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LAYER 8
By Michael Cooney

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OPINION

Carnegie Mellon develops smart, bright headlights that won't blind oncoming drivers

Carnegie system tracks oncoming drivers and blacks out small parts of the headlight beam that would typically shine into drivers' eyes

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Carnegie Mellon

Carnegie Mellon researchers say they have come up with a smart, programmable headlight that in the future would let drivers utilize the increased visabiltiy of their car's high-beams without blinding oncoming drivers.

"The programmable headlight senses and tracks virtually any number of oncoming drivers, blacking out only the small parts of the headlight beam that would otherwise shine into their eyes. During snow or rain showers, the headlight improves driver vision by tracking individual flakes and drops in the immediate vicinity of the car and blocking the narrow slivers of headlight beam that would otherwise illuminate the precipitation and reflect back into the driver's eyes," the researchers at Carnegie Mellon University's Robotics Institute stated.

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The system comprises a Digital Light Processing projector instead of a standard headlight or cluster of LEDs, an Intel i7 quad core processor and a camera.

The system lets the researchers divide the light into a million tiny beams, each of which can be independently controlled by an onboard computer. A camera senses oncoming cars, falling precipitation and other objects such as road signs.

The one million light beams can then be adjusted accordingly, some dimmed to spare the eyes of oncoming drivers, while others might be brightened to highlight street signs or the traffic lane. The changes in overall illumination are minor, however, and generally not noticeable by the driver, the researchers stated.

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System latency — the time between camera detection and a corresponding adjustment in the illumination — is between 1 and 2.5 milliseconds. This near-instantaneous reaction means that in most cases the system doesn't have to employ sophisticated algorithms to predict where an oncoming driver or a flake of snow will be by the time the headlight system responds, the researchers said.

Though currently larger than standard headlights, the reseachers said the smart headlights could be accommodated by trucks and buses, whose headlights are especially prone to causing glare because they are positioned high off the ground. Eventually, miniaturization should make the smart headlights compatible with smaller vehicles. With the speed of miniaturization, smaller versions for cars could be forthcoming quickly.

The system does have a few challenges. For example the researchers noted since the prototype was built with off-the-shelf components, data transfer speed is slower than if the components were more closely integrated (like as in an embedded system). In order for the system to be used on an automobile it needs to be made faster and more compact. It also needs to be engineered to be durable for temperature, moisture, humidity, vibrations, bumps, etc. In addition, the system reduces glare at low speeds, but becomes less effective as speed increases, the researchers said.

The technology currently being researched for building a faster, compact system is expected to take 3 to 4 years to complete. Commercializing it as a product will take additional years, the researchers said.

"Even after 130 years of headlight development, more than half of vehicle crashes and deaths occur at night, despite the fact there is much less traffic then," said Srinivasa Narasimhan, associate professor of robotics. "With our programmable system, however, we can actually make headlights that are even brighter than today's without causing distractions for other drivers on the road."

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Michael Cooney — *Online News Editor*

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