

Doc. Dr. Alexander Wilkie
CGG KSVI MFF
Charles University in Prague

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Assessment (posudek oponenta) of the Master's thesis titled

**"Using gyroscopes and accelerometers for removing blur
in mobile phone photography"**

submitted by Bc. Ondřej Šindelář

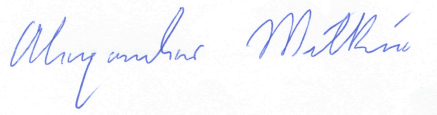
In his thesis, the candidate reports on his implementation of a deconvolution-based image de-blurring system for a contemporary handheld smartphone system. Deconvolution based de-blurring works best if and when data about the induced distortion in the image is available - which in the case of a blurred photograph usually amounts to knowing which shaking motion the camera was subjected to while the shutter was open. Given the fact that modern camera phones do have motion sensors, but due to space constraints usually not very sophisticated cameras that are prone to blurring, this seems like a very promising approach for such systems.

However, while the basic idea for such a system is quickly stated, the candidate had to overcome numerous practical problems when implementing a test system that achieves this. In particular, the quality of data delivered by the motion sensors is not as comprehensive and sufficient in terms of quality as one would ideally need, and due to their small size, smartphone cameras deliver images of subpar quality that violate some of the underlying assumptions needed for artefact-free deconvolution (optical distortions, and noisy images). In addition to this, the lack of access to raw camera data proved to be an issue, as well as spatially-varying PSFs.

Overall, the thesis is very well written, and the discussion of the pros and cons of the described testbed system are exemplary. The one thing the reviewer could imagine as being potentially useful for this research (especially if it were to be taken further) would have been the construction of a test environment in which simulated raw image data was used, e.g. via simulation of the camera found in the smartphone. However, such a simulation would be a significant amount of work in its own right, and since the candidate managed to compensate for the lack of raw image access, this is not to be held against the thesis.

Given the inherent technical issues, that the candidate managed to get a test implementation to work as efficiently as he did is a substantial achievement. As such, the presented work is a solid result. In the opinion of the opponent, the thesis achieved its stated goals, can be recommended for acceptance.

Sincerely,



Alexander Wilkie