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Donnons un sens à l'innovation

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Interactions



UTC Startup

Series I



A UTC spinoff company wins a medal



The startup Sensovery, co-founded by Anne Guénand, a UTC engineer who majored in design, was awarded a Medal - during the President's New Year's greetings ceremony offered by the Compiègne Conurbation Authority for the company's products notably those that help handicapped persons (or senior partly disabled persons) in day-to-day life. ■



http://webtv.utc.fr/watch_video.php?v=8HKB2MORW7UK

Might we soon see a UTC campus in Mexico?



In the policy framework planning for the setting up a joint UTC campus in Mexico, HE the Ambassador of France to Mexico, Ms Maryse Bossière was able to meet the various actors of the UTC local ecosystem, with companies and authorities interested in this project. The next rendezvous will be a return visit in April to Mexico to approve the possible financial arrangements. ■

Three UTC startups at the Las Vegas 2016 CES

Three start-ups in which UTC graduates are working were present at the 2016 Consumer Electronics Show (CES), Jan. 6-9, 2016. These three startups (Sensorwake, Equisense and Insensi) - among some 150 French companies present at the 2016 and 49th edition of the CES, presented their innovative products: Moreover Sensorwake and Insensi each received a CES Innovation Award 2016:

- Insensi - for its new generation home phone Ily (buzzword in English for I love you) - was laureate for "accessible technology"
- Sensorwake - for its olfactory alarm, which releases, wake-me-up scents, was laureate in the "household goods" category. ■



2015 «WOMAN IN GOLD» AWARD

There's gold at UTC!

Anne-Virginie Salsac, a specialist in fluid bio-mechanics at the CNRS who works at the UTC-BMBI Lab. (Bio-Mechanical & Bio-Engineering) was nominated December 2015 as "2015 Woman in Gold - Innovation". This reward came as a surprise to Anne-Virginie and in all humility she used the notoriety of the event to vehicle a few messages about her sense of commitment to scientific research and the demanding context of science today and in terms of possible applications to the world of medicine.

This particular Gold, you will not find it by digging in the cellars under UTC or by panning the sand-beds of the Oise river. But

at UTC, what is precious is not always "mineral" but often of a more "human stuff". December 12, 2015, Gold took the form of a lady scientist, Anne-Virginie Salsac, elected "2015 Woman in Gold - Innovation". At the age of 38, this CNRS research scientist is not only an internationally reputed specialist in fluid bio-mechanics applied to the domain of blood vessels in particular and to biomedical engineering in general, but someone who is committed and sensitive to her work and scientific issues. These qualities, taken together, won over the jury of this 23rd edition of the 'Women in Gold' event - which consists of awarding a series of trophies to women who uphold demonstrably some essential values. The award to women like navigator Isabelle Autissier (Woman in Gold - Heart in Hand) or Agnès Troublé (line "Agnès B." (Woman in Gold - Style), the Prizes (created in 1993) are given to persons who display essential, universal values such as generosity or solidarity.



Trophy for Innovation ... and also for the public

Anne-Virginie Salsac admitted she was surprised when the Trophy organizers informed her she had been preselected and even more surprised when she received the invitation to attend the Trophy Ceremony Dec. 12 in Avoriaz (French Alpine station). "The fact that I had been selected by the Jury seemed incredible but getting the Public award too was a total surprise", explains our research scientist. Explanation - on the day for the ceremony, the public is also invited to vote via Internet. For Anne-Virginie Salsac, "this further consecration shows that the public is concerned by science and research and more especially when it comes to thematics in health-related areas".

Making science attractive and equitable

For several years now, it has been observed in all OECD member countries that the fraction of students who register for science and/or technological course is regularly decreasing. "Our younger people seem less and less attracted by

sciences. But if through these Trophies the young people (especially women) were able to discover the passion that lies in a research worker's career and chose to go for a job here, then we would have won our bet: to transmit a beautiful virus, that sparks discoveries!", explains the young Anne-Virginie Salsac. And she goes on to underscore the importance of supporting and promoting inspired women who are happy to be at the cutting edge of their profession. "Even if we do see efforts made today to ensure equitable recruitment conditions between male and female candidates, there are still large disparities in certain specialties", she details. As a research scientist she deplores this situation, all the more so that there is a strong erosion factor in the male-female career paths. "It is important that the young women can project themselves in research jobs and find satisfaction there. The research world can only prosper in having diversity and plurality. It is our mission to cultivate these!" underlines Anne-Virginie Salsac.

Facilitating appropriation by medical professional spheres

Each day that passes brings new challenges for the research teams, "but many other challenges still remain in the field of fluid biomechanics to better understand the complexity of the human body and to continue to develop new diagnosis technologies and therapies to meet tomorrow's needs", says Anne-Virginie Salsac. Medical practitioners often make use of anatomic data, such as MRI imaging, ultrasonic images, but far less biomechanical data. It is therefore important to make the new tools available for practitioners who are non-specialists and to inform the medical community about progress made in this specialty. Dr Salsac has specialized in vascular mechanics and gives the example of congenital, abnormal vessels that interconnect arterial and venous blood circuits

– and here it is possible to patch the leak with “surgical glue”. “Our lack of information about the mechanisms and the possible chemical reactions of this particular glue with blood and blood vessel walls is a brake to further development of the gluing technique under clinical conditions and the training of young radiological surgeons”, explains our research scientist.

In a wider context, Anne-Virginie Salsac emphasizes how important it is to exchange among the specialties involved in order to be able to understand complex, interdisciplinary issues. Over

and above fluid and solid mechanics, mass transfers or biochemical reactions ... there are numerous specialties and the reality is often multi-physics in essence. In such a scientific vista, “it is absolutely necessary to go beyond the classic specialty boundaries and to merge both experimental and digital approaches”, underlines Anne-Virginie Salsac who also insists that digital modelling tools be made accessible to the practitioners themselves. Will this be as a Woman in Gold or as a scientist at the forefront of the challenges and methods used in modern research? Anne-Virgie is no doubt

partly one, partly the other. And in all probability it was for this reason that the CNRS awarded her its 2015 Bronze Medal, thereby rewarding the undisputedly high level of her research work and professional track record. ■

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ENGINEERS FOR TOMORROW EVENT

UTC graduate declared *‘Usine Nouvelle’* for his DecoControl Alu®

So, how do you place/insert a tactile switch on a brushed steel or wooden dashboard? The automobile equipment manufacturer now knows how to do this, thanks to work done by a former UTC student. The concept goes by the name DecoControl Alu® and was singled out by the French technical review ‘Usine Nouvelle’, awarding its designer Omar Ben Abdelaziz the 2015 Design trophy.

Omar Ben Abdelaziz, a UTC graduate, in December 2015 received the “DesignTrophy” at the Engineers for Tomorrow event organized and sponsored by the review ‘Usine Nouvelle’. The award is for a new tactile switch design that will operate on any surface, including aluminium. As an Innovation Project leader at Faurecia, the automobile equipment manufacturer, the laureate is a specialist in man-machine relations in the Faurecia Interior Design division. This technology goes by the name of DecoControl Alu which was selected for then Design Trophy 2015, inasmuch as the Jury recognized the extra degree of freedom offered in the choice of materials and in the design itself. The technology relies on a piezo-electric effect where the slight deformation of the switch produces an electric current, with a return that takes the form of a vibration that the user’s finger can sense.

Lighter equipment

Another target in terms of innovation is the search by automobile manufacturers to make and integrate lighter parts. “Today vehicle designers are highly sensitive to seeking and finding minimum weight for their parts, for the purpose of lowering energy consumption”, details Nicolas Dauchez, Head of the UTC-AVI industrial acoustics and vibrations course and research. Reduced thickness for steel plates (including slimmer tactile switches) are in line with this research, as well as the development of new materials at Faurecia. For example, they have developed a material called ‘NAFILEan’, composed of jute fibres and synthetic resins that

allow for an up to 20% gain in overall weight. 100% natural materials are currently being explored as substitutes for plastics.

Faurecia continues to orient its corporate policy to attain better energy savings, reduced reliance on hydrocarbon sources, so as to be ready to adapt to the growing demand trends for visual and connected equipment... “We now have additional screens that blend in well with the interior design constraints, such as having on board wireless charging systems for mobile phones, or variable ambiance for the driver ...” states Omar Ben Abdelaziz, to show how fast the sector is evolving today and the increasing fraction of man-machine interfaces ... his personal specialist domain. ■

High class interiors

This innovative design follows suit to research carried out by Faurecia on “decors” with tactile functions. “Using piezo-electric sensors allows you to position the switch on all sorts of surface and materials”, details Omar Ben Abdelaziz who heads this project. There are other advantages to the device: retro-lighting, the haptic reaction when the switch is activated and the ‘slim’ depth, less than 1 cm compare with 2 to 3 cm for classic tactile switches. For the company Faurecia Systèmes d’Intérieur, the world leader for vehicle interior equipment, they can now offer a high class technology that usefully completes its range of parts designed to improve the comfort and convivial atmosphere inside our cars.



