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Carnival: a modular framework for automated facial animation

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Problem
Facial animation is difficult to do convincingly, particularly when synchronizing with speech. There are various ways to automate facial animation:

- Performance-driven animation
- Audio-driven animation
- Audio-visual text-to-speech synthesis (AVTTS)

The problem with these solutions is they bring together software and data formats from different fields—in particular speech technology and graphics technology—that are not well integrated.

- Conversion of facial dynamics into animation is cumbersome, slow and offline.
- Lack of live connection between speech and rendering pipelines. Difficult to backtrace animation problems, or see outcome of edits in the speech processing level.
- No standard control interface for different facial models, so adaptation process must be repeated in each case.

Solution
Software framework called “Carnival” which places speech and graphics components within a single object-oriented system.

- Fast and automatic end-to-end processing
- Real-time animation and linked display of time-varying representations for instantaneous feedback/feed-forward information
- Standardized object interfaces for easy integration of new components

The core of our solution is a platform independent C++ API.

Applications
- API may be used for fast prototyping of automated animation systems
- Suitable for performance-driven, audio-driven, or AVTTS applications
- Our implemented tool built on the API is suitable for in-house industrial or academic use