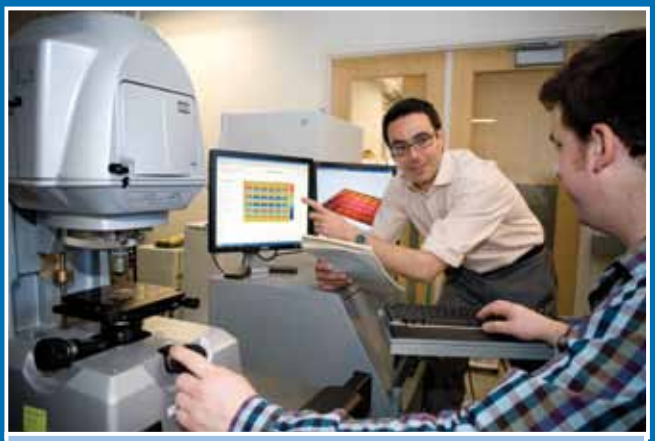
CMC MICROSYSTEMS IMPACT

Technologies Interplay to Create More Life-like Projection Images at Half the Cost and Power Consumption

The image quality of movies you enjoy at the cinema or on your home theatre system could one day be improved at a comparatively low cost, thanks to microelectromechanical system (MEMS) devices designed at the University of British Columbia. Researchers from multiple engineering disciplines—electrical, computer and mechanical—are developing a high dynamic range light projector, incorporating an array of steerable micromirrors that can be added to existing LCD- or DLP®-based projection systems. The technology improves the brightness and contrast ratio of the projected image by at least a factor of two, resulting in a more intense and life-like image.



Dr. Boris Stoeber (left) works with PhD student Reynald Hoskinson (right) to design a micromirror array to address the engineering problem of how to maximize light distribution

Dr. Boris Stoeber, Assistant Professor with joint appointments in the Departments of Mechanical Engineering, and Electrical and Computer Engineering, explains: "There is no other comparable technology available today that would improve the peak brightness of projected images without changing the projector lamp. This is significant to the consumer for two reasons: the cost of the lamp is 50% that of the entire projector and higher peak brightness can be achieved without moving to a lamp that consumes more power." Another technical advantage is provided by their micromirrors, tilting over a continuous range, that redirects the light from the projector lamp with a finer degree of control than digital micromirror devices, which allow only on/off control.

Reynald Hoskinson, PhD student in the Department of Electrical and Computer Engineering, is working with Dr. Stoeber to design the micromirror array. He explains that their design addresses the engineering problem of how to maximize light distribution. The problem occurs because dark parts of a projected image are made by blocking light—discarded light that can be better used to make bright parts of the image brighter. The micromirror array modulates and redirects light from the projector lamp before it reaches the high-resolution image-forming element used in current projectors. By channeling more of the light where it is needed, the result is higher peak brightness, reduced power consumption by at least 50%, or a combination of the two.

What strikes Dr. Stoeber most about their technology is the interplay of field-programmable gate array (FPGA) technology, image processing and MEMS mirrors that manipulates the direction of individual light bundles from a projector lamp to visibly improve the quality of projected images, all while being more energy-efficient.

Through CMC Microsystems, the researchers accessed the Micragem MEMS prototyping technology, provided in partnership with Micralyne Inc. in Alberta, to create 25 separately controllable groups of micromirrors on a single device. The first prototype has been integrated into a projector, along with optical lenses, a light source and the image-forming element. FPGA technology is used to drive the mirrors and (in the future) for image processing.

Next steps for the research group include applying what they learned from the initial prototype to iterate the design and make an improved set of mirrors, moving towards a commercially-viable technology. Dr. Stoeber explains: "We are in contact with a local company that fabricates high-end video projectors. They are interested in integrating our technology as a sub-component into their next-generation, high-performance projector." Watch for it at your local cinema. *cmc*