The first Pop'Café at the Daniel Thomas Innovation Centre



Feb 5, 2016, the UTC Innovation Centre organised the First Pop'Café on the theme "Protect your innovations". The

objective of the event was to bring together various 'innovation actors', viz., company heads, executive managers, research scientists, etc. Christophe Soret, Picardie regional delegate for INPI (French national property rights institute) made a presentation as to who and why you should protect your ideas. Other Pop'Café events will follow, on themes such as Horizon 2020, How to make a Business Plan, design thinking, financing start-ups... ■

www.weezevent.com/pop-cafe



The laureates of the Sorbonne Universities Cluster CAPES Chairs Programme

The programme of the Sorbonne Universities Cluster CAPES Chairs, with the financial support of the Brazilian Ministry in charge of Higher Education and Research aims at strengthening and encouraging the hosting of high level Brazilian research scientists. Sorbonne Universities and three CAPES set up this prestigious programme, signed when President François Hollande made a State visit to Brazil in 2013. A first call for proposals enabling mobility to one of the HE establishments members of the Sorbonne Universities Cluster was launched in 2014 and the first two laureates were nominated for 2015-16. Over and above Prof. Paulo de Mattos Pimenta, who lectures at the University of São Paulo, hosted by UTC for 6 months, there is also Prof. Marcelo Bozza, a specialist in immunology at the Federal University of Rio de Janeiro who will be hosted by the Muséum National d'Histoire Naturelle (MNHN). In its capacity as a member of the Sorbonne Universities Cluster, UTC is a beneficiary of this most distinguished programme. The Sorbonne Universities Cluster the only French institution that benefits from CAPES Chairs. This puts SU on a par with Harvard, Oxford, Cambridge, with a collaborative agreement with Brazil aimed at stimulating scientific excellence and ensuring the highest quality in the Brazilian higher education and research system.

CHAIR

The Sorbonne Universities cluster (SU) welcomes Brazil to UTC

In the framework of the CAPES Chairs - Sorbonne Universities cluster (SU) – see insert below, UTC will be hosting a very high level Brazilian research scientist, Prof. Paulo Pimenta who works at the University of São Paulo. Prof. Pimenta will be employed at the Chair of Mechanical Engineering to conduct research as to the possibility to double the capacity of offshore wind-turbine farms.

In the framework of the CAPES Chairs - Sorbonne Universities cluster (SU) – cf. insert below, UTC will be hosting a very high level Brazilian research scientist, Prof. Paulo de Mattos Pimenta, to work with Adnan Ibrahimbegovic, Professor of the UTC Chair of Mechanical Engineering. As of Feb. 2016, for a period of 6 months, this eminent Brazilian specialist will offer his expertise (acquired by working with John Argyris inter alia, one of the pioneers of computational mechanics). "This particular insight due to the German school of mechanical engineering will be most interesting", underlines Adnan Ibrahimbegovic.

A pedagogical objective

A book will be edited by Springer for use in the Masters' and PhD programmes; the draft is being finalised by Adnan Ibrahimbegovic and Paulo Pimenta. The title will be "Nonlinear mechanics of structures and flexible multibody systems" and constitutes one of the main pedagogical objectives of the stay of Prof. Pimenta in France. "The South American and German approaches, brought to Compiègne by Prof Pimenta will be confronted with North American approaches that were perfected during my PhD days at Berkeley and in various industrial collaborative programmes in France, so that we can build up together a comprehensive panorama of the field", underlines Adnan Ibrahimbegovic. The US approach consists of making a high level use of computational techniques, whereas in France the approach favours mathematical applications. As far as applied research is concerned, industrial experimentations in France and Brazil are still very different. The needs expressed by industries such as Airbus for large aircraft are different research those at the Brazilian company Embraer, where the policy is to design and assemble smaller aircraft. These two high level scientists would like to unite the different approaches in a single reference book and to demonstrate how best they can be implemented depending on the needs and situations as they arise.

Doubling the size and capacity of wind-turbines

These two experts also aim at producing a significant progress in wind-turbine design. Both France and Brazil have excellent offshore opportunities to make the



most of very large scale wind-turbines. "The objective here is to come up with a feasible design with twice the size and power generation capacity compared with already installed models" adds Adnan Ibrahimbegovic. This objective implies modelling the various fluid interactions (wind, water) and the supporting structures (the base, the mast, the turbine blades ...), so as to attain a full understanding of this multi-physics. For the UTC based specialist, it is primordial to understand the system behaviour over along operational tie-span and in extreme climatic conditions.

Flexible turbine blades, inspired from dragon-fly wings

Another prospective progress could lie in an analysis of dragon-fly wings – hopefully to design flexible turbine blades that would prove more reactive to changing wind conditions. An innovation like this would make it easier to cut in a generator under light wind conditions, and at the same time would reduce the risk of a blade braking in stormy conditions. As Adnan Ibrahimbegovic sees it, the partnership could lead to the possibility of proposing their solution to a call for research programme in the framework of the EU programme Horizon2020, which aims among other targets at securing renewable and clean energy procurement. If they succeed they could benefit from 25 Meuro grant to pursue the design and build the largest offshore wind turbine ever assembled to date. The collaboration with Prof. Pimenta seems especially relevant in terms of complementary knowledge bases, but will also serve to bring Brazil and France closer to make best use of the innovative approaches. A case in point here is that Adnan Ibrahimbegovic has now been appointed to a Franco-Brazilian Chair in the State of São Paulo where with its 120 000 students, the University is the largest in Brazil. ■



UTC Series I Startup



All vertical market segments are affected by digital innovations and by trends seen at the Consumer Electronics Show (CES), undoubtedly the greatest hi-tech event in the world, which 3 UTC start-ups chose to attend. Consider the distribution sector which is having to think hard about on-line trade (e-commerce) and virtual reality. Insurance companies are concerned by the development of driverless cars. Banks are closely monitoring mobile phone transactions. Automobiles are taking on board more and more technologies, for audio, sensors, assisted even automatic driving. Traditional sectors can see how their competitors are jumping on the connected object band wagon or not. In short, everyone is involved to a greater or lesser extent! Visiting the CES provides the opportunity to analyse digital strategies with real-life ingredients, users and targeted uses, without forgetting or neglecting the underlying economics: is the price to pay for a connected solution worth it? Could the price possibly drop radically to democratize uses? This sort of question is valid everywhere: for 3D printing, for 4K TV and all sorts of connected objects to come. The 3 UTC start-ups had a continuous education boost at the CES2016, Las Vegas.

UTC fully approved when we heard Shawn DuBravac -chief economist and director of research for the Consumer Electronics Association (CEA)®, a U.S. trade association – declaring loud and clear that it is not the technology that counts but rather the uses made of technologies. You have to focus on what is possible, from a technological point of view and also on what is meaningful. The name of the game is meaningful versus possible. The products presented by three UTC graduates present at Las Vegas and the other French start-ups detailed in the brochure underline this priority. To a large extent, they have taken on board the future trends in health, food and entertainment sectors.

However, it is clear today - as Professor Dubravac confirmed - two third of the business turn over in digital products is concentrated in only a few categories: mobile phones, i-pads, television sets and computers. But the emergence of new categories such as drones, virtual reality or 3-D printing could change the 'givens' here.

Over and beyond the products aspects, the 2016 CES has underscored three key mega-trends that help us foresee the coming major digital world changes:

- **Ambient detection:** we already have

sensors that can measure everything continuously, monitor babies, drivers, house temperatures, physical activities, cats and dogs, what we eat and all of this is 'filmable' and 'recordable'.

- **Aggregate learning** relates not only to making use of data from the sensors (light levels, weather, numbers of persons present, temperatures, level of fatigue), but also involves the Google learning algorithms also based on the data, IBM Watson ...in a word, aggregate learning comes via collective learning and continuous system information to develop the best scenarios as seen in video games and with the equipment manufacturers who are now creating machine learning and auto-learning protocols.

- **Building up ecosystems** : it may seem self-evident, but new technologies tend to mature as and when their local ecosystems are established. A good example here is in VR (virtual reality) which will soon be used to promote travel spots. The ecosystem here will surely integrate the 360° full-circle cameras seen at the 2016 CES. And we also note that 4K TV is coming of age. ■



Year 2016 saw the French beat all their previous attendance records at CES Las Vegas

249 French companies attended including 201 start-ups

France has become **3rd CES exhibit country** after China and the USA

Thus, France represented **50% of the foreign exhibitors** from the Eureka zone start-ups.

24 French companies 'honoured'

2 out of 24 Prizes awarded went to UTC start-up companies, viz., SensorWake and ILY

Sources: rapport du CES 2016:
www.oezratty.net/wordpress/2016/rapport-ces-2016/

Olivier Ezratty will deliver the closing address – After COP21 – what will transportation look like tomorrow? Wednesday, Feb.10. 6 pm Cité des sciences et de l'industrie, Paris



#35

October
2015

'Design Thinking' upgrades the fire-fighter's helmet

When fire-fighters operate in a closed environment, they are often handicapped by lack of visibility because of ambient smoke. Maybe this will soon belong to the past, thanks to Iperio®, a camera attached to the helmet enabling the firemen to see through smoke. This is a technological 'gem' developed by Corentin Huard, Chairman & Co-founder of Ektos SAS and Alice Froissac, who graduated 5 years ago from UTC, also co-founder of Ektos.

