Popular science summary of the PhD thesis

PhD student	Mads Emil Brix Doest
Title of the PhD thesis	Instrumentation for Estimating Surface Radiometry
PhD school/Department	DTU Compute

Science summary

The ability to measure and compare the appearance of products is highly relevant to the manufacturing industry. Product appearance is an important part of visual quality assurance and is to a large extend still a manual and highly demanding task performed by humans. A big part of Industry 4.0 is the digitization of the manufacturing processes and introducing the digital twin, being a digital version of the real product. This thesis has been carried out in close collaboration with industrial partners through an organization named Manufacturing Academy of Denmark (MADE), and as such the research project focuses on applied research for industrial use. The industrial interest in this topic relates to visual quality assurance, more specifically to develop instruments able to quantify if the appearance of a produced part is within specification or not. Coupling this with the parameters used to control the machines and we would achieve, what in Industry 4.0 is referred to as "closing the loop". As such the focus of this research project is developing instrumentation and methods that can be used for visual quality assurance with the goal of "closing the loop". We seek to make the appearance of an object quantifiable, so that others can link it to machine parameters, this is an important and for appearance an unsolved task. In this thesis we developed three instruments focused around robots and cameras, to estimate the surface radiometry in an automated way. We developed practical methods that can help introduce appearance in the digital twin such that it can be compared with the physical twin for Visual Quality Assurance.

Please email the summary to the PhD secretary at the department