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**Modelling Speech Articulation Energetics Using AnTon –
an Animatronic Vocal Tract**

Robin Hofe

University of Sheffield, UK

ABSTRACT OF THE TALK

Modern speech technology relies heavily on statistical models of acoustic properties of the speech signal. This approach has proven to be more effective than earlier, knowledge-based techniques. However, the performance of statistical models is closely related to the amount data they are based on. And, crucially, this relationship is not linear. Recent years have seen the performance of speech technology stagnate at a level of performance well under that of humans, even though the amount of speech data used to train the models have been increased dramatically.

Many argue that knowledge has to be reintroduced to speech technology in order to advance further. An area that seems pivotal is the relationship speech and the energy required to produce it. After all, speech is an evolved behaviour and energy cost is the main constraint in evolution. However, measuring speech production energetics in humans is very difficult, especially on the level of attributing costs to single articulators or muscles.

In order to investigate human speech production in detail, and thereby provide data for future improvements of speech technology, a bio-inspired robotic speaker was designed. 'AnTon' stands for "Animatronic Tongue and Vocal Tract" and it is unique in that it mimics human anatomy rather than

functionality (as other speaking robots do), i.e. the biological muscle configurations are represented directly in the model. This means that the model's behaviour can be mapped directly to human speech articulation, provided that it is carefully calibrated and evaluated.

This seminar talk introduces AnTon, starting from the design concept and motivation, to the integration of the final model. AnTon's performance in simple vowel production tasks will be evaluated in comparison to human speakers. The project website can be found at <http://www.dcs.shef.ac.uk/~robin/anton/anton.html>.