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News Release

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Nature's insect navigators inspire robots that find their own way

New understanding of how insects navigate using the sun and daylight could aid the development of guidance systems for robots.

Scientists sought to better understand how insects – including desert ants, which can travel long distances over barren terrain – use their eyes and brain to keep track of their direction.

Their findings could help develop a cheap low-power alternative to Global Positioning Systems (GPS) for self-guided devices.

A team of scientists led by the University of Edinburgh used their knowledge of insect anatomy to build a sophisticated computer model determining how they estimate their direction of travel.

Researchers discovered in detail how the animals' eyes and brains process how sunlight scatters as it travels through the atmosphere, forming a pattern of polarised light. Observing variations in this light pattern enables insects to determine their direction at each stage of their journey.

Insects combine this sense of direction with step counting, enabling them estimate the distance and direction home. They can do this even after travelling a long way on random routes, over rough terrain, or carrying heavy loads.

Researchers tested their findings by comparing simulations to real-life journeys made by ants. They found that insects can determine their direction to within 2 compass degrees, even allowing for the sun's movement across the sky during long journeys.

Their results will be used to build a prototype sensor for testing on robots in outdoor spaces.

The study, published in *PLOS Computational Biology*, was carried out in collaboration with the Universities of Sheffield and Münster and supported by the Engineering and Physical Sciences Research Council.

Professor Barbara Webb, of the University of Edinburgh's School of Informatics, who led the study, said: "Insects have evolved eyes and brains that can accurately extract compass information from daylight, allowing us to copy this mechanism for navigating robots."

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