From building an interactive platform with rich, fast and reliable feedback channels to ...
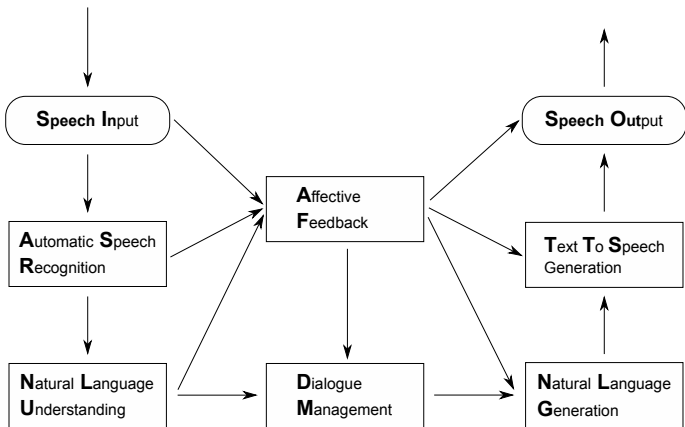
Ovidiu ȘERBAN

`ovidiu.serban@insa-rouen.fr`
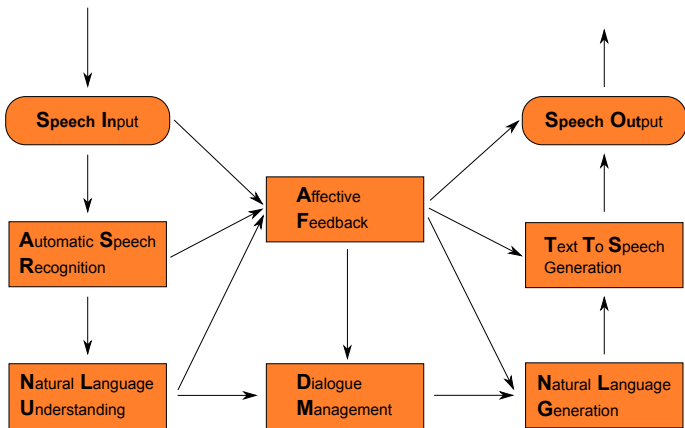
LITIS Laboratory, INSA de Rouen, France &
"Babeș-Bolyai" University, Romania
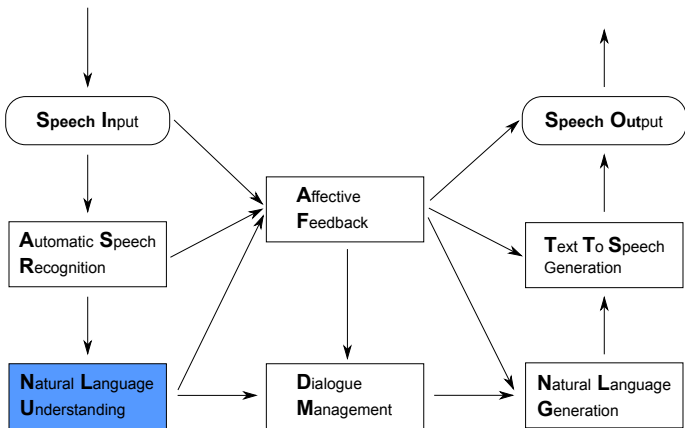
June 7th, 2013

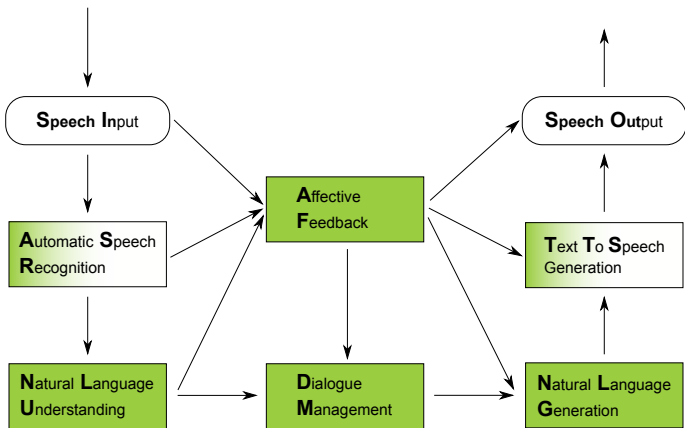# Interactive Systems Design

Interactive Systems Design

Interactive Systems Design

Interactive Systems Design

AgentSlang

Introduction

AgentSlang is a platform for modelling *Distributed Interactive Systems*, which integrates new components for Knowledge Extraction, Affective Feedback Detection and various existing Natural Language Processing, Automatic Speech Recognition and Text-to-Speech modules.

AgentSlang	← component collection
Syn!bad	← linguistic pattern matching
MyBlock	← component middleware
ZeroMQ	← communication library

Interactive Systems Design

Existing platforms

- SEMAINE[1]: + Affect Oriented Design - No Dialogue Management
- Companions[2]: + Dialogue Oriented Design - Not Open Source

The goals

Incorporate the Dialogue and Affect Oriented Design into one single Open Source Project.