«I am a serial entrepreneur!» claims Alice Froissac, who graduated from UTC in 2010 and was chosen as laureate for the "promising start" in the annual Engineers Prize organized by the magazine Usine Nouvelle et Industries et Technologies. But on the face

of it, her initial HE training did not predestine her for this. "First I did a

degree in engineering scene at University of Paris

6 (Pierre & Marie

Curie) but I found it was terribly

theoretical,

"recalls Alice

Froissac. "I

had always

been attracted

by industrial

design

questions and

consequently,

instead of doing

a Master's degree, I

started looking for a course

that could suit me better and UTC was

one of the rare engineering schools that

proposed engineering training with an

opening to industrial design – I was able

with a combined engineering and design

profile to adapt to various situations

and professions". After gaining her

UTC diploma, Alice went on to follow

a one year add-on course at the Paris-

Est d.school affiliated to the Ecole des

Ponts and became involved in a project to

upgrade fire-fighters experience in smoky

fire conditions thanks to a technology

from Thales Optronics that allows you

to "see" through smoke. "In June 2014,

did not wish to pursue development

internally and so Corentin Huard, who

had worked on this project and myself

decided to do so and we create a start-up

business Ektos". It is in the framework of

this start-up that they continued together

to develop the invention, now under

the code-name Iperio. An infrared (IR) camera is attached to the firefighter's helmet (it can be detached if need be).

The images are projected inside the closed, ventilated helmet either by projection on the Plexiglas visor or via a monocular mini-screen (both approaches

are under investigation). These images are also transmitted in real-time to the fire-officers outside so they too can

have a vision of what is gaping on at the fire scene. The images could also be recorded, for training and return on

experience. "We spent a lot of time with the firefighters to understand their needs for vision", explains Alice. This forum

the base for "design thinking", viz., innovation cantered on user expectations. We observed their operational practice

and behaviours in our search for solutions. This runs against the traditional approach in France, where first we tend

to develop the technology and then look for possible application areas". To best define the firefighters' needs, Alice

and Corentin worked with the Moissy-Cramayel fire-brigade. "Firefighters already use IR cameras but they are

hand-held models which slow down their progress. During the tests, we realized

that a huge number of constraints had to be integrated: the camera must not be too heavy, small enough so as not to

hamper the firefighter's moves. It must resist high temperatures and physical shocks and also have a reasonable battery

life". In order for the firefighters to "see" through smoke, as we said the camera is thermal IR based, enabling a distinction

of a person lying on the ground and more intense fire spots. "However, for the following step,

we want to explore use of the technique Thales proposed in the beginning, viz., in the near IR which really allows you to "see" through

smoke, with varying levels of grey," adds Alice. But near IR a very expensive form of technology and require even more

development work before it can be proven totally efficient in operation. Iperio could

be used for forest fire detection on board Canadair aircraft, the pilots being able

to localize fire-starts more accurately and carry out more precise water or

retardant bombing. After a series of tests conducted in April, Alice and Corentin

are engaged in fund-raising to develop the next prototype which is planned to be smaller and more functional. "We

have already benefited from the BPI Frenchtech grant and we were laureates at the UTC-PEPITE-Tremplin Prize for

student entrepreneurship achievements", adds Alice. Today we are looking for

other forms of finance and partnerships. And, we are already thinking about

developing our product for overseas markets – in a sense, fire-fighters round

the world could be interested in a product like Iperio". But Alice and Corentin have

even further ranging prospects; they would like to set up a second company,

for training packages on design thinking and corporate coaching. Ah, yes! That is

the life of a serial entrepreneur ! ■

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To understand and be understood : that is the question

Fluency and skills in a foreign language, notably English, are absolutely necessary today in the professional world. To understand and be understood by people from every walk of life, with different cultures and accents is therefore fundamental to success. Unfortunately, the way languages are taught, especially English, at both schools and in higher education establishments, simply does not meet the need. And this is where Pipplet – a start-up created earlier this year by three UTC graduates - comes in to help fill the gap.

Pipplet in short, offers on-line language assessment. The objective is to assess the skills acquired with a view to communicating, defending as position or even expressing emotions in a foreign language.

Oral skills are therefore predominant in the Pipplet test protocol, as Baptiste Derongs confirms: "During the test, we do not focus on grammar skills as is the case with 'academic language learning', but look rather at assessing a person's capacity to correctly understand a group of persons and to be understood by its members. There is a prerequisite minimum set of skills needed to be able to benefit from the Pipplet service, but naturally the questions used can be adapted in terms of the person's level. In fact, even if the person takes the test in his/her mother tongue, the assessment will check the ability to be understood by non-English native speakers."

It was during a stay in London that the idea of creating Pipplet dawned on Baptiste Derongs, a UTC graduate with the elective major in computer science and engineering. The decision was taken to set up the company, with two other UTC graduates he met in London: Adrien Wartel, with the same UTC degree and specialty and Matthieu Herman, whose specialty was Mechanical Engineering. "Thanks to the training we had received at UTC, we were able to identify an excellent level of complementarity between our combined skills. "My area is more with commercial prospects and business development", explains Baptiste Derongs, who is more concerned with technical aspects, and Mathieu who deals with design questions. Two 'computer scientists' and one 'mechanical engineer', working together in the field of social sciences. That really does illustrate the UTC spirit! The start-up was laureate in the category "emerging companies" at the i-Lab competition,

July 2015, organized jointly by BPI and the French ministry in charge of Higher Education and Research. "We were awarded the maximum subsidy of 45 000 € to help accelerate our company's development phase", says Baptiste. Currently, we have a partnership agreement with the University of Paris, Sorbonne, University of Paris 6 (P & M Curie) and soon with UTC. "This partnership with the universities will allow our start-up to rapidly build up a corps of users spread over five continents. Our objective is to have access to a representative sample of the entire world' speakers. A Pipplet user will thus be in a position to exchange with between 50 and 100 other users, in several countries, so that the can become familiarized with different accents", adds Baptiste. Every person registered for the test is invited to answer fifty or so questions: 25 questions where the person is the speaker and 25 where the same person has to listen to another user and answer questions about what the he or she was saying. "For example, one user will explain how to go from point B to point A and a second user is supposed to find B, starting from point A. If both persons have correctly understood each other, we check their mutual understanding and that question has been correctly answered. Statistically speaking, we can give a mark that represents the person's ability to understand and to be understood." The Pipplet test relies on a corpus of questions which were established with the help of a professional linguist.

For the moment, the Pipplet test is available in English, but an extension to encompass other languages is already on the board. "Our system

and the test, potentially, can be operated in any language, provided that questions are framed to suit the local cultures where it is spoken. Moreover, we have had lots of enquiries to develop the test in French. Of course, when you want to establish the test in another language, you have to assume there will be a sufficient number of persons who actually speak that language, with a certain number for whom it will be their mother tongue", underlines Baptiste.

Two 'computer scientists' and one 'mechanical engineer', working together in the field of social sciences. That really does illustrate the UTC spirit!

A more long term objective is to have the test results certified, for example, for inclusion in a candidate's CV.

"Users would receive a score chart when they have completed the test, indicating their degree of fluency in inter-personal communication", adds Baptiste. "The more users there are for Pipplet, the better the recognition of the test level certification. But to attain this, we must be sure that the test is passed under valid conditions, i.e., the person is not helped out by someone else".

Pipplet targets mostly business concerns, notably for the purpose of recruitment procedures. As Baptiste sees it, the evolution will consist of "proposing tailor-made tests for companies, to assess, for example, the ability to communicate in team formation, in a given professional area such as the automobile sector, or in banking and involving speakers in specific target countries such as China or India for example".

Another objective is to be able soon to offer the test for any private individuals who wants to assess their capacity to communicate satisfactorily. ■

plus <http://www.pipplet.com>



Equisense, a marriage of *horse-riding and innovation*

#36

December
2015

Over the past months, various start-ups and small business concerns have benefited from the facilities offered at the UTC Daniel Thomas Innovation Centre, and in particular, over and above meeting rooms, from the Fab'Lab, advice on hand, technical rigs, etc. The start-up Equisense has been a beneficiary since April 2015.

«Since last April, I have been working full-time on the Equisense Project at the UTC Innovation Centre» says Benoît Blancher a 2015 UTC graduate - Mechanical Systems Engineering (GSU).

“As we are working on a connected object and it proves really useful to have the Fab'Lab next door, so to speak. At UTC we can exchange with our lecturers and professors and INPI (the French national industrial property rights agency) is never far away, as well as observing other students working

other projects. The students can work at the Innovation Centre via Lab. or



project work. Besides, since our object is in the field of horse-riding, we note that the French Institutes for Horses, a benchmark institution, is in Compiègne and possesses many stables. All told, the environment

is highly favourable for our project”.

Horsemanship is something familiar to Benoît who has been a keen rider for 10 years, notably in gymkhana competitions. “What I noticed was that there were no connected objects in horse-riding, a sport where there are numerous important parameters that relate to your mount's performance and well-being: speed, balance, irregular gait ... Following a summer placement with another UTC graduate's start up (designing a lamp and smartphone hook-up), I became interested in 3D printing and connected objects in general”.

