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On the development of a avatar capable of speech and singing

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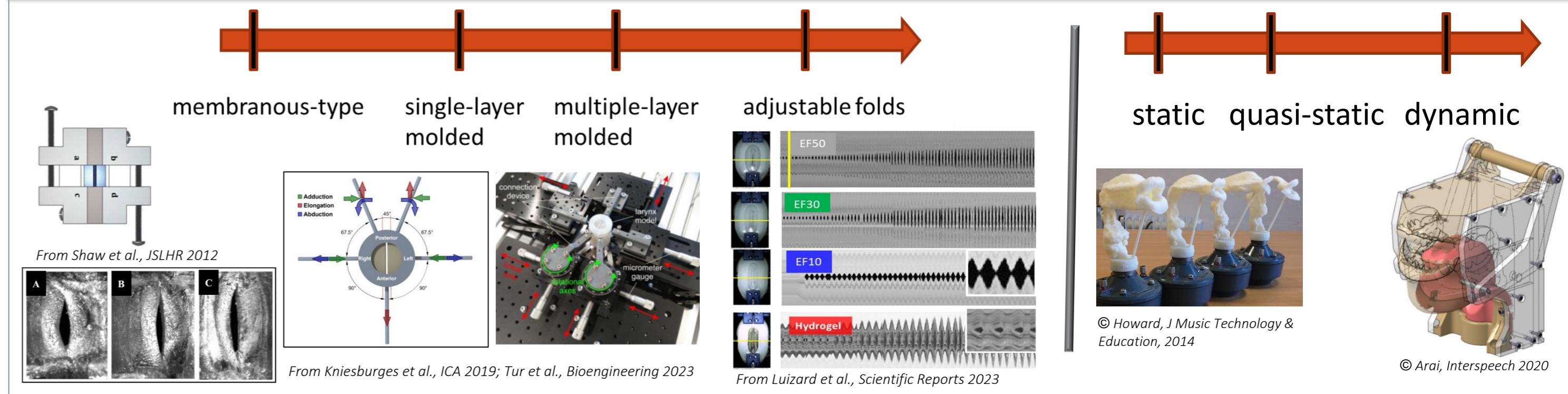
Gunnar Rugheimer prize
Best Poster Award

INP Ense3
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AIMS

- design of a biomimetic mechatronic testbed with **phonatory** and **articulatory** aspects important for voice and speech production (named **Pinocchio**)
- Explore **fluid-structure-acoustic interactions** and better understand **their impacts in phonetics**

phonation EXISTING TESTBEDS articulation



phonation

DESIGN AND CONCEPTION

articulation

Larynx up to glottal plane

Vocal-folds stretching control system

Two actuation configurations with different boundary conditions

Configuration A: lateral constraint

Configuration B: medial-lateral, inferior and superior constraint

Tongue body and apex

FE tongue model
Hermant, Perrier and Payan, 2017
Biomechanics of living organs

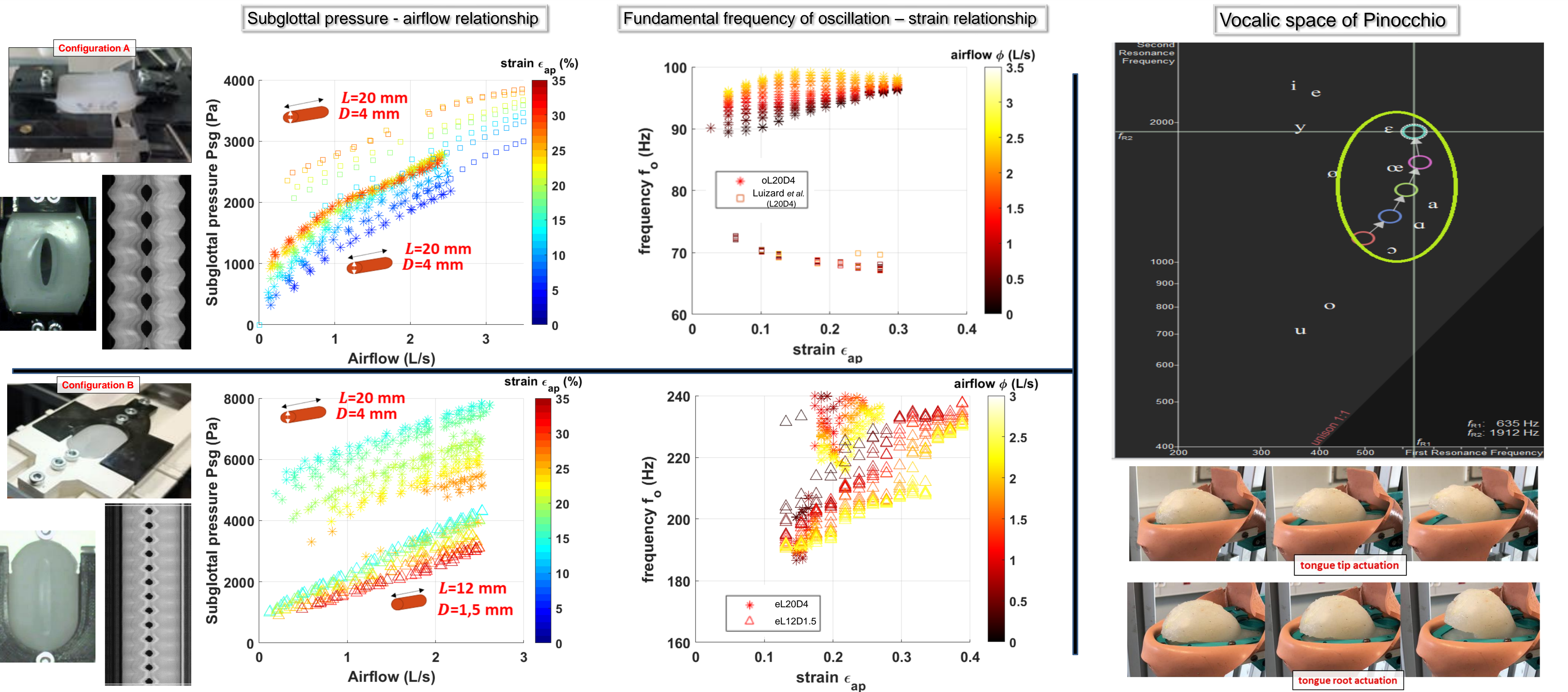
Tongue

Pinocchio vocal-tract, jaw and cheeks

phonation

RESULTS

articulation



DISCUSSION & CONCLUSION

Ability to self-oscillate with and without a vocal-tract, over a wide range of flow rates and for different degrees of tensile stretch

Increasing f_o with increasing pre-strain in the anterior-posterior direction (ϵ_{ap})

Factor of variability in vibratory behaviour : boundary conditions, folds geometry and material

Variation of F1 between 500 and 700Hz with mouth opening induced by jaw movement

Variation of F2 between 1000 and 2000Hz with tongue and jaw movements

Baby Pinocchio is able to produce vowels in the surrounding of [a]

Main references
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