

Theme: Future Camera & Sensor

- Sub theme: Low-height high-zoom camera module optics, algorithms, and camera system

The trend in mobile devices such as smartphones and tablets has been to decrease in thickness, which makes high quality imaging increasingly difficult. For example, with smartphone thickness now below 1cm, a good telephoto lens length may be 2-3x the thickness of the phone. Constraining the telephoto lens length to values close to the thickness of the phone sacrifices image quality for the sake of form factor. It is extremely difficult and expensive to support telephoto lenses capable of providing high quality optical zoom and fitting smartphone form factors. New approaches for the design of imaging lenses, algorithms, and camera systems are needed to achieve high quality optical zoom capabilities in smartphones less than 1cm thickness.

Overcoming the challenges outlined above will require new research to address the following objectives: 1) explore new camera module architectures that can meet the thinness criteria; 2) explore new image signal processing (ISP) algorithms, including machine learning based approaches, for handling the unique characteristics of the new camera module architectures and 3) explore and develop new system level camera architectures to support the new thin high-zoom camera module architectures and algorithms.

As part of this program, various solutions related to the future camera are of interest. These include, but are not limited to:

1. Low-height high-zoom camera modules
2. Folded optics
3. Computational Optics
4. Phase modulated optics
5. Computational Photography
6. Multi-Frame Processing
7. AI/ML Camera (component and system level)

※ *The topics are not limited to the above examples and the participants are encouraged to propose the original idea.*

※ *Funding: Up to USD 150,000 per year*