The first project developed at Equisense is a unit that is placed on the horse and serves to measure and analyse the animal's gait, to follow up its workout sessions, even when several riders mount that horse. For example, it allows you to have a precise vision of an obstacle circuit, where both performance and progress can be recorded: stride length, trajectories, jump curves, speed attained ... It therefore is an overall performance monitor that helps riders to adapt their work schedules to the horse; it is also accurate and easy to use. “It is perfect for all riders who mount more than once a week”, adds Benoît Blancher. “Our objective is to enable riders, whatever their level and horsemanship skills, to progress and to take care of their horses' well-being”. [To this end, it authorizes the riders to integrate the health care system for their horses. A print-out is available. The vet.

can also follow the treatments he/she has administered, notably when it comes to locomotion.

The sensor in it is full autonomous: it lights up and detects when it is on a horse's back and automatically records the data and forwards them to a phone, when the latter is close enough. “The following step will be to distinguish which horse it is on”, adds Benoît.

For the moment the interface is in English, French and German and can be used to record several horses as well as several riders. “We create a rider's profile and a horse profile and these can be shared among other riders”, explains Benoît. There is also a special interface for the trainers who can thus follow the workouts. Also propose special offers for professionals, notably a subscription where they can simultaneously benefit from an extensive series of sensors supplied under contract”. The start-up has been testing viable prototypes for several months now and is getting the sales model ready for a market launch. “We raised the funds needed this summer and we are preparing a fund-raising campaign on Kickstarter, end October, so that we can propose our equipment directly to the American markets which tend to welcome technological innovations”. The market launch for the first it devices is planned for year 2016. ■

plus d'infos ► <http://home.equisense.com/fr>

Using VR to create a *realistic sound surround environment*

The Aspic Engine project imagined by two Computer Science students Marc Muller and Quentin George, certified by the UTC Innovation Centre in 2012, was turned into a startup, Aspic Technologies, end 2014.

Aspic Technologies designs and proposes various software packages and equipment to video game and VR professionals,

helping them to integrate a highly realistic sound surround environment.

“Aspic Technologies makes the video and sound components coherent in a

virtual environment, replacing long and costly alternative methods by a real-time, efficient solution, albeit with a few ‘approximations’”, explains Quentin George.



The startup company is notably sole supplier for software and sound equipment for the EQUIPEX Innovation-Research platform for the Digital and Interactive Visual Environments (IrDIVE) at the SCALab laboratory at the Universities of Lille. The new platform will be inaugurated officially in Spring 2016 and will become the largest VR

facility in France. Moreover, the company intends to launch a fund-raising campaign during the coming year, to enable the founders to complete their marketing and sales staff. ■

plus
infos ► www.aspictechnologies.com



A connected medical device *to help calm back-aches*

Chronic back-aches represent an ailment for 8 out of 10 French people, and are often seen as the “scourge of the century”. In most cases, the cause lies in bad posture in the office and a far too sedentary way of life. To remedy this situation, Antony Rouhban – who was recruited at UTC in the continuous education engineering programme (major Bio-engineering) and Nicolás Latorre (from the University Favoloro, Buenos Aires, Argentina – doing his double degree at UTC, have developed a portable connected technology which warns you if you adopt a bad posture.

«**O**ur objective is to design a medical device to prevent, treat and monitor posture-related problems and issues. The device requires use by a health sector professional (a medical practitioner, a kine-therapist, etc. This particular project goes back to 2014 when Antony Rouhban and Nicolás Latorre registered for an “innovation competition” organized by the French Association for Bio-medical engineers (AFIB): «Nicolás had an excellent grounding in electronics and he added skills in project management, marketing and regulations. We then decided to present a project at the AFIP competition, with Didier Gamet (UTC-BMBI Lab) accepting that our presentation count as a TX (CC) credit course. Antony and Nicolás came First ex-aequo in the competition results and were also ranked among the 20 first projects selected for the Pépite Prize, springboard for student entrepreneurship. Their project also received a pre-certification by the UTC-Innovation Centre during the Sept. 201 assessment session for innovative projects. “Pre-certification, hopefully followed by full certification this coming year, enabled us to raise some funding but more than that to acquire a necessary qualification to allow other UTC students to work with us on the project”, adds

Antony. The UTC- Daniel Thomas Innovation Centre provided a perfect setting for these two young entrepreneurs so they could continue to develop their project. “We used to the full the resources made available by UTC and the Innovation Centre”, Antony confirmed. Over a one year period “we worked with close on 50 UTC students in a varied set of skills, from project management, economic intelligence, design, enterprise creation ... We notably ‘hired’ several students in the MPI major, which allowed us to have a precise monitoring of the various stages and this help was much

appreciated insasmuch as I was very busy in a placement during the previous semester. We made good use too of the Fab’Lab and the ‘motion capture room’ and equipment installed at the Innovation Centre. Moreover, Antony and Nicolás do not intend to leave the Innovation Centre now that they have their engineering diplomas. As Antony details “I can work full-time now on the project and we shall have assigned office space at the Innovation Centre. And, with the UTC-BMBI (bio-mechanics and bi-engineering Lab, we shall integrate a project maturation programme accompanied and funded by the SATT Lutech (technology transfer incubator). ■

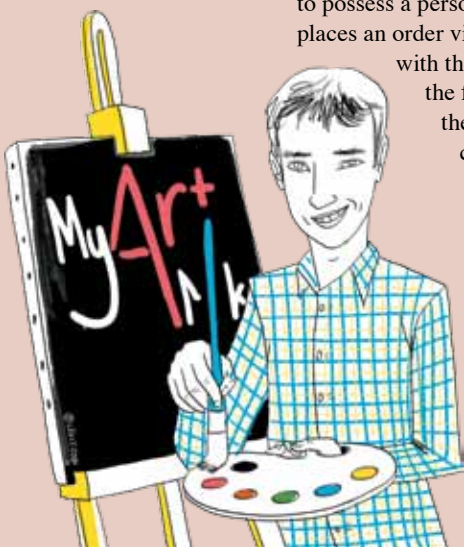




A digital partner for artists

Myartmakers is beginning its business operations in the world of art, its platform being launched in March 2014 proposing to create links between artists and potential customers.

So what is the underlying principle? Anyone who wishes to possess a personalized piece of art-work places an order via the site, using a form with the basic ideas, the size, the frame, supports, etc.: all these points are taken into consideration. Artists who consult the request can choose to follow suit, proposing an estimate. If the prospect is attracted by one of the offers, Myartmakers sets up the connection between artist and customer and ensures exchanges up to delivery, with a 15% commission (paid by the artist) which is a



level less than in street galleries (50%) and also specialist Internet art sites (20-30%).

Art moves into the lean start-up field

« Myartmakers is seeking to meet the artists' needs, inasmuch as the latter are reneging at seeing their work in a digital context and they do need help when it comes to selling art-work over the Internet. What we do is to position ourselves as a digital partner. Today the site has a pool of over 500 artists; 20 orders have been placed on line and 3 have already been finalized», says Adrien Saix, co-founder of Myartmakers. The platform was developed in compliance with the rules lean start-ups, and is continuously improved as a function of customer/prospect returns. «We now have an art gallery to propose art-works that have been finished, a system to assess the artists participating, a social network and we have other projects under way». Adrien Saix met his two associates, Dertrand

Debrie and Yohann Doaré when he was doing a specialist Master's degree at HEC, after graduating as an engineer from UTC in 2012 with the Urban Systems Engineering specialty. The ambitions of the trio are simple and straightforward: to become the reference Internet platform for modern art. While awaiting this goal, year 2014 is to be seen as the one in which they will learn to 'read the market'; the Myartmakers project won over the i-lab jury – the start-up finished selection in the top ten laureates in the category "Emerging projects". They received a 10 000 € check which is precisely the amount needed to rebuild the site, integrating the latest (as yet confidential) features. The company also came out very well indeed at the national competition for enterprise creation organised by the marketing consultants Netétudes, winning first prize out of 704 candidates. ■

plus d'infos ► www.myartmakers.com



The “Boîte à Encas”

Our lunch-break time is a necessary moment to relax and enjoy exchanging with our colleagues. However, it may prove difficult for those who do not bring in a meal with them or if the company canteen is not up to expectations. And this is where the Boîte à Encas – a start-up created by a UTC graduate - comes in.

It did seem an obvious idea to Michael Ormancey, a UTC graduate in the major Process Engineering (2012), during his engineering placements. “My placements were organized in industrial zones and I realized there were very few restaurant solutions in units without a canteen or a self-service. And that was where the idea arose to create a cafeteria system, adapted to each company's needs”. Michael's idea was simple: to deliver a turn-key cafeteria

with its own refrigerators, plates, cutlery, a microwave heater and a pay-box. But the Boîte à Encas is different from other systems in the way it is operated and the way food is supplied and distributed. “What we do is to provide the personnel with a magnetic card that can be recharged or even using restaurant vouchers. The pay-box is a tactile pad-device where the personnel badge in their ID to pay for the meals. The pad is connected to our data server and that lets us know, in real-time,

who is eating, how often he/she eats there and in what company. We can thereafter improve and narrow down the dish supply side, optimizing our delivery rounds with the stocks at the company premises”. The second originality of the system is to have a distribution system that varies according to the size of the client company. “When the personnel is between 30 and 100, the products on sale are offered in “self-service” mode”, explains Michael. “If there are more than 100

persons to cater for, the self-service approach is no longer viable. In this case, the customer will badge to open the fridge door and select among the dishes offered. Once the fridge closes again, the fridge will automatically deduct the price-to-be-paid from the magnetic card”.

