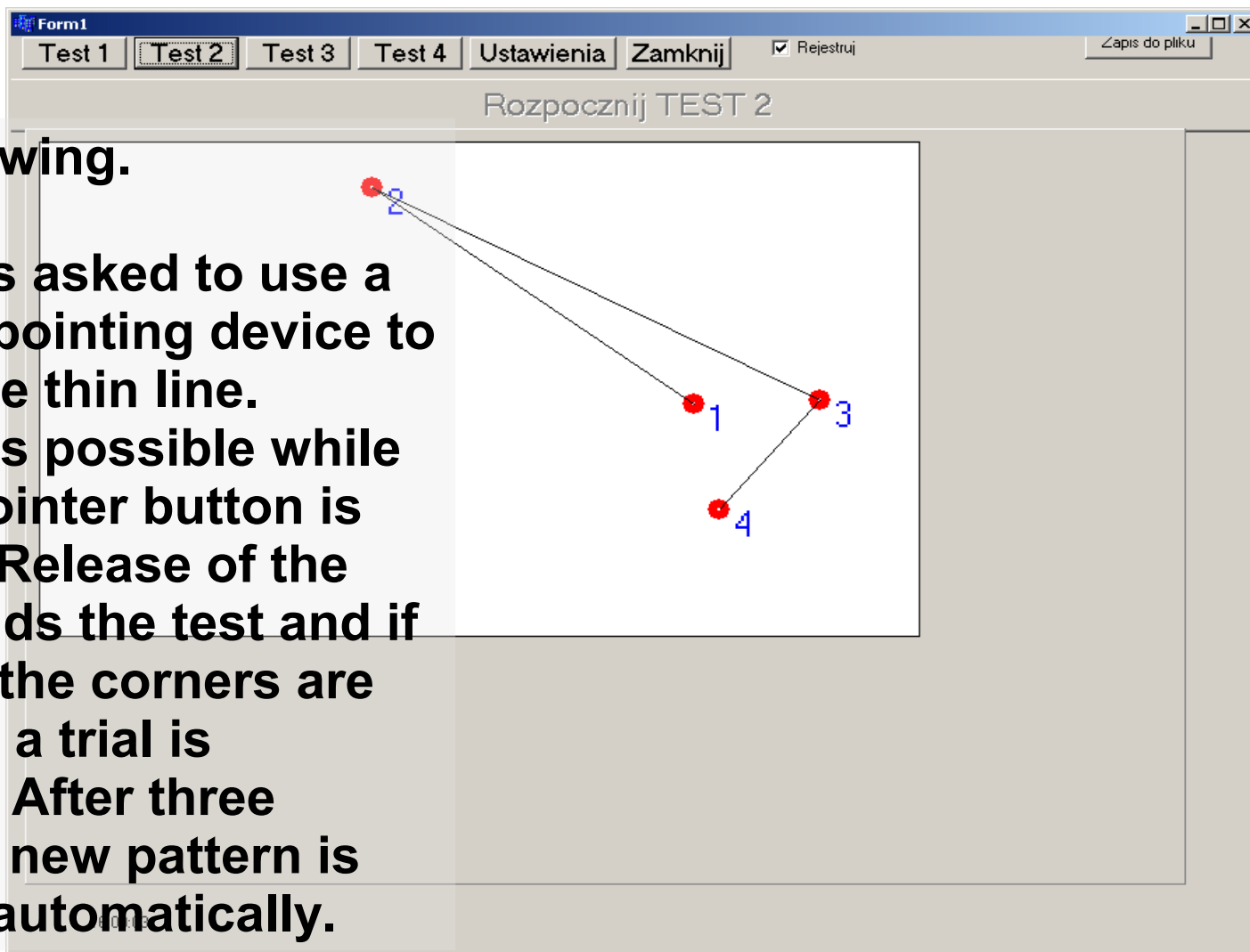
- 1- group of adults age between 25 and 40 – reference group (10 persons)
- 2- group of elders age between 65 and 85 – target group (20 persons)



