

# The measurement heating results of some parts of human body by lap top

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*Contents* - This work presents results on exploration on sample of 212 male lap top users and results of temperature measurement 12 different lap tops types during the time of its using and results of measuring of temperature of user's testicles area by thermal camera.

*Key words* - lap top, heating, measuring, testicles

## I. INTRODUCTION

The lap top presents necessary and important segment of modern life of many adults and children in last several years. The lap top is a portable device with its own power supply and many of lap top users are using lap top putting it on its laps. That brings to the very important fact that lap top is emitting great quantity of heat and that quantity of heat rapidly grows the temperature of that part of lap top users body, especially the testicles at male users. Because of that, it is necessary to measure the growth of temperature of some parts of lap top users body for the time of its using. It is very important especially at male users from elementary and middle school age and students because certain number of them don't have completely formed reproduction organs yet (related particular to users from elementary school) and certain number of them don't have children yet (none of all examined users didn't have children) .[1]-[3].

## II. AN EXPLORATION

The exploration realized in Niš in 2009. and 2010. in elementary school "Čele Kula", middle school "Nikola Tesla", electronic faculty, medical faculty, law faculty, economy faculty and faculty of environmental protection, on sample of 650 male users from age of 7 to 20 years old. An exploration included the number of children that use lap top from all of examined persons (results are presented on figure 1.), lap top way usage (results are presented on figure 2.), average time lap top usage (results are presented on figure 3.) and the purpose of using lap top (results are

presented on figure 4.). An exploration realized in the form of poll, where the polled persons answered about four noticed items. The number of lap top users was 212, which means that only 32,6% from all of examined persons (650) use lap top. If it compares with lap top users in some other countries, the result is very poor (for example, in Denmark, Sweden, Norway and Germany the number of lap top users exceeding 95% from all examined persons according to similar polls).

According to results of exploration, it was decided to choose 12 models of lap tops which were served for measuring of temperature: Lenovo G550, Asus eeePC 1215N, Fujitsu AH550, HP 4520s, Fujitsu Siemens V5535, HP dv6-1350ex, Asus A52JR, Lenovo X100e 3508, Toshiba Satellite C650D, Toshiba Satellite L30, Dell inspiron 1100 and Dell latitude D630. Named lap tops were the most frequently used at the sample of 212 male lap top users.

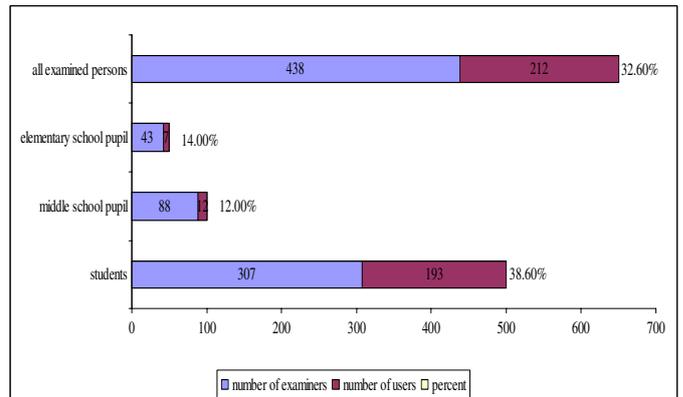


Figure 1. Number of users of lap top from different education age

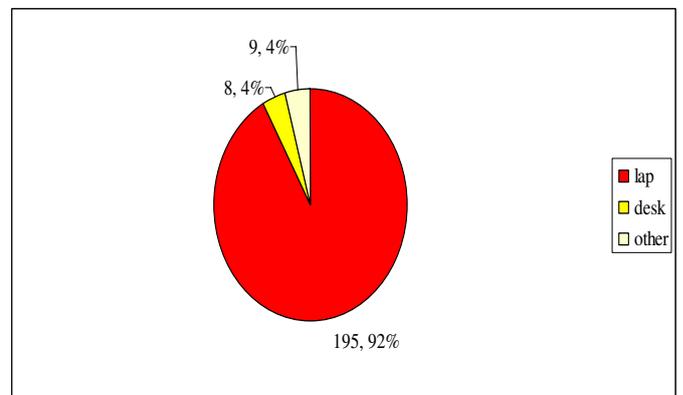


Figure 2. Lap top way usage (where is lap top placed during usage)