So, tell me, what is there in the fridges? “Our aim is to propose high quality dishes with respect to what you can find in major shopping centres”, says Michael. “We are working with three catering companies for the cooked dishes and with small foodstuff producers for the soups the desserts, etc. The diversity we have in our partner suppliers allows us to have an

attractively varied menu which we change every week, including provisions for non-gluten, sugar-free ... diets. Moreover, we prefer “in season” products and, indeed, all the dishes we prepare are made from fresh ingredients without any preserves added”.

A menu costs between 7 and 10 euros. “The aim here is to be on a par with the value of the corporate lunch voucher, adds Michael. But the clients can also purchase a snack or a breakfast with the same system!” After a launch phase concentrating on companies

with between 30 and 100 staff members, the Boîte à Encas is now preparing to move into the 100-300 bracket. “We hopefully will become a reference in the 100-300 range. “We want to become a reference in the Paris Île de France Region, announces Michael, knowing full well that this particular, capital, Region has the densest restaurant and food outlet offer in France. We have already equipped over 30 companies in the Paris area but the market potential is simply enormous!”

The as yet small company has big horizons and would like soon to cross the English Channel. As Michael sees it: “London’s food habits are very close to what we offer at the Boîte à Encas. We are planning to set up shop over there in the coming 2 to 3 years. But before that we shall extend our network and services throughout France”. ■

plus d'infos ► <http://laboiteaencas.com>



Communicating *by touch*

We are saturated by visual and audio information all day every day, but how could we transmit information via our sense of touch, not used very much today? This is the question addressed by the UTC-Costech Lab via an innovative prize winning project at the Innovation Centre in 2010. After 3 years maturing, the two UTC graduates in charge of the project design Thibaud Severini and Vanessa Caignault created their company Novitact.

The aim is to lend meaning to touch, notably through functions offered by the first product, the Feeltact vibratory comm-bracelet. This bracelet is a connected object that transmits and receives tactile messages in the form of vibrations. “The lexicon of our sense of touch is adapted to the users. The messages can be easily interpreted as a function of duration, intensity, rhythm and number of oscillators set in motion”, says Thibaud Severini, Chairman of Novitact/. The bracelet is

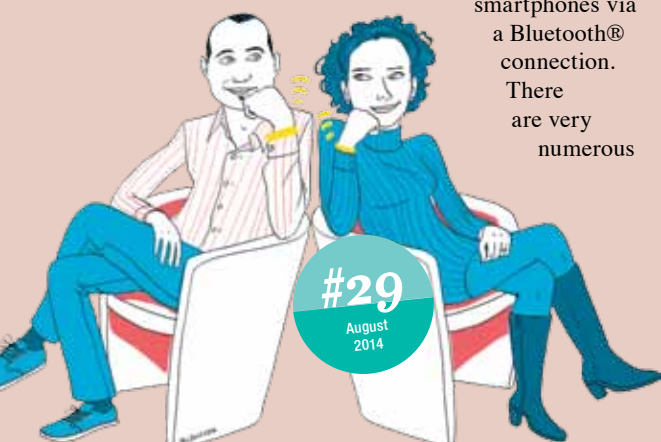
also connected to smartphones via a Bluetooth® connection. There are very numerous

possible applications for Feeltact. These could lie with professionals but also with private individuals even if Novitact – in the first instance – has targeted the profession safety sector, for environments where visual and oral communication prove difficult, or even dangerous. “For example”, explains Vanessa Caignault, CEO of Novitact, “a ticket inspector on a train who feels he/she is in danger can discretely send a message via the bracelet to warn his/her colleagues and receive a message in return about their arrival possibilities”. This idea for a vibration based data transmission system emerged in 2010 through a proposal by Nicolas Esposito, a research scientist working with the UTC-Costech Laboratory. It was Nicolas who first contacted Thibaud Severini – a graduate in Computer sciences and engineering from UTC. Thibaud joined the adventure in June 2010, managing what was to become an innovating project, and he co-invented the the bracelet format. Then it was the turn of Vanessa Caignault to join the team (likewise a graduate from UTC specialised in innovating projects management). “After 10 years helping others to launch products and start-ups, I decided to ‘cross the line’

and get into entrepreneurship on my own”. This prize winning project benefited from funding by the Picardie Regional authorities, via the Maturation Fund and likewise from Europe via the FEDER (Regional development fund). The company was officially created in October 2013 and won the Digital Spring prize awarded June 5 this year, convened at the UTC Innovation Centre, thereby earning their tickets to seats on the French delegation who will be present at the next Consumer Electronics Show (CES), Las Vegas and this will surely add a lot of international visibility to the young company.

“But the main objective this year”, says Thibaud Severini, “is to test the bracelets in real-life situations using some prototypes that we assembled as of April this year. The prototypes allowed them to contact several companies interested potentially in the product and to identify those who expressed a wish to join forces in a test phase to be conducted by end 2014. ■

plus d'infos ► www.novitact.com





Autonomous, mobile house-plants

When we use the term 'robotics', we often refer to humanoid robots, drones or robotic toys. But robotics covers a domain that reveals many other potential possibilities. The start-up Still Human with its project Ga.ia transforms our house plants into real 'cyborgs'!

Mathias Schmitt, who trained as an industrial designer at the Strate College, Sèvres (West Paris suburbs) initiated this rather mad-cap project. "To gain my diploma I had to develop an industrial project and I chose the field of robotics. At first, I thought of 'feeding' a robotic with a plant source and that led me to the conclusion that plants could gain through being connected to a robot! Finally, I decided to make a cyborg – half-plant, half-machine, where the plants could 'make decisions'". Mathias Schmitt became associate with another Strate College graduate to found the start-up Still Human, and develop the Ga.ia. Project. That was when he met Quentin Guilleus, a UTC graduate in the major Mechanical Systems Engineering (UTC-GSM), working as a trainee at the Integrated Robotics Centre, Île-de-France. Three years later, Ga.ia takes the shape of a two-wheeled robotic base, with an Internet connection and fitted with numerous sensors (hydrometry, UV, light, temperature ...). The data gathered in real time by these sensors depend on the species of plant, the period of the year, the weather conditions, etc., which are picked up Internet. Taken together, this information enables the robot to make decisions. "For example, if the plant needs water or light", says Mathias, "the robot will be able to take the decision to shift the plant to a more suitable position. From this point of view, Ga.ia is a real cyborg, with all the skills conferred by robotics, viz., with the capacity to make decisions to adapt to new situations, for example, when nearby house furniture is moved". The plant pot is fitted with cameras and lasers, to make an exact map of the room. "Ultrasonic sensors will also warn the robot that things have moved and that certain areas are to be avoided", adds Mathias. There, therefore, is no risk of the plant colliding with a piece of furniture or an animal. "In the beginning our project was focused on robots installed in public access areas", says Mathias, "but, as time went by, we shifted focus

to domestic or enterprise-based robots that can move round homes or houses without meeting any problems".

But, for Mathias and his colleagues, the robotic plant pot does not only have the objective to make the plant autonomous. "Currently, plants are considered as pieces of furniture and we tend to forget them. Now, we have plants that move around and we are more aware that there are alive, with their life rhythms and vital needs. We can now experience empathy for our plants and be more aware of the proper place for plants in our environment", underlines Mathias: the team is working on reinforcement of the interaction between plants and persons. "If the water level is too low, the plant will send a notification to a smartphone or display a message on the robot's front panel. The plant could then move directly to a water base, absorb air humidity or, via the sensors and Internet, even "request" a move outside the home if rain is forecast".

The Internet link could also enable the cyborgs to communicate with each other. "We envision using cloud computing technologies to collect the information generated, so that the robots can learn from other robots' error if, for example, a plant dies! We really want to exploit robotics as far as possible", asserts Mathias Schmitt. Of course, users always have the possibility to regain control of the cyborg, for example, to place an access interdict for certain rooms, or on the contrary to order it to go to a specific place.

The teams aims at commercializing several pot sizes, from mini-plants (office size) to small bushes (or trees). "Currently we are designing a 40 cm diameter pot, which allows you to plant

an excellent variety of plants", adds Mathias. "We are also developing Biom, Ga.ia's small brother so to speak which does the same job, but without moving the pot, which make the price tag more affordable, approx. 50€ compared with 300-400€ for Ga.ia". Sales of Ga.ia and Biom should begin in 2017. "Our first marketing target will no doubt be business companies, given that we have lots of enquiries for hiring plants to decorate open space offices or for special 'events'. After that, we do not as yet know if we are going to offer our products to private customers", announces Mathias. "We would welcome the opportunity to sell our products in flower-shops or in garden centres". But, while Still Human is concentrated on development of its two products (Ga.ia and Biom), it is also looking at international prospects. "We are thinking about developing our business in Asia, notably in Japan and Korea", says Mathias, "given that these two counties welcome both plants and robots". ■

plus d'infos ► www.cyborg-vegetal.fr





A new look at innovation

Emmanuel Macron, French Government Minister for the Economy, Industry and the National Digital Plan

Mr Minister – you have just come back from the 2016 edition of the CES at Las Vegas where France was ranked top for the start-up attendee exhibitors. How do you explain ongoing wave of pessimism in France and what positive actions could boost to support innovative ventures and opportunities?

