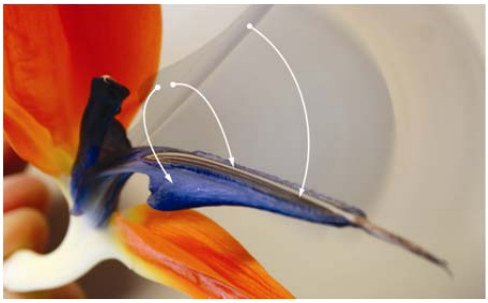
Press Release and Project description

Strelitzia flower serves as model for bionic shading system

VDI presents the International Bionic Award 2012 from the Schauenburg Foundation in Bremen.



The basic kinematics of the valvular pollination mechanism of Strelitzia reginae, the Bird-Of-Paradise. (Simon Schleicher/ITKE and Simon Poppinga/PBG)

(Düsseldorf, 26.10.2012) VDI Society Technologies of Life Sciences (VDI-TLS) has presented the International Bionic Award 2012 from the Schauenburg Foundation in the Stifterverband. The award included a prize of €10,000 and it was received by the team of 6 members: Julian Lienhard and Simon Schleicher from the Institute of Building Structures and Structural Design (ITKE) - University of Stuttgart/Germany, Simon Poppinga and Tom Masselter from Plant Biomechanics Group (PBG) Albert-Ludwigs-University of Freiburg/Germany, as well as Lena Müller and Julian Sartori from the Institute of Textile Technology and Process Engineering ITV Denkendorf/Germany. The award was given in recognition of the outstanding work for developing a biologically inspired flapping mechanism based on the Strelitzia flower. The award ceremony was organized by the founder Mr. Marc Schauenburg in Bremen on 26th October 2012 and Prof Antonia Kesel, within the framework of the "Patents from Nature" Bionic Congress in Bremen/Germany. Submissions for the International Bionic Award 2014 are possible until 28th February 2014.

The inter-disciplinarily assembled team took the strelitzia flower´s flapping mechanism as a model and developed Flectofin®, a hinge-less flapping mechanism inspired by nature: The Flectofin® is inspired by a deformation principle found in the Bird-Of-Paradise flower. Its valvular pollination mechanism shows a fascinating non-autonomous plant movement which was investigated with mechanical tests and abstracted simulations to better understand the basic underlying principles that are responsible for the plant's mechanical performance. The abstracted model revealed a coupled deformation that forms the basis of a compliant mechanism. By examining several plant movements, comparable elastic mechanisms were found with which it was possible to gain a deeper understanding of the interacting mechanical factors. With this knowledge it also possible to reconfigure the mechanism's various structural, geometrical and material parameters, in order to develop

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new functional configurations. As a result, a patent for this bio-inspired compliant mechanism was filed and successfully transferred into first technical applications, registered as Flectofin®.

Unlike rigid-link mechanisms that are commonly used in technical applications, the adaptability of the Flectofin® is based on the deflection of its elastic structure. The advantage of replacing local and most often susceptible hinges with elastic deformation of an entire structure lies in the fusion of all necessary mechanical elements within a robust all-in-one pliable component. Consequentially, fully functional mechanical systems can be constructed in one production step without the need for assembly. This technology renders the possibility for novel applications in various scales, ranging from architecture, aerospace technology, and medicine to mechanical engineering.

The successful product development of the Flectofin® Lamella, for example, proves the feasibility of this approach and reflects the promising potential of advanced fabrication processes. Furthermore, using the lamella as part of a Flectofin® Facade proves the concept's adaptability to an architectural scale and taps into new market niches. First collaborations with engineers and architects as they took place for the Thematic Pavilion EXPO 2012 in Yeosu, exemplify how the techniques developed for the Flectofin® can inspire real architectural projects and influence our designs already today.

Finally, by challenging our present mechanical understanding of biological and technical constructions, the Flectofin® clearly demonstrates an innovative paradigm shift towards an interdisciplinary knowledge transfer between biology, engineering, and architecture.

PROJECT TEAM

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About the VDI

The VDI, the Association of German Engineers (registered association), represents engineers and technology. With nearly 150,000 members, the VDI is the largest technical scientific association in Europe. As an independent non-profit organization, it is a central contact partner for technical, professional and political questions. Its strong network supports exchanges among the fields of industry, science, society, politics and engineering. The VDI creates solutions for relevant questions about the future, with the goal of strengthening Germany's position in the long term.

About the Schauenburg Foundation

The Iternational Bionic Award is endowed by the Schauenburg-Foundation since 2008. The Schauenburg-Foundation was established in 1986 by Hans-Georg Schauenburg, founder of the Schauenburg Group who has been in business in the Rhein-Ruhr area for over 50 years. The focus of the Schauenburg-Foundation, which is administered by the independent Stifterverband (Stifterverband is the business community‘s innovation agency for the German science system), reflects the close connection of the International Schauenburg Group to its roots and with scientific and technical innovation. The foundation mainly endorses academic projects in the area of engineering, economics and social sciences, as well as supporting young people in their vocational training.

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