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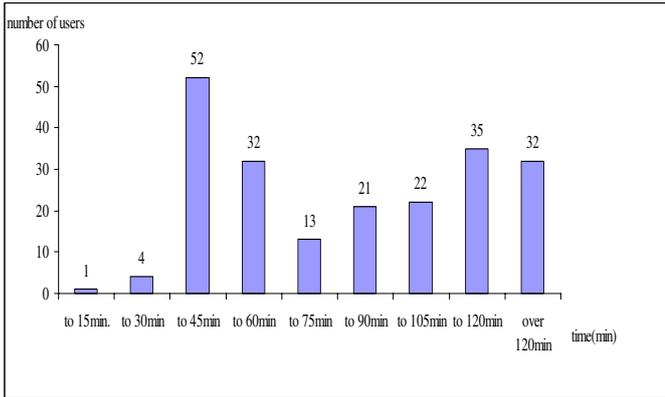


Figure 3. Average time lap top usage

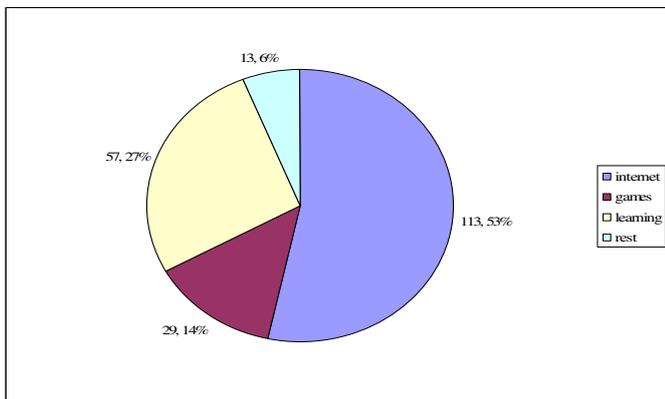


Figure 4. Purpose for lap top usage

It is important to note that the results of poll presented subjective evaluation of examined persons. The results are showing that the most of lap top users using lap tops placed in their laps (195 from 212), during the time to 45 minutes (52 from 212) and for internet (113 from 212).

### III. MEASURING AND RESULTS OF MEASURING

Measurement of temperature and changes of temperature on lap tops and human body during the time of using were recorded by thermal camera VARIOSCAN hr compact 3021ST (presented on figure 5).



Figure 5. The thermal camera VARIOSCAN hr compact 3021S

This camera provides visualization of thermal presentation of human body according to the detection of infrared heat waves. It can be set to record certain number of pictures in one second and to show the place with the biggest and the lowest temperature. Those devices have a great appliance in lot of scientific applications such as electro energetic, thermo energetic, medicine... [4].

The measurement was realized that, as the first step, measured temperature distribution for every lap top from surface and background before the lap top was turned on (presented on figures 6. and 7.). The next step realized that the proper lap top has been put on the users lap, and that moment noticed as a start of measurement and user used lap top during 45 minutes, what was scanned by thermal camera. Before that, the place around user's testicles and the lap top surface and background scanned by thermal camera and the temperature of these parts measured and noticed (presented on figures 8., 9., 10. and 11..). This was repeated for each 12 tested lap tops and the results were measured and noticed on several thousands pictures.

The way of using was playing of video games and work in some programs that were very hardware required because that was the reliable way that the highest temperatures realized.

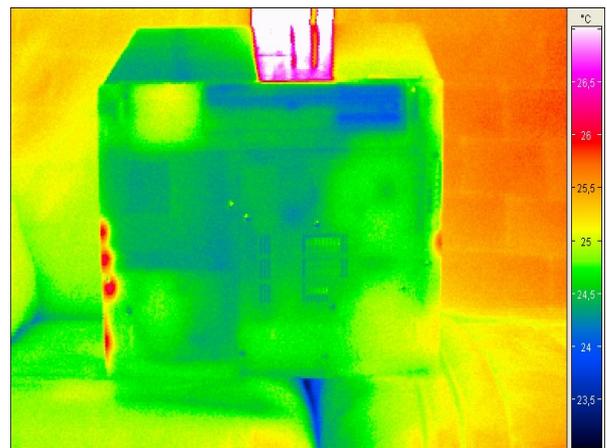


Figure 6. The example of temperature distribution for lap top background before using (as example Fujitsu Siemens V5535)