You are right. There is wide gap between, on one hand, the energy deployed and the successes of the French, their strong will in day-to-day living, to get up and out and progress, to innovate, to create business and enterprise, and in contrast the ambient, deep-reaching, deeply rooted pessimism when the French look at their future together. I am personally convinced that to stop the erosion, so to speak, we must engage in a double revolution, the first of which is ‘cultural’. We have been shackled for far too long now in a logic that stigmatizes those that fail – we have clear evidence of this in our schools and throughout the academic cursus – with the reverse effect of a sense of wrongdoing for those that succeed. You can surely agree with me that this leaves a very small margin for manoeuvre! The spotlights must be focused on the success stories of our economy to demonstrate to all that France is a country that has the courage to take on challenges and to innovate. That is how we can put an end to “French-bashing”. The second revolution is tied to innovation. We still imagine that innovation is ‘top-down’, i.e., initiated by the major companies and/or by State incentives. We simply are not looking in the right direction! Today innovation is ‘bottom-up’ with multiple initiatives. It should be in the responsibilities of public authorities to accompany and support those who innovate and to remove the stumbling blocks they meet, enabling their creativity to flourish. Let me take two examples, we have made provisions that the CIR (research investment tax relief) become a solid institution for companies that innovate and I also reorganized the French industrial policy perspectives round 9 solutions that help the business sectors (especially the SMEs) to reorganize themselves in terms of investments, corporate transformation, innovation and to be in the forefront for future markets..

UTC saw three of its start-ups present at the CES2016. As you know UTC is a combined “grande école” and University. Do you think it could play the role of a nursery structure for a future French economy? If so, what actions, in your view, would this involve?

Universities and the French ‘Grande Ecoles’ are already to the forefront in innovation and entrepreneurship. 37% young people today say they intend to set up (or take over) a business concern; what was an exception 10-15 years ago has now become commonplace. So to accelerate the movement, we created the statute of student-entrepreneur, precisely so that students can set up a business during, or just after completing their HE training courses without losing their social security protection as it stands. We also created students poles for innovation technology transfer and entrepreneurship acronym PERPETIE in French). UTC also allows its students to access the Picardie Regional, PEPITE. I want to encourage

Innovation is the field where
research scientists draft, frame
and think through a project and
the enterprises implement them.

you to go knock on their door (if you have not as yet already done so). Lastly, innovation is the field where research scientists draft, frame and think through a project and the enterprises implement them. That is why we must strengthen even more the links between academic teaching establishments and the business work-places. We can already see synergies like this elsewhere in the world, and they represent the future of business innovation. All the skills, all the ingredients are out there to ensure that French innovation reaches and stay at the cutting edge of world successes here. We just need to bring the actors closer together!

Could Europe itself be a positive lever to improve national competitiveness levels?

Europe today is not only a lever to improve corporate competitiveness in general, but I believe that it presents the best chance we have in French to see our economy become one of the most competitive in the world. The EU Single Market zone provides a great opportunity for our companies. There are close on 500 M consumers and this allows them to undertake large scale development possible. This huge market also gives access to new technologies and to a reservoir of talents that are not found elsewhere round the world. Our companies are currently in direct competition with American or Chinese giants, for example, in the digital- driven sectors so we must be in a position to make best use of all the resources we have in Europe. That is why the bolstering of the single market and the improvement of European competitiveness have been taken as two of the main priorities for the formation of the European Council of which I am a member. Allow me to recall a quote from Jacques Delors that sums up fairly well the way I see the EU Market, quote “Competition that stimulates business, cooperation that strengthens bonds and solidarity that unites us”. It is indeed because our enterprises are facing a much larger market area that they become more competitive and at the same time, inasmuch as they are European, they have common challenges to face. I should add for the UTC students that Europe is a tremendous opportunity for young French people to head elsewhere and complete their studies or even set up businesses outside France. To allow them to travel even more simply, I proposed that the Erasmus programme be generalized, open to all young people in Europe as of the age of 18, to spend at least a semester in another European member state, to study to complete an apprenticeship. I am convinced that gaining training outside France is a positive way to see young French people to return with new ideas and to innovate here, in France. ■

RESEARCH

40 years of acoustic and vibration courses/ research at UTC

To celebrate its 40 years' "in business", the Industrial acoustics and vibrations specialty staff will be organizing two Special Days, March 10-11, 2016. This event will provide the occasion to make a status report with an update on progress and challenges in these fields allowing the department to "imagine the future" here. The research teams are seeking to characterize and model noises to make them more bearable (viz., acceptable) ... with of course commercial prospects and to possibility to gain a high reputation in this specialty.

UTC's Industrial acoustics and vibration specialty was created in 1977, thus Spring 2016 will mark its fortieth anniversary. The training course is recognized as demanding, both from a theoretical and a practical standpoint of the training provided for the students who choose this specialty, which has a dozen or so lecturer research scientists. AVI (its acronym) counts over 800 graduates now and every year some 20-25 new students register for this specialist course.

Reducing and transforming noise

In engineering sciences, acoustics and vibrations impact the following sectors: transport, mechanical engineering, building trades, the environment and even telecommunications, urban areas and energy. "Our research focuses mainly on vibrations which propagate through structures, and those induced by air

disturbances such as at the blade tips of wind turbines", explains Nicolas Dauchez, recently appointed to head this training specialty at UTC and a research scientists in the acoustics and vibrations team. The main area of application and aim is to be able to control noise to provide an acceptable level of acoustic comfort. "The aim is to attenuate (or transform) noises to make them acceptable", details Jean-Michel Ville, the former head of AVI who underscores how important is to understand how people perceive

sounds and qualify them as “noise”. Psycho-acousticians are even thinking about sounds as a way to convey impressions about products. As an example, “the “clunk” sound made by a car door closing and locking is unconsciously integrated to the way consumers make their choice of vehicle,” explains Jean-Michel Ville.

The SNCF sound image

The SNCF (French national railway operator) is highly interested in noises on board its trains and other sounds/noises coming from the equipment. “The railroad company is trying to build a recognizable acoustic signature, agreeable to the client-passengers”, explains Jean-Michel Ville. This sound identity will be declined and blended to other sounds - doors opening/closing, commercial jingles, etc. Making sounds and studying how they are perceived is an independent expert domain. A company like Genesis, who are partners to the CEVAS research programme (cf. below) employ psycho-acousticians to test various sounds on juries in order to analyse the way the sounds are “received and appreciated (or otherwise). We can even wonder – will the day (and sounds) come that make you want to travel?

CEVAS, quiet air-conditioning



CEVAS : Test bench

In order to satisfy customers’ needs for comfortable travel conditions, the equipment makers must comply with the automobile constructors’ specifications more rapidly (and for a continuously lower cost). VALEO, a world leader in automobile air-conditioning units have a set of partners – including the UTC acoustics research team - in a programme called CEVAS (acronym in French for Silent Design Air-conditioning and Ventilation units), with the CETIM, ESI-Group and GENESIS, to develop silent ventilation air-flows that are judged satisfactory by potential customers. “The UTC-AVI research team therefore developed some test gear and some unique digital models to characterize airborne sound (fan, distribution ducts, thermal feeds, filters, louvers) separately and in combinations. The data acquired are fed into the design tool finalized by the CETIM in a collaboration with GENESIS.

dBET or silent electric power units



Whereas the CEVAS programme aims at mastery of the air-conditioning system on board a road vehicle, the dBET programme is fundamentally more focused on acoustic emissions of sound by the electric transformers for propulsions units in trains. The project is financed by ADEME and involve two UTC laboratories (UTC-LEC and UTC-Roberval), plus the Electric Power systems lab at the École Centrale, Lille as well as several industrialists such as Arcelor , Mittal, Transrail Boig & Vignal, Alstom Transport who supervise and coordinate the project and the ESI Group who manage the project on behalf of ADEME. “Modelling transformer vibrations is a highly complex affair”, says Mohamed Ali Hamdi, UTC Professor and Scientific Executive Director for the ESI Group, and he underscores the importance of bring together specialist for differing laboratories to better understand the multiphysics issues involved. He also points to the key role played by software package editors who have the tools and the know-how to integrate the various approaches developed by the research scientists and engineers who work on this project. The final objective of dBET is to reduce noise from this omnipresent piece of equipment used in the propulsion systems for trains and which can prove to be a nuisance to passengers and to those who live near the tracks.

ECOBEX, ‘no-nuisance’ cars in tomorrow’s cities!