## Target hitting.

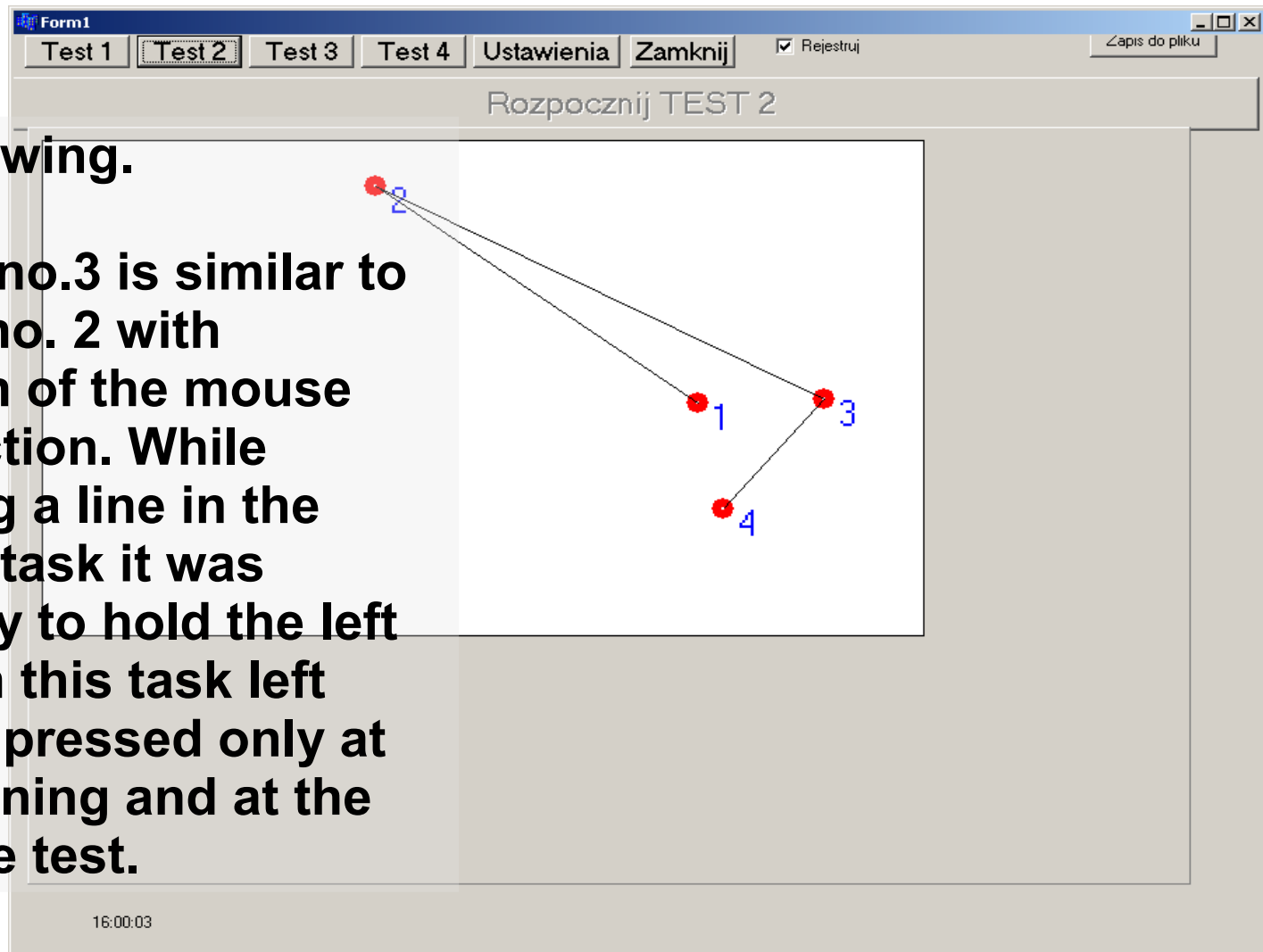
**Red box appears in random screen positions. The user task is to select the box and click on it. Movement of the pointer is recorded every 50msec until target hit**