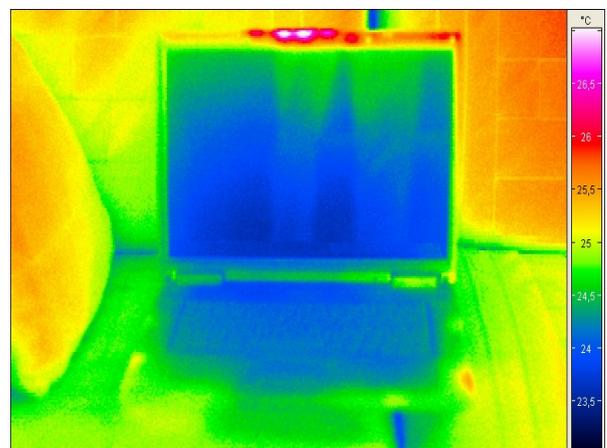


Figure 7. Temperature distribution example of lap top surface before measuring (as example Fujitsu Siemens V5535)



Figure 8. The example of temperature distribution of user's body before measuring with marked temperatures

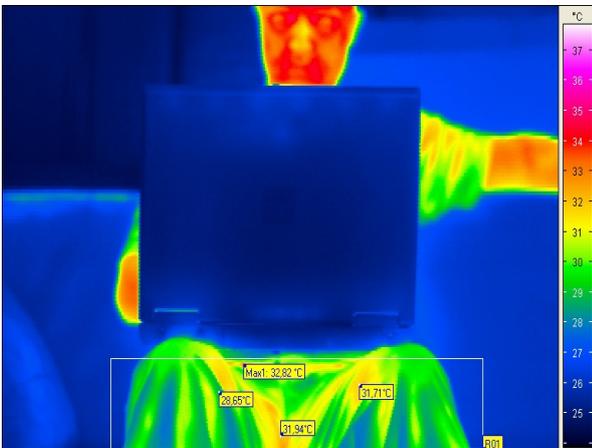


Figure 9. Lap top positioned in user lap with marked temperatures at the start of the measuring (as example Fujitsu Siemens V5535)

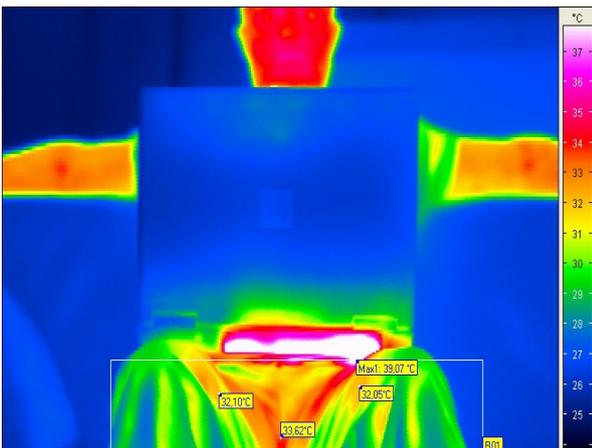


Figure 10. Lap top positioned in user lap with marked temperatures after the time of 45 measurement minutes (as example Fujitsu Siemens V5535)

It is very important to note that every new measuring was realized after the break of 24 hours because that was the way that cumulative effects of heating on lap top user's body should have been disabled. The camera was set to scan five pictures in one minute. The temperature of environment was

about 24 C°. The software EVEREST ultimate edition 2007 was consulted for the temperature of central processor unit and mother board. The point with the most temperature value on lap tops was supply region (presented as example on figure 12).



Figure 11. An example of temperature distribution of user's body after measuring of 45 minutes with marked temperatures (as example HP4520s)

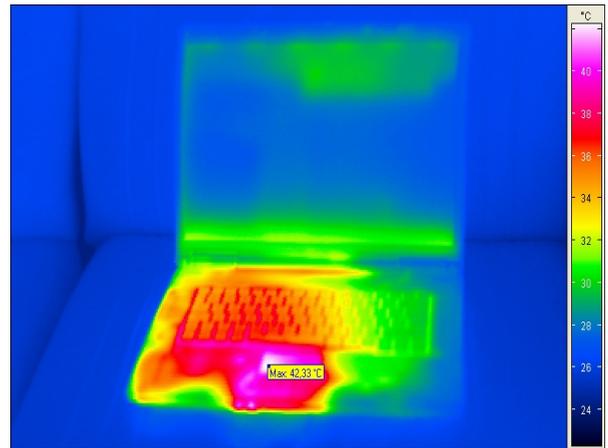


Figure 12. Lap top surface temperature distribution example after measurement (as example Fujitsu Siemens V5535)