ECOBEX : Modelling the engine compartment

Another project supervised by Nicolas Dauchez at UTC is ECOBEX (acronym in French for External noise abatement using optimised screens), the aim of which is to reduce noises as car pass by, by using aousting screens round the propulsion unit. The consortium led by Vibratéc

has major groups as partners, e.g., the Renault Group or Saint-Gobain ISOVER, Mecacorps and various service companies such as ESI Group, the M2a Critt, Matelys, RJP, MicrodB ... the finance being provided by two Regions Nord-Pas-de-Calais and Rhône-Alpes, plus Bpifrance and the DGCIS government bank and agency and by two competitiveness clusters i-Trans and LUTB. The three main sources of noise in a moving vehicle are the engine, the exhaust system and the tyres. “It turns out to be quite a difficult task to improve on engine noise whereas tyres and exhaust noises are perfectly “under control””, says Nicolas Dauchez who adds that the target decrease of 6 decibels set by the EU for horizon 2024 will be achieved by acting on the propulsion unit sound emissions. The objective of ECOBEX is to optimize absorbing screens placed in the engine compartment. “Various experimental and mock-up experiments have been conducted as well as acoustics modelling to identify new paths forward”, explains Nicolas Dauchez. The modelling has allowed is to isolate the sound emissions with an accuracy down to a few centimetres and they also take into account the other constraints of the automobile industry-thermal, pollution, costs, etc. Some twenty different materials are being tested and there is a PhD working specifically on the effects of shaping technologies by thermo-compression on the acoustic characteristics of the screens. The ECOBEX project, which started in July 2014, is planned to terminate in July 2017. ■

Two Special Days

To celebrate its 40th year « in business », so to speak, UTC-ME-AVI are organizing two Special Days (March 10-11, 2016) at UTC so that future engineers can get a good insight to the specific of this specialty. “Today we see industrialists making numerous demands that relate to comfort in terms of acoustics and vibrations”, explains Mohamed Ali Hamdi. In a world that where ICTs are pervasive, sound is becoming an increasingly important factor, and this is obvious in the context of a coming event “Be the future of sound” launched by LUTECH (Technology Transfer Accelerator) in which UTC is an active partner. UTC-ME-AVI will consequently continue to train engineers capable of designing “silent ways and means” and able to adapt to new challenges by implementing their numerous skills, tools and knowledge in the field. Not only will the 40th year events open up new prospects for future AVI engineers, but it serves to celebrate Jean-Michel Ville’s handing over the department keys to Nicolas Dauchez, a year ago - after numerous years in charge of the specialty.

AGENDA

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Roadef 2016

Feb. 10-12, 2016

The UTC Heudiasyc Lab will be organizing the 17th annual conference of the Société Française de Recherche Opérationnelle et d'Aide à la Décision [French Group for Operational Research and Aids to Decision-making] which brings together academics and industrialists from several countries to discuss combinatory optimization, industrial engineering, logistics, modelling and discrete event analysis, etc.

First UTC/Sorbonne Universities international winter school

Feb. 15-20, 2016

This inaugural winter school, DIPFablab (Design of Innovative Products in Fablabs) aims at presenting various methods and technologies used to design and create product prototypes using tools that are available in a Fab'Lab (laser cutters, 3D printers, Arduino cards ...). Dip FabLab's university partners are UPMC (University of Paris 6 Pierre & Marie Curie) and the Ecole Polytechnique, Turin. This international school will be organized in two locations, one in Italy, the other in France, so as to have a bilingual (French and English) overview of the different ways Fab'Labs are seen and operated in each country.

"Open Lab" Day at the UTC Innovation Centre

Feb. 19, 2016

In the framework of DIPFab'Lab, UTC's Innovation Centre is organizing a day devoted to fast prototyping, targeting school and lycée students, HE students, lecturers, people with projects, company executive ... There will be a lecture on "What exactly is a Fab'Lab?", a Round Table with the professionals in prototyping, design, techniques and technologies that will lead to debates on the advantages in these new production technologies, plus a visit to the UTC Fab'Lab

www.weezevent.com/open-day-dipfablab

19th edition of the Composites Festival

March 1-31, 2016

For this 19th edition of The Composites Festival – which will bring together artists and scientist at the Jean Legendre Centre, Compiègne, the attendees will be able to enjoy several digital and artistic set-ups developed by Serge Bouchardon (UTC Professor for ICTs – Director of the UTC-COSTECH Lab, Vincent Volckaert (a UTC engineer), Antoine Aufrechter and Clément Routier (UTC students): Deprise, an on-line digital creation on the capture/ control theme, Detrace, an on-line creation which offers a game related to digital traces left by users (on purpose or not) and Typomatic, an artistic set-up that plays with and on the shapes of letters.

www.espacejeanlegendre.com/composites.aspx

MATHEMATICAL OPTIMIZATION

Using mathematical optimization

to fly Internet balloons and to detect heart disorders

As Johan Mathe sees things - he incidentally is mad keen on mathematical optimization (and a recent UTC graduate) - various complex problems can be solved using a similar methodological approach: i.e., you optimize the system to attain an acceptable solution. The model used to move and position Google Internet antennae is close to the algorithm developed to detect and classify cardiac mal formation using an ultrasonic sensor input.

Does Google ever do things like anyone else? In the Goggle X research labs near San Francisco, any new project will be deemed worthy if and when the development cannot demonstrate that it will not work. "Take the Loon project the aim of which is to provide Internet access to 4 billion people on Earth (who today have no connections), the idea is to place helium balloons in the stratosphere; the initial project team tried to demonstrate that it was impossible to position these relay balloons – hundreds would be needed - with sufficient accuracy", explains Johan Mathe, UTC graduate and former engineer on the Google Loon team.

Accuracy needed: better than 200 km

Having the balloons change altitude to make use of winds is the only way to move and position these antennae balloons accurately so they can act as relays for mobile phones. For several years, the R&D team modelised and experimented the set-up, trying to show the extreme difficulty met with these balloons (15m diameter!) flying some 20 km above the Earth. "The project was almost abandoned because we could not hold a position with an accuracy better than 200 km, whereas the transmission range is less than 40 km", underlines Johan Mathe.

A local approach

But just at the time the team was about to demonstrate that the programme was not feasible, two innovations changed the deal. "The first idea consisted of using atmospheric winds to change the balloon height and make it move laterally", explains Johan Mathe who wrote the algorithm that enabled the balloon to move "upwind" (when the wind a priori was blowing the wrong way!). Controlling various wind levels calls for a precise knowledge of local weather conditions. The second idea consisted of using the balloons themselves to collect and transmit the data needed via on-board sensor devices. The result was an accuracy of 500 m for a balloon in flight between New Zealand and Chile. The flight continued for another 3 months, during which the balloon

accomplished several revolutions of the Earth.

From balloons to cardiac malformation

The work was a success for Google and also for the mathematical optimization methods implemented by Johan Mathe to compute the balloon trajectories and a high complex and uncertain milieu. "The optimization tools I used here can potentially be applied to all sorts of differing problems", explains our UTC graduate, who chose to leave Google and move to another area: detection of cardiac malformation using echography, with the view to preventing future heart disorders from occurring. Johan was all the more sensitive to this field because of family cases, and he was recruited by Baylabs who were developing recognition algorithms base on 'deep-learning' processes, which is an innovative area for automatic learning protocols. "The processes relay on very efficient visual recognition tools which are used both for self-drive cars to photo analysis and management techniques", underlines Johan Mathe. Again, from Johan's point of view, recognizing a malformation consists of optimizing its identification from among a set of possible results. Echo-graphics is an inexpensive way to analyse parents' conditions, and the development of a tool that helps non-specialists – such as the GPs – to easily detect a heart condition represents a great progress in this field. It is all the more important that heart diseases are a major factor for mortality and numerous abnormal conditions can only be detected today by specialists using expensive equipment. Mathematical optimisation, whether it be applied to stratospheric balloons or to detection of heart malformations, is almost magical in the sense that the same degree of formal presentation and analysis allow very different physical situations to be assessed. ■

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The revolution of the digital wave and employment

Following on to the Seminar on Big Data and Employment - the main challenges and impacts on employment, January 18-22 at UTC, Prof. Yann Moulier-Boutang, Chair of Economics, UTC, Member of the CRI-COSTECH, gives a synthetic overview of the ongoing digital revolution and employment.

We have heard and read just about everything there is to say about the globalization phenomenon that began, in fact, back in the mid-1960s. Productive restructuring was implemented round the world, in compliance with the global value chain: the impact of immaterial ingredients (engineering design, aesthetics, logistics and pressure of suppliers' and clients' networks, trade-marks brand names) has become a determinant factor and indeed has pushed manufacturing/assembly process back-stage. Consequently, delocalisation of the production units became much easier. Full employment collapsed in the central economies while the weight of industry in the GDP fell to the level of 11% in the USA.

The massive arrival of computers everywhere, in industry, in the service sectors, in our home and personal life-style have not as yet overtly produced many positive effects. Indeed, as of the early years 2000, what did become noticeable in terms of industrial employment positions (with application of lean production methods), in services and in logistics.

But no sooner had we begun to see the light at the end of the tunnel due to technology-induced unemployment, with the arrival of a multitude of start-ups, "apps" on smartphones than the 2008 financial crisis struck the world's market places and economies and the arrival of a second digital wave made production sectors suffer a lot.

