

## Would you like to know more about Arai's Vocal-tract Models?

Thank you very much for showing us your interests on my Vocal-tract Models and their family. This document tells you more about them including information for people who are interested in displaying these phenomenal educational tools in science museums, using them in your class, etc.

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APD URL: <https://www.splab.net/APD/>

### **1. Acoustic-Phonetics Demonstrations (APD)**

We have been developing and using several types of physical models of the human vocal tract for education in acoustic phonetics and speech science. The models are very effective tools for demonstrating how we produce speech—both vowels and consonants. If you would like to learn more about our vocal-tract models and their family, please visit the following APD website:

<https://www.splab.net/APD/>

This page includes a list of demonstration videos on YouTube. For example, a video of demonstrations on vowel production using VTM-T20:

<https://www.youtube.com/watch?v=DMmPfl209t8>

### **2. STL files for 3D printing**

If you are interested in 3D printing of our vocal-tract models, the STL files for 3D printers are available at the website above (for VTM-N20 and VTM-T20 models). Please visit the APD website with the index number of V100, that is <https://www.splab.net/APD/V100/>.

A sound source is needed to produce vowels with the vocal-tract models. Please note that a sound source with low quality produces less intelligible sounds. One of the best sound sources is the reed-type sound source SS-R30. If you would like to know more about this sound source, please let us know and ask our further assistance. I would be very happy to help you out.

### **3. Museums in Japan**

I have already had opportunities to supervise the following exhibitions in Japan:



Left: Shizuoka Science Museum (permanent)

Center: Hitachi Civic Center Science Museum (permanent)

Right: Okinawa Zoo & Museum (permanent)

#### 4. Museums in the world

I have also supervised the following exhibitions around the world:



Left: Technorama (Switzerland, temporary)

Center: Händel Haus (Germany, permanent)

Right: Estonian National Museum (Estonia, permanent)

#### 5. Considering to have the vocal-tract models at a museum

Because many people have expressed an interest so far in having these models more readily available in the public sector, we are currently contacting people connected to museums to identify venues around the world where our vocal-tract models could be displayed. Any information would be appreciated.

#### 6. Acknowledgments

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#### 7. References

- The first paper on VTM-T20
  - T. Arai, "Simple physical models of the vocal tract for education in speech science," *Proc. of INTERSPEECH*, 756-759, Brighton, 2009.
- The first education paper on vocal-tract models (The Acoustical Society of Japan)
  - T. Arai, "Education system in acoustics of speech production using physical models of the human vocal tract," *Acoustical Science and Technology*, 28(3), 190-201, 2007.
- The education paper published in JASA
  - T. Arai, "Education in acoustics and speech science using vocal-tract models," *J. Acoust. Soc. Am.*, 131(3), 2444-2454, 2012.
- Invited paper on vocal-tract models (The Acoustical Society of Japan)
  - T. Arai, "Vocal-tract models and their applications in education for intuitive understanding of speech production," *Acoustical Science and Technology*, 37(4), 148-156, 2016.
- Book chapter in a textbook
  - T. Arai, "Vocal-tract models in phonetic teaching and research," in *The Routledge Handbook of Phonetics*, W. F. Katz and P. F. Assmann (eds.), Routledge, 2019.