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[1] http://www.semaine-project.eu/
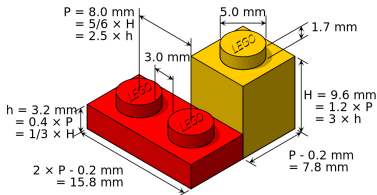[2] http://www.companions-project.org/

Component based design (Hypothesis)

Lego Principle

- A system of flexible and generic components, with a high level of compatibility and re-usability
- Each component has a unique set of properties
- Components can be linked in "almost" any configuration

MyBlock (Our solution)

agent SLANG
MODEL·DEPLOY·ENJOY

Service Level *

Request / Reply
Named service

Component Level

Publish / Subscribe
Data types
Internal Channels / Topics

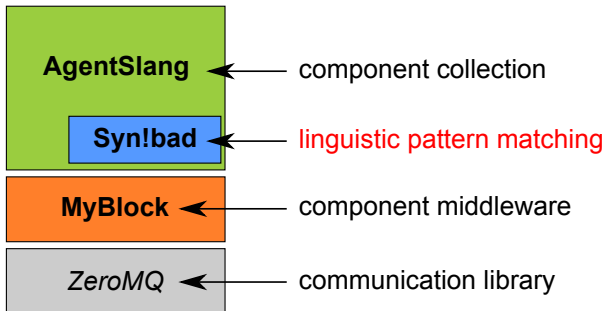**Architecture Level**

External Channels
Config
Subscription / Publishing

Deployment Level *

Profile
Machine
Platforms

Syn!bad

AgentSlang ← component collection

Syn!bad ← linguistic pattern matching

MyBlock ← component middleware

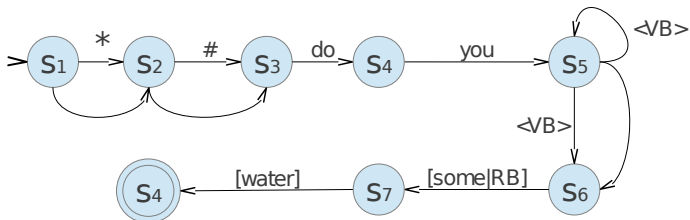*ZeroMQ* ← communication library

Syn!bad

Intro

- Syn!bad $\iff$ Synonyms [are] not bad $\iff$ Synnbad
- A **synonym**-based **regular expression** language extension used for **linguistic pattern matching** in dialogue systems

Example

- `Ovidiu do you have some water`
- `<name> do you <verb> some <object>`

Syn!bad Patterns

Pattern
$name <#*>? do you <VB*>* [some|RB*] [water#object]

Syn!bad Patterns

Pattern
`$name <#*>? do you <VB*>* [some|RB*] [water#object]`

Tokens

- `$name` - variable matching
- `<#*>?` - optional punctuation mark
- *do* - single constant word
- `<VB*>*` - verb token
- `[some|RB*]` - synonym token, restricted by POS
- `[water#object]` - synonym token, matched to local variable

Syn!bad Matching

Pattern

```
$name <#*>? do you <VB*>* [some|RB*] [water#object]
```

Example

```
Ovidiu , do you want any aqua
```

Matching

- `$name` ← Ovidiu
- `<#*>` ← ,
- `<VB*>` ← want
- `[some|RB*]` ← any (**any** and **some** are adverbs (**RB***) and **synonyms**)
- `[water#object]` ← aqua (**water** and **aqua** are **synonyms**)
    - `#object` ← aqua

Syn!bad ID & Styles

IDs & Styles

Pattern	ID	Style
what do you want ?	p1	relation=familiar, rudeness=high
what can i do to help you ?	p1	rudeness=low
if i may ask , how could i help you ?	p2	relation=polite

Style matching

Style	ID		
	p1	p1	p2
relation	familiar	*	polite
rudeness	high	low	*

AgentSlang

AgentSlang ← component collection

Syn!bad ← linguistic pattern matching

MyBlock ← component middleware

ZeroMQ ← communication library
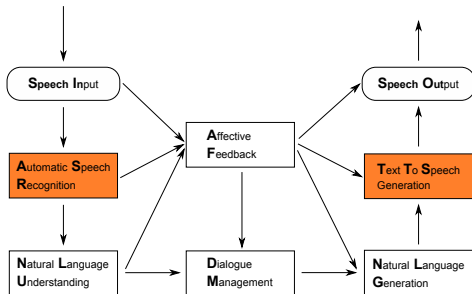
AgentSlang

Component	Function
Log Component	Debug/Logging
System Monitor Component	Event Monitoring
Component Monitor	Platform Monitoring
Text Component	Text Input/Output
Voice Proxy Component	Speech Input
MaryTTS Component	Speech Synthesis
iSpeechTTS Component	Speech Synthesis
Senna Annotator	POS Tagging, Chunking, NER
Metaphone Encoding Component	Phonetic Encoding
Template Extractor	Knowledge Extraction
Dialogue Interpreter	Dialogue Generation
Command Interpreter	Dialogue and Command Generation
Valence Extractor Component	Valence Extraction

