Improving Automatic Interface Generation with Smart Templates

**Problem**
- Automatic interface generators have difficulty using domain-specific design conventions
  - Often added by interface designers after automatic generation
  - e.g. standard number pad on telephone
- Interfaces generated for end-users must apply conventions automatically
  - Users of the system are not likely to be trained interface designers
- Conventions must be applicable to multiple generation platforms

**Solution**
- Standardize on a set of “Smart Templates” a template for each design convention (see list to right)
- Do not require every interface generator to implement every Smart Template
  - Smart Templates defined in terms of primitive spec. language features, so always renderable
  - Not implementing a template may be preferable for some generators (e.g. speech)
- Smart Templates have flexibility for use in multiple specifications
  - Templates are parameterized to cover the common and unique functions of each appliance

**Background: Personal Universal Controller (PUC)**

**Problem**
- Appliances, such as VCRs, kitchen appliances, etc., are becoming increasingly complex
- Increasing complexity often leads to poor user interfaces (Brouwer-Janse, et al.)

**Solution**
- Use hand-held devices that users already have (PDAs & mobile phones) to provide high-quality remote control user interface
- Automatically generate interfaces from an abstract specification of the appliance’s functions

**Example Interfaces**

**Templates**
- Some Smart Templates we have defined (we expect to find more):
  - date
datetime
  - dimmer
image
  - image-list
media-controls
  - mute-mic
mute-speaker
  - power
phone-dialpad
  - time-absolute
time-duration
  - volume
audio

**Examples of variation in one parameterized Smart Template (media-controls):**

**Example Interfaces**

**Smart Template Examples**

**media-controls**
- Used for controlling the playback of a media stream – sound or video
- Possible devices include stereos, camcorders, answering machines, etc.

**time-duration**
- Used for manipulating durations of time
- Possible devices include alarm clocks, media players, microwaves, etc.

**System Architecture**
- Appliance adaptors allow system to connect to and control real appliances
- Two-way communication protocol allows UI to control appliance show current appliance state
- Abstract specification language allows functional description of appliances
- Automatic interface generators on multiple platforms (PocketPC, Microsoft’s Smartphone, and TabletPC) and modalities (graphical and speech)