In a word (or three to be precise): we now observe a conjugate effect of connectivity, Big Data generated by the interactive Web 2.0 and the arrival of learning machines. Complex work is now 'copied' and human behaviour is mimicked perfectly by recent algorithms

This year, the UTC inter-semester seminar was devoted to exploring this phenomenon and its impact on the whole global Society. We benefitted from the contributions of experts who have analysed the problem in its entirety. Our exchanges were moderated usefully by Bernard Stiegler, author of *La Société Automatique* [An Automated society], and enriched by Bruno Teboul (Keyrus University Paris Dauphine), Ariel Kyrrou (University of Versailles Saint-Quentin-en-Yvelines SACIM Sciences, Art, Culture, Innovations, Multimédia), François Nemo (Consultant # Branding), looking at the theme of a "uberization" of employment and the strategies deployed by companies to face

We now observe a conjugate effect of connectivity, Big Data generated by the interactive Web 2.0 and the arrival of learning machines.

up to the digital challenges. The seminar in fact coincided with the transmission to the new French Labour Minister Ms Myriam El Khomri of a Report by the National Digital Council (CNNum) entitled *Travail, Emploi, Numérique, Les nouvelles trajectoires* [Labour, Employment and new Digital Paths]; cf. (in French) - <http://www.cnnumerique.fr/travail/>.

Nathalie Andrieux who, for quite a while, was in charge of digital affairs for the telephone operator Orange and a Member of the Cnum and responsible for preparing the Report, as well as Judith Herzog, Mathilde Bras and François Levin (all chargés de at the CCNum) presented their 20 Report proposals. Sophie Pène, likewise Member the CNNum (who works at CRI and University of Paris I) author herself of the Report *Jules Ferry 3.0, Bâtir une école créative et juste dans un monde numérique* [Jules Ferry 3.0. Building a creative and equitable school for a digital era] , (October, 2014); cf. http://www.cnnumerique.fr/wp-content/uploads/2014/10/Rapport_CNNum_Education_oct14.pdf raises a series of questions about how the education system in France should be updated and modified. She has been also been invited to present her findings and recommendations for Higher Education and Research and she talked to the seminar about this work in progress. She chaired a workshop looking at students' proposals. President Alan Storck also invited the seminar attendees to make known their proposals to the Science Policy Committee of UTC. Pierre Pezziardi coordinator for State initiated startups at the Government's Modern Public Action Agency (SGMAP) explained to the audience the kind of uses of Big Data could help job-seekers to find positions. In the afternoon session - shared with another seminar event, DD01 - Grégoire Bignier (Versailles School of Architecture and Landscaping) examined the questions raised by the introduction of biomimetics in architectural planning and design, while Pascal Jollivet, UTC, reframed the employment descriptors in terms of digital second wave factors, and Jean-Pascal Foucault defended the idea of human tag sensors (not just physical devices) in the use made of Big Data with a view to building a smart city environment.

Franck Ghitalla and myself products a few elements of an ongoing study with *Entreprise et Personnel* exploring the Web (including social networks) to



try to identify emerging trends and to write possible evolution scenarios for the decade ahead in relation to the strategic policy questions of enterprise – the session ten took the form of a workshop. ■

d'infos ➤ The very valuable and rich contents of the seminar, its exchanges and proposals will be embodied in 3 Reports, as follows:
www.utc.fr • <http://webtv.utc.fr>

d'infos ➤ Rapport Les nouvelles trajectoires
<http://www.cnnumerique.fr/wp-content/uploads/2015/12/Rapport-travail-version-finale-janv2016.pdf>



Presented by
Toby, UTC's
'Visitor from the
Future'

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Developing skills to adapt better

Sylvain Lemerrier has just been appointed Procurement Manager at ALLIANCE AUTOMOTIVE France, a position that calls for a combination of skills, in sales, marketing, international and strategic affairs.

Following the advice of other UTC graduates, Sylvain Lemerrier came to UTC in 1992, in the Mechanical Engineering major.

«What pleased me immediately I arrived at UTC was the semester-organized programme, along with a Credit Course (CC) progression to attain the diploma. This meant that we were not chained to a rigid ultra-technical framework and we were invited to acquire and develop other skills. As far as I was concerned, this was with my sales bent. So, on top of a solid technical and scientific grounding I was attracted by economics, languages and an international vista. With all this, UTC was a perfect choice for me» stresses Sylvain.

Meeting and confronting other cultures

Sylvain was able to enjoy a lot of foreign experience, through a placement with Goodyear in Luxemburg, followed by a semester in Canada at the Ecole Polytechnique de Montréal to study Industrial Engineering (plus after-hours classes at McGill University). To complete this scene, Sylvain did his en-of-studies project at Ohio State University, Columbus. «By setting my marks rapidly in international commitments, I was able to be successful in a number of things, from teaching to professional and even personal gains», he adds. Once he had received his UTC engineering diploma, Sylvain set about looking for a «CSN» (a science oriented national service outside France), which he did at Faurecia, in Wales, UK? «The CSN at the time was the equivalent to the modern VIE (international volunteers for industry) and allowed us to work in a foreign company abroad. It was a truly rich experience, since we were professionally assigned to positions carrying a high degree of responsibility just after our graduation.»

Mad keen on cars and purchasing

Sylvain always had (and continues to have) a passion for cars. «[To paraphrase Astérix] I fell into it and I'm stuck with it! My career path led me to Purchasing divisions. At Faurecia I was appointed QA Manager (production) with close links to the suppliers and the Purchasing Department». In 1999, he was recruited by PSA (automobiles) at their subsidiary company Sogedac – at the Purchasing Directorate where he became their QA Manager (Purchases). Quite rapidly Sylvain rose to the position of Project manager for procurement of raw material and was then offered the position as Purchasing Team Manager, carrying the responsibility of handling purchase orders worth up to 400 Meuros, with over 100 suppliers round the world. «At UTC I had done a minor specialty in economics and that helped me enormously. Generally speaking, UTC «pushed us» to learn how to adapt continuously and to react to every sort of situation, to take initiatives and above all «to sort things out». Whatever

the challenge, we just had to be able to solve it», Sylvain adds. Other functions such as Head of Purchasing at Autodistribution, a centralized company for automobile spare parts. This experience brought Sylvain a little closer again to «trading» aspects, continuing at Philips Automotive Lighting as their Senior Manager for a large-scale internal account. «That was a very rewarding and enriching training experience and one where I really got myself involved in Sales», he recalls. In 2015, he was offered the position of Director of Purchasing at Alliance Automotive France, a key player in the field of automobile parts distribution and associate services throughout France and Europe. In this function, Sylvain is now responsible for all purchasing for the activities of the Alliance Automotive France and he plays an active role in defining the international procurement policy of the Group.

A sector undergoing a total revolution

Never disabused, Sylvain has always been able to appreciate being at the cross-roads of several arras. «You really can never get bored in a job like this, with an open and carried milieu where we handle loads of products used in numerous, new environments, and that is a rich experience indeed! Today we hear more and more about connected objects, new horizons that lead on to the discovery and use of new technologies. Electric cars and the progress we see in driverless vehicles, such as the Google®-car are really going to revolutionize the sector in the coming 5 to 10 years. Products will evolve as will the players in the field; we shall all have to adapt to offer a range of products that meets the needs for parts replacements and that is quite a challenge, believe me! Market slot mergers and concentrations and accelerating internationalization will also be strong factors – so we must remain vigilant if we want to be able to integrate the changes as early as possible.»

«Networking» with an ever-open mind

«Building up a personal network and enjoying experiences abroad is absolutely capital», insists Sylvain. «UTC gave me all the keys for this. You learn how to make the most of the benefits, not only in terms of a career and track record, but also in terms of personal development ... we have to make the most of this terrific changing period! I have kept strong links with my alma mater UTC for over 20 years now. My wife is also a UTC graduate and I have good contacts with my former university comrades ... indeed many are good close friends. When I began my engineering training, I knew I was going to see new horizons open before me and for this and more I am very grateful to UTC. UTC graduates are easily recognized with their open mind and their capacity to adapt – that is the name of the game!» concludes Sylvain Lemerrier. ■



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Director of publication

Alain Storck

Editor-in-chief

Nadine Luft

Editors

Marilyne Berthaud

Jonathan Menerat

François Rébufat

Design/Realization

L'agence

& Dorothée Tombini-Prot

Assistant

Corinne Delair

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Aurélien Bordenave

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1992	Admitted to UTC
1997	Graduated from UTC, majored in Mech. Eng., with the specialties: Industrial Quality and Reliability, Materials and technological Innovation
	QA Manager (Production) - Faurecia
1999	QA Manager (for Purchases & Procurement) - PSA
2001	Project manager for indirect procurement of raw material (steel) - PSA
2002	Head of the vehicle parts purchasing team – PSA Peugeot Citroën
2005	Head of the spare parts purchasing team – PSA Peugeot Citroën
2006	Coordination leader for the LV Pole and Synergy in International Purchasing - Group Autodistribution
2011	International Key Account & OEM Business Development Manager – PHILIPS Automotive Lighting
2015	Procurement Manager – Alliance Automotive France