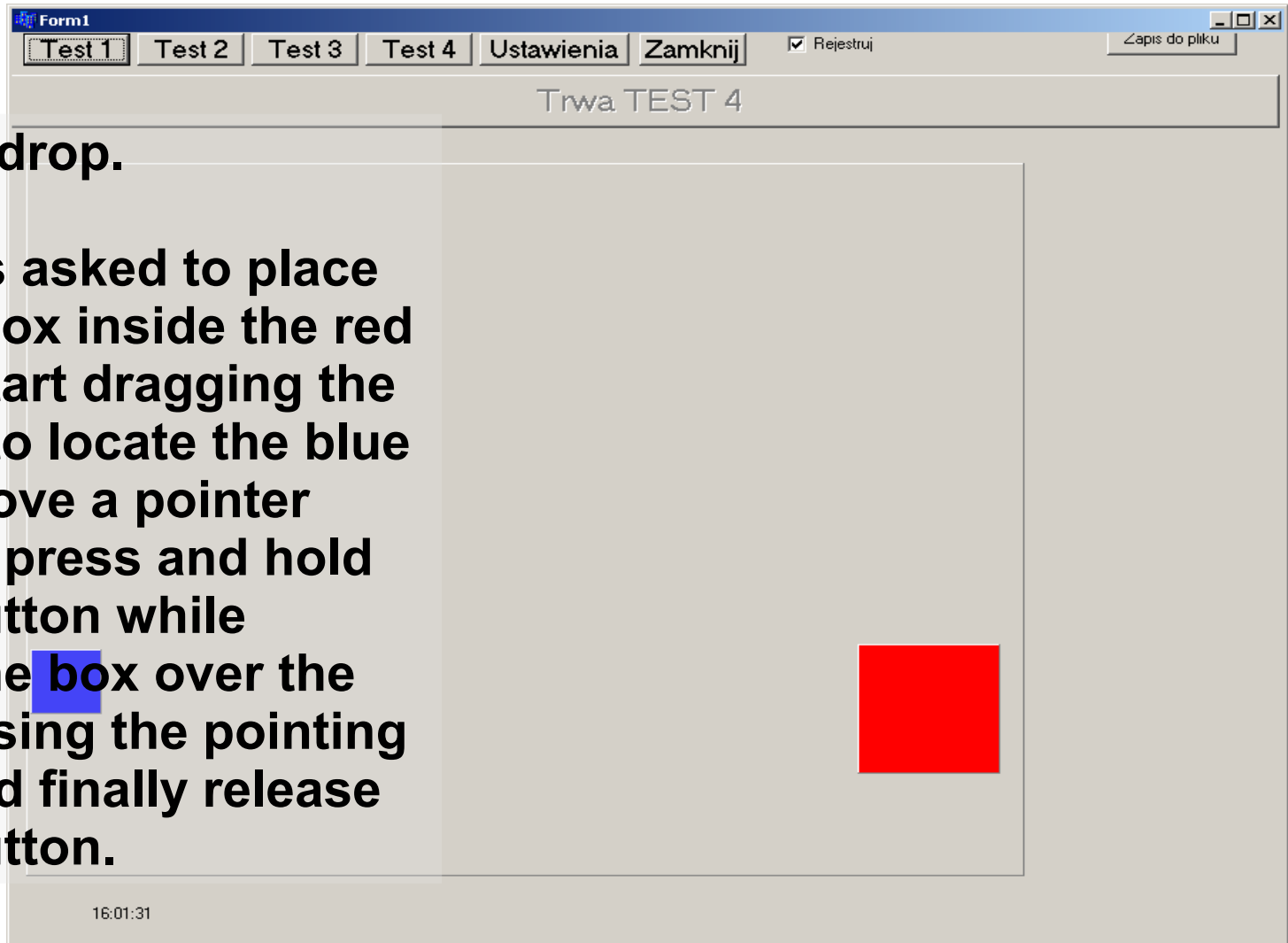




## Line following.

The task no.3 is similar to the task no. 2 with exception of the mouse button action. While redrawing a line in the previous task it was necessary to hold the left button, in this task left button is pressed only at the beginning and at the end of the test.

