

**I. IDENTIFIKAČNÍ ÚDAJE**

<b>Název práce:</b>	<b>Automatic Optical Inspection of PrintedCircuit Boards</b>
<b>Jméno autora:</b>	<b>Bc. Ondřej Kunte</b>
<b>Typ práce:</b>	diplomová
<b>Fakulta/ústav:</b>	Fakulta elektrotechnická (FEL)
<b>Katedra/ústav:</b>	Katedra kybernetiky
<b>Vedoucí práce:</b>	Mgr. Radoslav Škoviera, Ph.D.
<b>Pracoviště vedoucího práce:</b>	Český institut informatiky, robotiky a kybernetiky, ČVUT

**II. HODNOCENÍ JEDNOTLIVÝCH KRITÉRIÍ**

<b>Zadání</b>	<b>mimořádně náročné</b>
<p>There are already many solutions to the problem the student decided to tackle. However, most of these solutions are proprietary and often too expensive for individuals or small companies. One of the reasons is that developing a solution that would be cheap and yet provide usable results, is very difficult.</p> <p>Development of such tool requires understanding of the PCB creation process as well as extensive knowledge of techniques used in computer vision and to some extent machine learning. Therefore, the task itself is very difficult.</p>	

<b>Splnění zadání</b>	<b>splněno s menšími výhradami</b>
<p>The assignment as such was mostly fulfilled. The student failed to demonstrate the solution in a real application due to logistic problems (he was abroad while working on the thesis). However, most of the testing was done using real PCBs and images acquired in a realistic setting.</p>	

<b>Aktivita a samostatnost při zpracování práce</b>	<b>D - uspokojivě</b>
<p>The student started working on his thesis with enthusiasm and was actively consulting his ideas and progress. He frequently reported preliminary results of the experiments related to image acquisition. However, later on his activity tapered off, especially while writing the text of the thesis.</p> <p>In my opinion, the completion of the thesis was hasted. The student left me only a little over a week for any adjustments to the text. Therefore, unfortunately, the final version of the thesis has a lot of inconsistencies, shortcomings, and errors.</p>	

<b>Odborná úroveň</b>	<b>D - uspokojivě</b>
<p>The thesis contains a detailed summary of the used methods and tools, which is sufficient for such work. However, the explanation of why these methods were chosen is very poor. There are almost no results of the preliminary experiments involving alternatives to the selected methods. Therefore, it is hard to judge whether the implemented methods were really the best methods for the task or were chosen mainly on the account of their availability in the software libraries. There is also no note of parameter optimization for any of the methods. Some of the bad results were clearly the consequence of insufficient parameter tuning of the detection or preprocessing methods.</p>	

<b>Formální a jazyková úroveň, rozsah práce</b>	<b>B - velmi dobře</b>
<p>The thesis is written in English and has 62 numbered pages. The text is divided into 8 chapters; each chapter is further divided into subsections as needed. The division of the text is clear. After the introductory motivation behind the thesis and the topic of PCB creation, the author describes the methods used in his work. Afterwards, he explains the proposed approach and its implementation into a software solution. Finally, the student explains the testing setup and presents the results, including discussion.</p> <p>The thesis contains minor typos and stylization errors. The thesis should contain more images illustrating the used methods and data.</p>	

<b>Výběr zdrojů, korektnost citací</b>	<b>C - dobře</b>
<p>There are 27 cited sources. The use of the sources is correct, although citations are missing for some of the methods presented in the thesis.</p>	

**Další komentáře a hodnocení**

I would like to commend on the students work on the practical part of the assignment. He built his own light box for image acquisition and the PCB samples.

**III. CELKOVÉ HODNOCENÍ A NÁVRH KLASIFIKACE**

*As stated before, the topic is a difficult one. The student put a lot of work into the practical part of the thesis and created the setup of image acquisition and the testing samples.*

*Regrettably, the theoretical part of the work was quite poor. If the student spent more time on the selection and optimization of the methods, the results might have been better and more usable for real-world application.*

*Due to the hastened completion process, the testing of the final solution is insufficient. More testing and possibly a comparison with related solutions would be required.*

Předloženou závěrečnou práci hodnotím klasifikačním stupněm **C - dobře**.

Datum: 26.1.2018

Podpis: