Professor working on practical cloaking device (w/ Video)

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(PhysOrg.com) -- A physicist at the University of St Andrews hopes to make major advances in the 'tantalising' field of invisibility in the next two years. Professor Ulf Leonhardt, who cites the Invisible Woman and Harry Potter as sources of inspiration, is working on a blueprint for a practical cloaking device that could even protect coastlines from water waves.

Thanks to funding from the Royal Society's Theo Murphy Blue Skies award, Professor Leonhardt will be able to pursue full time for the next two years 'turning science fiction into a reality'.

The researcher, who describes his invisibility work as 'geometry, light and a wee bit of magic', is inspired by optical illusions, Arabia and the imagination of his children.

He said, "The idea of invisibility has fascinated people for millennia, inspiring many myths, novels and films. In 2006, I began my involvement in turning invisibility from fiction into science, and, over the next two years, I plan to develop ideas that may turn invisibility from frontier science into applicable technology."

"Technology is the modern form of magic; imagine your ancestor being transported into the future - they never thought it possible that people could fly or talk to others in different parts of the world. Fantastical, magical things are possible in principle; the question is whether you can

turn them into practice, and that depends largely on ideas, which are even more essential than the development of new materials."

The Theo Murphy award aims to further 'blue skies' scientific discovery by investing in novel and ground-breaking research. Professor Leonhardt's work on invisibility, which he describes as the 'ultimate optical illusion' was deemed to fit the 'original and exciting' criteria.

Using modern metamaterials made of ordinary material such as metal, Professor Leonhardt is working on the design of invisibility devices using Fermat's principle, or the law of refraction. Metamaterials, described as 'designer atoms', consist of tiny structures with unusual electromagnetic properties.

His research exploits the unorthodox connection between the bending of light in materials and the geometry of curved space. In bending light, transparent materials like glass or water appear to distort the geometry of space, which is the cause of many optical illusions, including invisibility.

He explained, "Imagine a transparent material that guides light around an object without distorting the light; the object would disappear from view. One way of achieving this feat is to let the material act like a coordinate transformation of space: the cloaking device condenses space, enclosing the object into a single, invisible point."

"Turning invisibility from a tantalising idea into an applicable technology requires a new paradigm. The goal of this project is to generate new ideas using the non-Euclidean geometry of optical material to create the blueprint for a practical cloaking device. Such ideas may also be useful wherever the control of waves is desired, not only for light, but perhaps also for the protection of coastlines from water waves."

Although Professor Leonhardt says it is difficult to predict possible

applications, he suggests that invisibility research may actually be used to improve visibility, leading to the development of the perfect retroreflectors (cats eyes), better microscopes and improved lenses.

And while the New Scientist recently predicted that invisibility cloaks could be a part of everyday life in thirty years time, the St Andrews' professor remains 'open-minded' about the possibilities of his research.

"Broadband invisibility clearly is blue-skies research. I will try my best to explore how far one can go, but I cannot guarantee that at the end of the project invisibility will be easy to achieve in practice.

"I will most certainly find easier ways of cloaking, but it remains to be seen how practical they are. The important thing is to understand the foundations and come up with something new or take an existing idea to extremes; using technology and ideas to make things happen - technology we cannot imagine would ever exist."

Provided by University of St Andrews