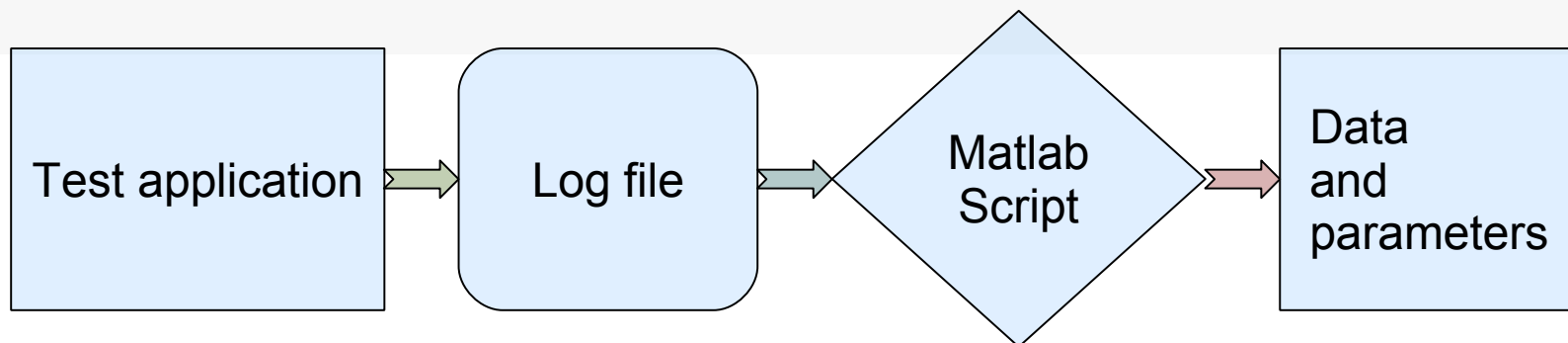




## Drag and drop.

An user is asked to place the blue box inside the red one. To start dragging the user has to locate the blue box, to move a pointer over it, to press and hold the left button while moving the box over the red one using the pointing device and finally release the left button.

**After each test a text data log file is created. Filename is created automatically on the base of current time and date. This prevents from loosing of any data. Custom Matlab script has been created to import collected data. In every test pointer position is stored every 50 msec.**



Total pointer travel time:  $TPTT = N \cdot \Delta t$

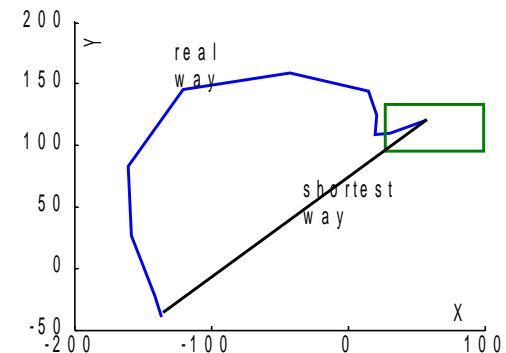
Real way : 
$$RW = \sum_{n=1}^N \sqrt{(x_n - x_{n-1})^2 + (y_n - y_{n-1})^2}$$

Movement ratio :  $MR = RW/SW$        $SW$  – shortest way

PVV – partial velocity vector

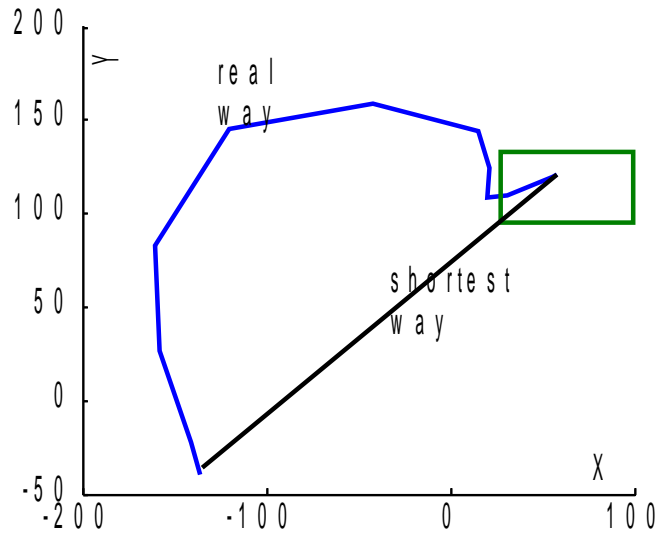
AV - average velocity  $AV = RV/(N \cdot 50ms)$

