

SATW-Forschungsübersicht zu Advanced Manufacturing in der Schweiz

Die Schweizer Wirtschaft hat in den vergangenen Jahrzehnten im Vergleich mit den meisten anderen Industrieländern eine hohe Wertschöpfung kombiniert mit hoher Beschäftigung aufgewiesen. Unsere Industrie ist schneller gewachsen als diejenige in den Nachbarländern und hat uns Wohlstand bei geringer Arbeitslosigkeit beschert. Dies sind grundsätzlich gute Voraussetzungen, um den Herausforderungen zu begegnen, denen sich die Schweizer Industrie in Zukunft stellen muss.

Gegenwärtig ist die industrielle Produktion in einem schnellen und grundlegenden Wandel begriffen, der hohe Qualität und Flexibilität bei den Produkten bei geringeren Kosten – auch bei kleinen Stückzahlen – verspricht. Diesem Wandel begegnet die Industrie mit neuen, additiven Herstellungsverfahren. Diese Technologien, umgangssprachlich bekannt als 3D-Druck, bieten prinzipiell revolutionäre Möglichkeiten und haben das Potenzial, traditionelle Fertigungsprozesse abzulösen. Neue Produktionsprozesse verlangen nach innovativen Steuerungsmöglichkeiten. Mit Industrie 4.0 ist ein neues Konzept für die Fabrikationssteuerung und das Produktdesign definiert worden, welches das Potenzial für fundamentale Umwälzungen hat.

Beide Themen werden an Konferenzen diskutiert und zu beiden Themen existieren in der Schweiz bereits etliche Forschungsaktivitäten. Die Schweizerische Akademie der Technischen Wissenschaften SATW will dazu beitragen, diese Aktivitäten besser aufeinander abzustimmen. Die SATW hat deshalb die Forschungsübersicht «Advanced Manufacturing in der Schweiz» erstellt.

Die Aktivitäten der Forschungspartner, das heißt der Universitäten und Fachhochschulen, wurden detailliert erfragt und in der Forschungsübersicht abgebildet. Die kurzen Texte der beteiligten Institute sind in die beiden Themenbereiche «Additive Fertigung» und «Industrie 4.0» unterteilt. Um einen einfachen und übersichtlichen Zugang zu den Daten zu ermöglichen, wurden jedem Institut maximal sechs übergeordnete Fachbegriffe – visualisiert als Symbole – zugeordnet, welche die Aktivitäten und Kompetenzen widerstreichen. Somit kann in der Forschungsübersicht entweder systematisch nach Instituten oder nach Aktivitäten und Kompetenzen gesucht werden.

Die Forschungsübersicht «Advanced Manufacturing in der Schweiz» zeigt, dass viele Akteure mit einer aussergewöhnlich grossen Vielfalt an Aktivitäten tätig sind.

www.satw.ch/advanced-manufacturing

The PhysiScope

The PhysiScope aims to guide young people into the heart of physics to experience scientific concepts hands-on.

The PhysiScope is an interactive demonstration lab in which visitors play the starring role: in exchanges with our scientific staff, they discuss physics, perform experiments, and relate them to the important goals of today's research. We aim for surprise and fun while awakening our visitors' passion for science and guiding them towards key questions in our high-technology world. Each session lasts about one hour, with minimal reference to mathematical formulae, but nonetheless based on an accurate description of the experimental observations to illustrate the underlying physics concepts and inspire the public.

The PhysiScope is located in the University of Geneva, at the heart of the Physics Section, recognised world-wide for the quality of its research. Inaugurated in 2008, it has already attracted more than 28'000 visitors (5'400 during the last 12 months). Last year, it ran 345 shows over 36 weeks. It can stage up to 4 shows per day, 5 days a week, and is usually booked well in advance.

This innovative teaching laboratory is mainly aimed at 11-18 years old school classes (75% of the visitors), accompanied by their teachers. However, all the demonstrations are also adaptable towards younger children, as well as to adults and seniors. The PhysiScope is open to any group of 10-28 people. The visitors can choose among different, regularly updated topics. Current topics include electricity, mechanics, different states of matter, scientific inquiry, col-

ours, pressure, and astronomy. Our visitors come mainly from the Geneva region, but also from further away in Switzerland, as well as from abroad (France, Finland, Denmark, Netherlands, Portugal, England, Germany, Greece, Kazakhstan...).

The PhysiScope is run by an interdisciplinary and motivated team composed of 3 professors, 1 scientific collaborator, 1 specialised technician, 10 research assistants, 1 model





maker, 1 3D animator, and 1 communication officer. The place is a resolutely high-tech venue with spectacular demonstrations, which is important to excite and interest younger generations, more and more used to fancy gadgets.

Many other activities

But that's not all. The PhysiScope is also involved in a range of other edutainment activities. We contribute to articles in the Migros magazine describing simple

experiments that children can easily reproduce at home. We further participate in outdoor activity centers; holiday passports; demonstrations during the Night of Science; a travelling art&science exhibition named "Supra100" (a collaboration between scientists and artist Etienne Krähenbühl to celebrate the 100 year anniversary of the discovery of superconductivity) to different museums; astronomy workshops, extra muros shows; collaboration with CERN for "*La main à la pâte*" and "*Dans la peau d'un chercheur*", and many more.

From PhysiScope to ScienScope

The success of the PhysiScope has inspired similar projects within the Faculty of Science, and resulted in the creation of the ChimiScope (2011), the BioScope (2014), the MathScope (2015), and the Stellarium Gornergrat (2015). All these Scopes, as well as the already existing BiOutils, are part of a broader structure, the ScienScope. This educational platform created in 2014 is designed to gather scientific outreach initiatives open to the public in various disciplines of the Faculty of Science, to strengthen their impact and to increase their visibility.

ODK

Last but not least, the PhysiScope has also been involved for the last 4 years in the co-production of a weekly TV show for the RTS, the french speaking Swiss national TV. The show is called "*ODK - L'Oreille Des Kids*" and targets 7 to 11 year old children. Each show explains one topic in 12 minutes, starting with an interview of child participants, followed by explanations from a specialist, with a lab experiment and a 3D animation that helps to visualise the underlying sci-

entific concept. This is then followed by an interview of a professional in a related field, and ends with a description of a simple experiment that the young viewers can do at home by themselves. The first two years were devoted to physics, complemented for the last two years by topics in astronomy, biology, chemistry and mathematics developed by the others Scopes of the Faculty of Science.



The first 32 science episodes are available on DVD and can be ordered on the PhysiScope web site. Primary school teachers in Switzerland can order it free of charge for restricted usage in their teaching activities.

Conclusion

If you have not had the opportunity to do so already, you should definitely come to Geneva and attend a show, you will surely enjoy the visit!

Links

PhysiScope: <http://physiscope.ch>

Faculty of Sciences: http://www.unige.ch/sciences/index_en.html

Migros magazine: <http://physiscope.ch/migros-magazine/>
Night of Science: http://www.ville-ge.ch/mhs/nuit_science.php

Supra100:

<http://dqmp.unige.ch/physics-for-all/art-science/>

Dans la peau d'un chercheur: <http://www.danslaopeau-dunchercheur.org>

Bioscope: <http://bioscope.ch>

BiOutils: <http://bioutils.ch>

ChimiScope: <http://chimiscope.ch>

MathScope: <http://mathscope.ch>

Stellarium Gornergrat (an online astronomy observatory):
<http://stellarium-gornergrat.ch>

ScienScope: <http://scienscope.unige.ch> (site under construction, online soon)

ODK-L'Oreille Des Kids: <http://www.rts.ch/jeunesse/l-oreille-des-kids/>