Interview with Gergely Takács, PhD.
Research engineer at the Faculty of Mechanical Engineering, Slovak University of Technology, Bratislava

1. Tell us a bit about yourself.

My great-grandfather was a machinist on a steam locomotive, at a time when the job was as prestigious as piloting an airliner is nowadays. My grandfather was the first one to own an electric arc-welding machine in the county and could mend anything with an engine and wheels. My father is a mechanical engineer by training, and being as versatile as he is, designed everything from stadium roofs to fairground attractions.

I can do none of those things. Nevertheless, I am a big nerd and by extrapolating from this pedigree, you can imagine how I ended up studying mechatronics at the Slovak University of Technology in Bratislava. I finished all my degrees at this university and started to work as a full time researcher just recently.

2. What research projects are you working on now?

My current research is focused on applying smart memory alloys as actuators in active vibration control, where the actuator is maintained around its phase-transition temperature using constrained predictive control, in order to maximize deformation amplitudes at higher-than-usual drive frequencies. Of course, most scientists are researching whatever their grant agency wants them to research—so, ssshhh, don't tell anyone—but this is absolutely not what I'm supposed to work on right now.

3. What is your new book, *Model Predictive Vibration Control*, about?

The book is about utilizing model predictive control to minimize mechanical vibrations in structures with embedded actuators. This optimization-based control strategy has been around for decades in the petrochemical industry and possesses many advantages, for example the explicit handling of process constraints. However, these advantages come with a price of a relatively high computational load, making real-time implementation in structures with fast dynamics somewhat difficult. The book introduces the reader to the basics of vibration control and model predictive control, ultimately combining these great techniques and reviewing some of the issues and difficulties turning up along the way...

4. If you had unlimited funding, what sort of research would you be working on?

We all know from Batman and Iron Man, that unlimited funding and engineering is the best superpower of all. Therefore, I would be a genius-billionaire-playboy-philanthropist working on my very own powered armor suit.

5. What is the biggest challenge facing engineering research?

Science and engineering research is grossly under-funded in my country, and this is not only my personal opinion. Slovakia allocates the lowest percentage of its gross domestic product to research and development of all EU member states. It is very hard to do any sort of research or teaching with laboratory equipment mostly from the sixties.

On the less serious side, it's a challenge to get a healthy tan: all work and no play makes engineering researchers pale boys. And girls.

6. What is the best part of your job?

Doing research—especially at a university—has many perks, so I do not even know where to begin. For me, the most important aspect of this job is to be able to learn about new concepts or put new ideas to trial, and that never gets boring. The academic environment is friendly and relaxed, so most of the time I feel like I come here to play and that maybe I should be the one to pay the university to let me hang around. Also, I get to wear a white lab coat!

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Model Predictive Vibration Control
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