PV - peak velocity       $PV = \max(PVV)$

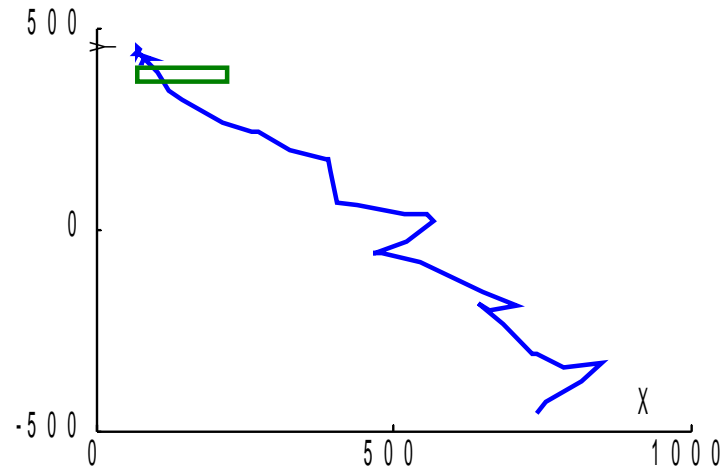


$\Delta t = 50ms$

## Test no. 1

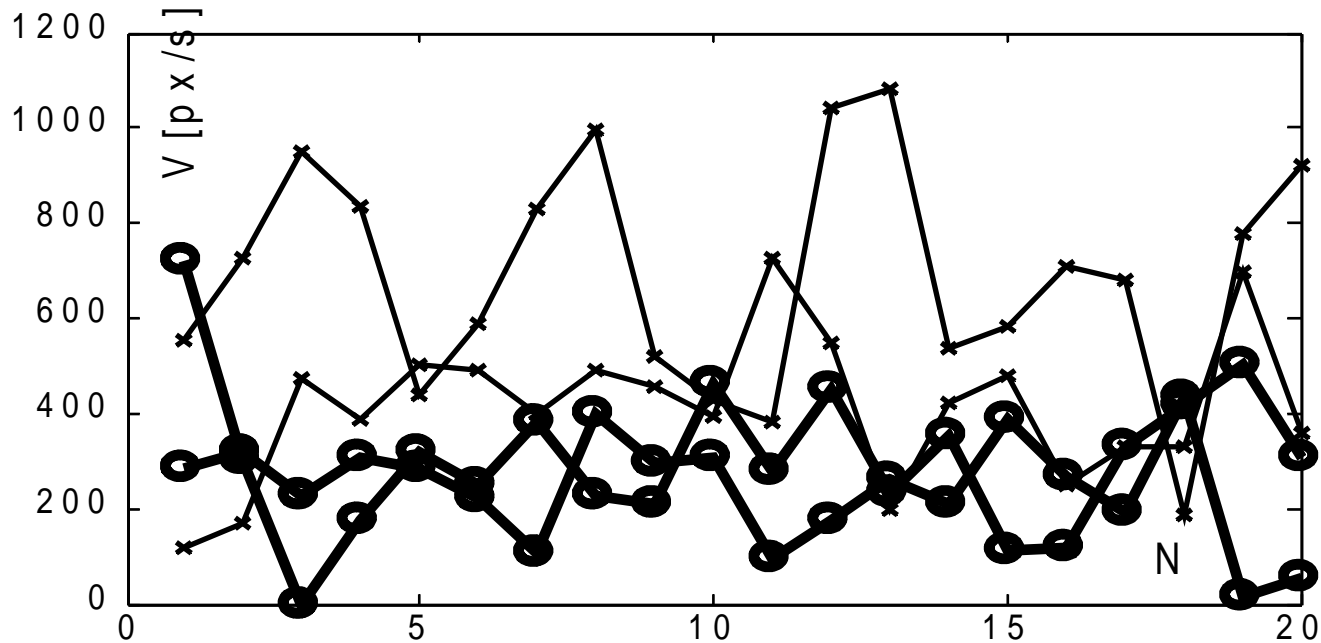


Mouse