AgentSlang

Component	Function
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AgentSlang

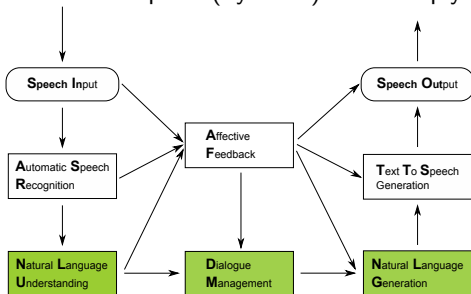| Component	Function
Template Extractor	Knowledge Extraction
Dialogue Interpreter	Dialogue Generation
Command Interpreter	Dialogue and Command Generation

Dialogue & Command Interpreter

A simple reactive model: Template (Syn!bad) ID $\rightsquigarrow$ Reply ID
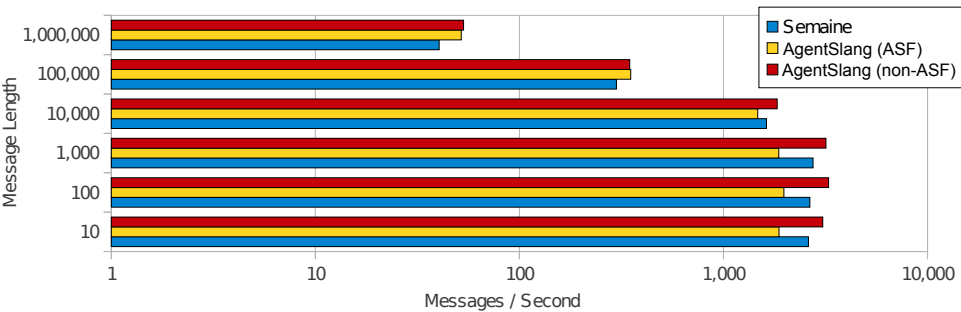
AgentSlang - Valence Extractor

Valence Extractor Template

- A generic structure template for text features ⤳ valence data (positive, negative or neutral)
- Currently not implemented, but several algorithms are available:
  - □ a collection of Syn!bad patterns, with various styles for polarity
  - □ affective contextonyms (see O. Șerban, A. Pauchet, A. Rogozan, and J-P. Pecuchet. *Modelling context to solve conflcts in SentiWordNet.* ACII. 2013.)
  - □ multi-modal semantic features (see O. Șerban, G. Castellano, A. Pauchet, A. Rogozan, and J-P. Pecuchet. *Fusion of Smile, Valence and NGram features for automatic affect detection.* ACII. 2013.)
  - □ AFFIMO (see M. Ochs, J. Ollivier, B. Coic, T. Brien and F. Majeric. *AFFIMO: Toward an open-source system to detect AFFinities and eMOtions in user's sentences.* WACAI. 2013.)

Conclusion

	AgentSlang	Semaine	Companions	Mirage	GECA
Middleware Platform	MyBlock (ZeroMQ)	ActiveMQ	Inamode	Psyclone	OpenAir
Integration Approach	pub/sub	pub/sub	plain socket	blackboard	blackboard
Operating Systems	Android+LMW	LMW	Unknown	LMW	Unknown
Data Interface	custom Objects	string+XML	XML	string	XML
System Management	Yes	Yes	(No)	No	No
System Events	Yes	No	(No)	No	No
Actively Maintained	Yes	Yes	Unknown	(No)	(Yes)
Platform Licence	GPL+CeCILL	LGPL	Proprietary	Unknown	Unknown
Dialogue Management	Yes	No	Yes	(Yes)	Yes
Affect Oriented	Yes	Yes	Yes	No	No

AgentSlang vs SEMAINE

Chart legend:
- Semaine (blue)
- AgentSlang (ASF) (yellow)
- AgentSlang (non-ASF) (red)

X-axis: Messages / Second (1, 10, 100, 1,000, 10,000)

Y-axis: Message Length (10, 100, 1,000, 10,000, 100,000, 1,000,000)

- ASF $\iff$ Automatic System Feedback
- AgentSlang (non-ASF) is the equivalent of SEMAINE
- a SEMAINE (XML) message has 1 000 - 100 000 chars
- a AgentSlang binary object has 100 - 1 000 chars

More technical details

- AgentSlang code and distribution will be released **soon** under GPL + CeCILL-B licence
- web: `http://agent.roboslang.org/`
- svn: `https://labanquise.insa-rouen.fr/projects/agentslang/`
- Contact me for the technical details: `ovidiu.serban@insa-rouen.fr`
- We plan to open a "component market", where various algorithms will be available for benchmarking.

M O D E L · D E P L O Y · E N J O Y