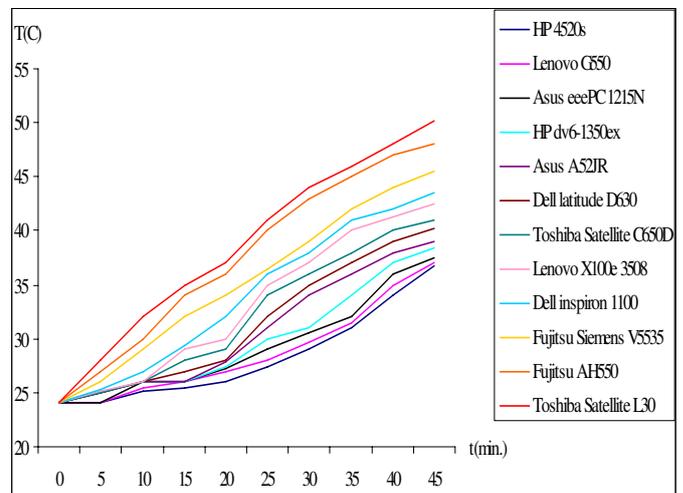


Figure 13. Temperature rising during the usage of lap tops

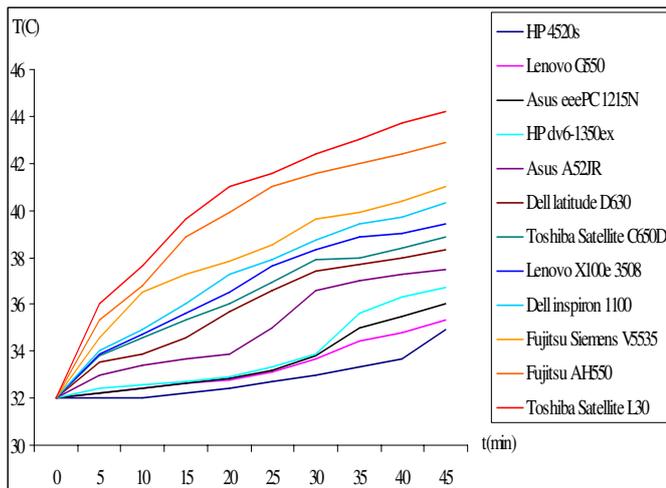


Figure 14. Testicles region temperature rising during the use of lap tops

All of measuring results for all 12 lap tops are presented in figures 13. and 14. where can be seen that the growing of temperature of complete lap region including the testicles region is a irrefutable fact. The lap top with the biggest heating degree was Toshiba Satellite L30 (50.2 C° - lap top temperature after 45 minutes and 44.2 C°-testicles region after 45 minutes) and the lap top with the smallest heating degree was HP 4520s (36.7 C° - lap top temperature after 45 minutes and 34.94 C° testicles region after 45 minutes). Figures 13. and 14. also showing that temperature slightly rising and after the measuring time of 45 minutes and it can achieve some high values for the measuring time of several hours.

#### IV. DISCUSSION

The measuring results that were realized in this work showing that the growth of temperature in the lap and testicles region is high and it can amounted from 2.94 C° for lap top with the smallest heating degree to 12.2 C° for lap top with the biggest heating degree for the measuring time of 45 minutes. It can be seen that after 45 minutes measurement the temperature still rising.

It is very important fact that the average temperature of male testicles should be 33 C°. The reproductive organs, which the important parts are testicles are complex organs where lot of biochemical processes and reactions are happening and these processes and reactions depending of lot of factors (psychic and physical, inner and outer) including the temperature. Change only one factor could cause very serious problems in the functioning of whole system. [5]-[8].

For example, the process of liquid faction or the process of sperm dilution, which is developing by the influence of prostate enzymes, is also temperature dependent. In the normal conditions this process is developing fast ( maximum for the time of 60 minutes) with the optimal temperature range from 20 C° to 37 C°, where all of enzymes are active, so, the change of only few degrees can cause problems.

The influence of temperature could be relieve using lap top on some other place such as desk, bench, floor; also, lap top pods can be used if the lap is the only place where the lap top can be placed, but pods can rise the temperature of lap top.

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#### REZULTATI MERENJA ZAGREVANJA NEKIH DELOVA LJUDSKOG TELA LAP TOPOM

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