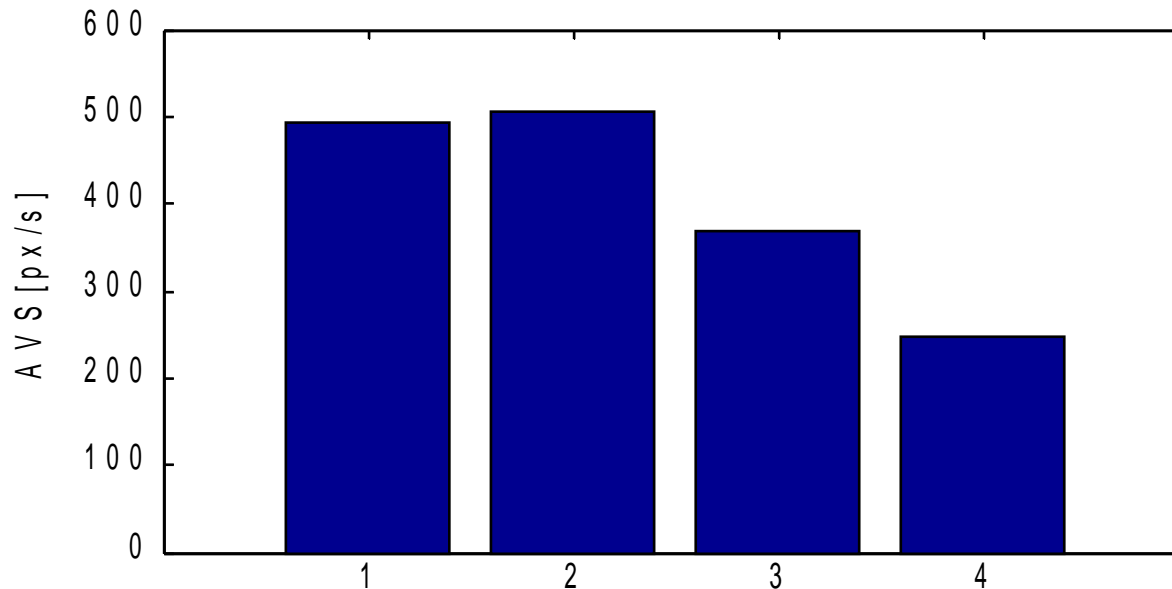


Trackball

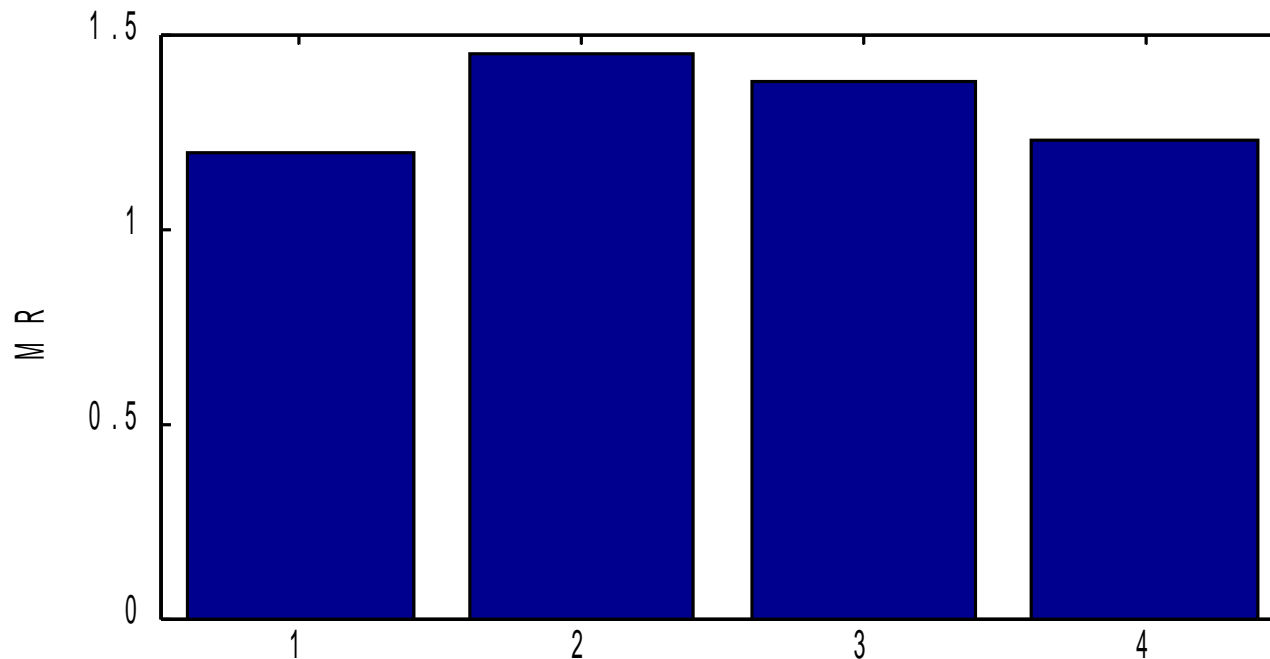
## comparison of trackball and mouse for aged group x- mouse o- trackball



