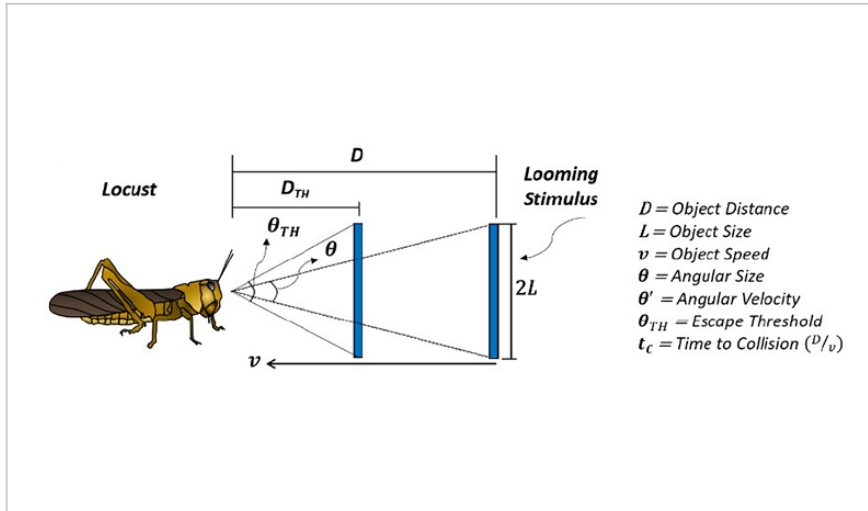


# An Ultra-Low Power Biomimetic Collision Detector

ID# 2020-5048



PennState



LGMD geometric considerations

## Technology Summary

This technology is an ultra-low power collision detector inspired from the collision detection neuron inside a locust called the Lobula Giant Movement Detector (LGMD). The device consists of a monolayer MoS<sub>2</sub> photodetector stacked on top of a non-volatile and programmable floating gate memory architecture, both combined, imitates the escape response of the LGMD neuron, to an approaching object. This is achieved at a frugal energy expenditure of a few nano-joules and at the same time offers orders of magnitude benefit in device footprint.

## Application & Market Utility

Neuromorphic computational devices are able to offer a low cost, low energy alternative to supercomputing by mimicking components of a biological nervous system. By taking inspiration from nature, such technology can enable high-performing functionality at a fraction of the cost (energy, component size/number, computational steps/complexity, etc.) of traditional methods. This type of efficiency will become ever more important as vast numbers of sensors are deployed to any number of devices, including IoT, autonomous vehicles, micro-devices, and defense applications.

## Next Steps

This technology is patent pending. The research team seeks collaboration for further development and licensing opportunities.

TECHNOLOGY READINESS LEVEL

1-3

### Seeking

Licensing | Research

### Keywords

- Collision Detector
- Biomimetic
- Low Power
- Photodetector
- Programmable Non-volatile Memory

### Researchers

#### Saptarshi Das

Assistant Professor of Engineering Science and Mechanics

[Online Bio](#)

[Website](#)

#### Darsith Jayachandran

Graduate Student

### Originating College

College of Engineering

### Office of Technology Management Contact

Rokita, Joseph

[jjr152@psu.edu](mailto:jjr152@psu.edu)

814-863-6336



Invent Penn State is a Commonwealth-wide initiative to spur economic development, job creation, and student career success. Invent Penn State blends entrepreneurship-focused academic programs, business startup training and incubation, funding for commercialization, and university-community collaborations to facilitate the challenging process of turning research discoveries into valuable products and services that can benefit Pennsylvanians and humankind. Learn more at [invent.psu.edu](http://invent.psu.edu).

Penn State is an equal opportunity, affirmative action employer, and is committed to providing employment opportunities to all qualified applicants without regard to race, color, religion, age, sex, sexual orientation, gender identity, national origin, disability or protected veteran status.