

An Optical Phased Array for LIDAR

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Abstract. We have previously demonstrated the development of an Optical Phased Array (OPA) micromechanical system (MEMS) used for beam steering, which shows great advantages over previous mechanisms such as opto-mechanical, acousto-optical (AO) or electro-optical (EO). We aim to integrate the OPA MEMS system into the application of automobile navigation, which is currently primarily dominated by opto-mechanical scanning based systems. Opto-mechanical scanning devices are usually bulky and relatively slow, while competing technologies (AO, EO) utilize devices that while small in size, cannot provide the steering speeds and versatility necessary for many applications. In drawing from phased array concepts that revolutionized RADAR technology by providing a compact, agile alternative to mechanically steered technology, the OPA based LIDAR program seeks to integrate thousands of closely packed optical emitting facets, precise relative electronic phase control of these facets, and all within a very small form factor. Comparing with other competing LIDAR system, the OPA based LIDAR system will have multiple degrees of freedom for phase control which enables not only agile beam steering but also beam forming and multiple beam generation, greatly expanding the diversity of applications.