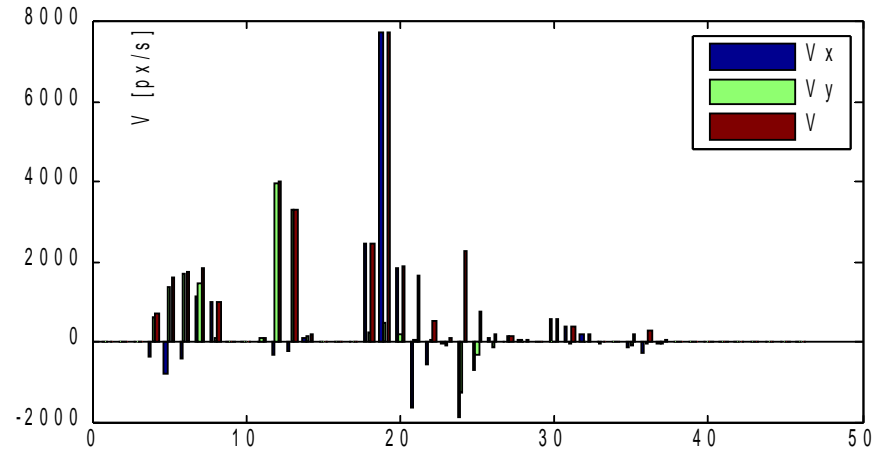
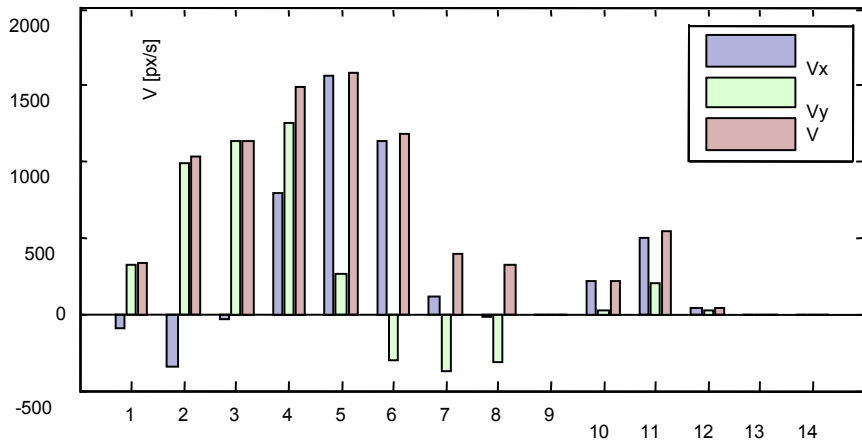
average speed for all series of the data 1 – group of young using mouse, 2 – group of elders using mouse, 3 – group of young using trackball, 4 – group of elders using trackball



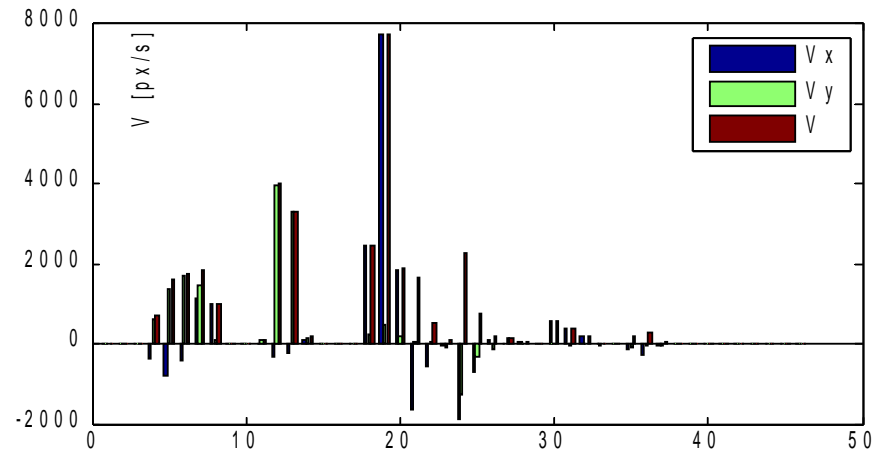
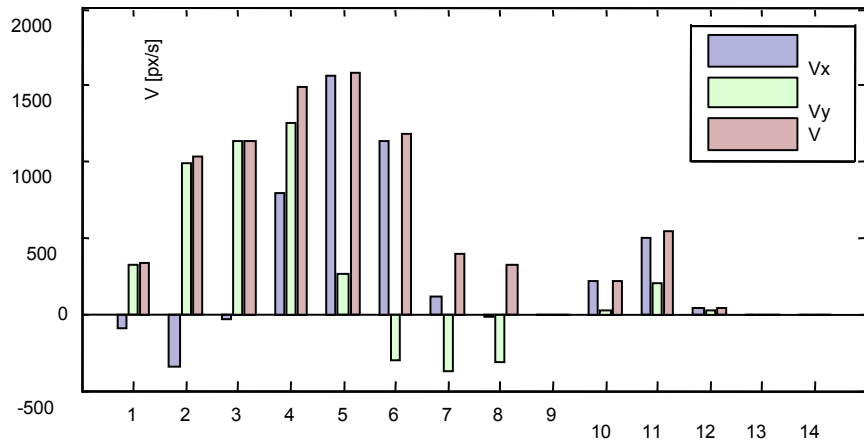
**A movement way ratio – actual vs the shortest. 1 – group of young using mouse, 2 – group of elders using mouse, 3 – group of young using trackball, 4 – group of elders using trackball**



