Univ.-Prof.
Prof. h.c. (Moscow State Univ.)
Dr.-Ing. Dipl.-Wirt. Ing.
Thomas Gries
Institutsleiter

Hans-Christian Früh
Wiss. Mitarbeiter

Mein Zeichen: HCF
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Project title:	**Development of a novel acoustic reinforcement fabric for violins made of CFRP -NeoAcousticWeave-**
Partner:	mezzo-forte GmbH, C.Cramer GmbH, Forschergruppe ‚Sound Analysis and Design' HAW Hamburg
duration:	06/2018 – 05/2020
funding:	Zentrales Innovationsprogramm Mittelstand (ZIM)

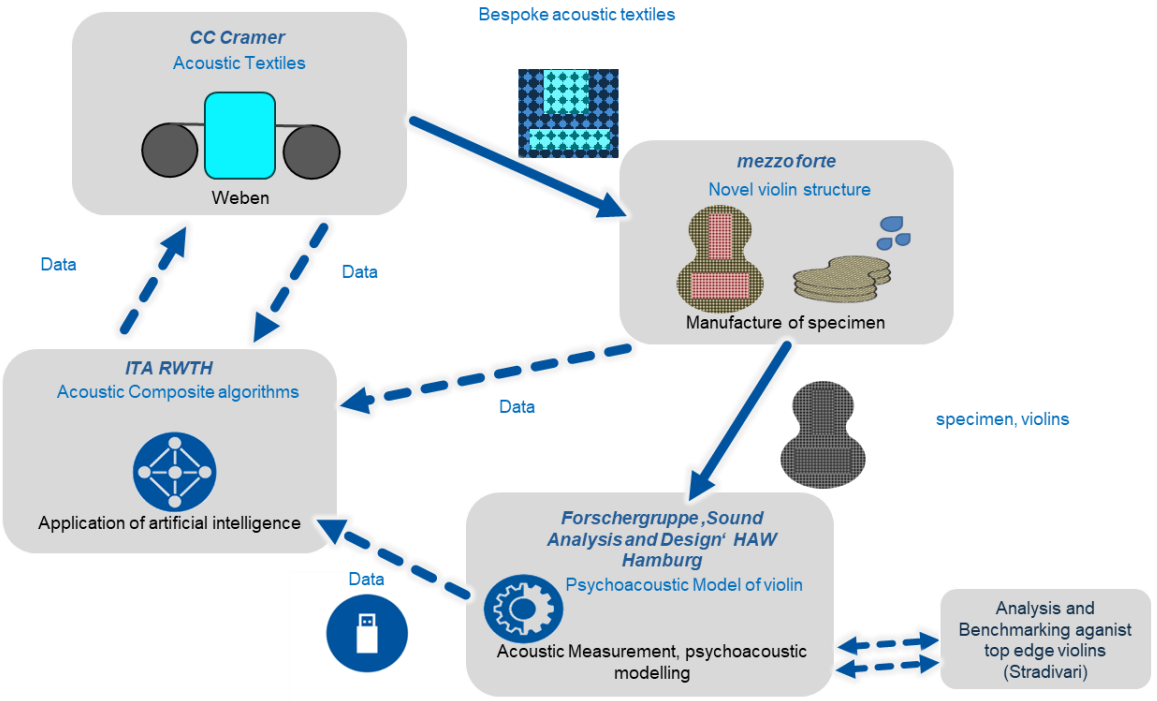
Mission Statement

Stringed instruments represent a musical cultural asset of worldwide importance. Beginning with the first string instruments, musical instrument making reached its peak in the 18th century with the violin makers Stradivari and Amati. The methods of instrument making up to this point can be characterized by elaborate empirical studies, which ultimately led to a sound pattern that is still considered a reference today. From the point of view of research, too, previously measured instruments show typical signature fashion characteristics that can be assigned to outstanding sound characteristics. In the meantime, the state of the art is to make copies of old master instruments when building new stringed instruments and thus to emulate the sound model. Through the use of modern measuring technology, musical instruments and their sound can be quantified and measured. In addition, psychoacoustic methods are used and combined with traditional violin making methods. It is now possible for the violin maker to produce instruments that have the euphony of an old Stradivarius, for example, but also the volume and projection for modern performance practice. But even this approach is limited by the material wood. In particular, the spruce top of a high-quality string instrument is regularly at the limits of its mechanical load. CFRP, however, due to its material properties, is in principle capable of reproducing characteristics that cannot be reproduced with tonewoods. Although violins are made of CFRP, their laminate is not specifically designed for a sound experience. With FRP it is possible to individually adjust material properties consisting of stiffness and damping behaviour or acoustic sound transmission by the materials used and the material combination. However, there is a lack of suitable semi-finished products as well as of knowledge and methods to develop such semi-finished products. To

develop such semi-finished products and to create the methodical basis for them are a central component of this project.

methodology:

The solution is to link production parameters along the entire process chain for the production of string instruments with the methods of psychoacoustics. The linking of the fundamentally different parameters and measurement results as well as sound models is carried out using methods of neural networks or deep learning. The implementation takes place through an intensive data and material flow between the participating project partners, whose interdependencies are shown in the following diagram.



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Kontakt

Dipl.-Ing. Hans-Christian Früh
Mail: hans-christian.frueh@ita.rwth-aachen.de
Tel.: +49 (0) 241 80-23272