## A partial speed profile of sample movement a) mouse, b) trackball



## A partial speed profile of sample movement a) mouse, b) trackball



An application for measuring of the basic tasks has been developed

Primary tests were obtained and analysed

A correct pointing device enables easier computer navigation

A standard set of tests should give one answer, currently does not

Any pointing device gives certain behavior (on the basis of test results it is possible to answer what was the device)

Application does not store user data (age, sex etc .) nor user feedback

Application does not store pointer information

More data are needed

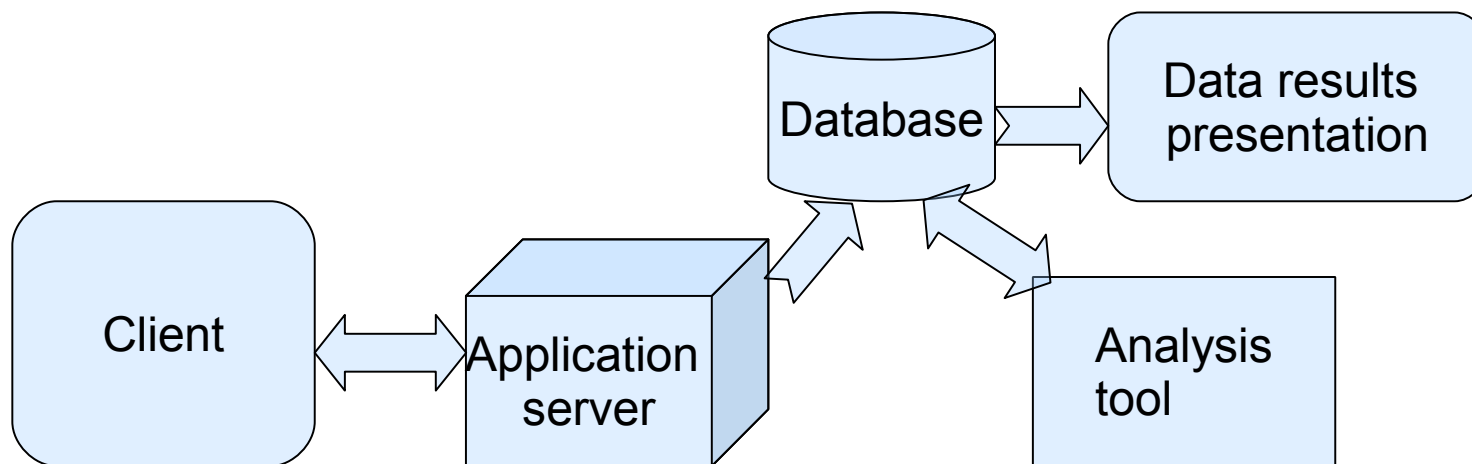
- more volunteers
- more pointing devices

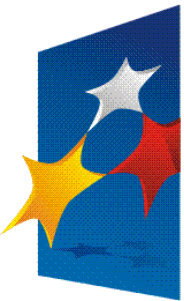
A new, internet based application is under development

Data should be stored in the database – this will ease data analysis using any available tool

Internet based application give broader access to the application giving more reliable data

More information should be gathered – such as pointing type, user feedback etc.





## INNOVATIVE ECONOMY

NATIONAL COHESION STRATEGY

EUROPEAN UNION  
EUROPEAN REGIONAL  
DEVELOPMENT FUND



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