

# Understanding Words You've Never Heard

John C. Henderson

781-271-2352 • [jhndrsn@mitre.org](mailto:jhndrsn@mitre.org)

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The logo for the MITRE Technology Program, featuring a stylized graphic of stacked blocks in yellow, orange, and blue to the left of the text.

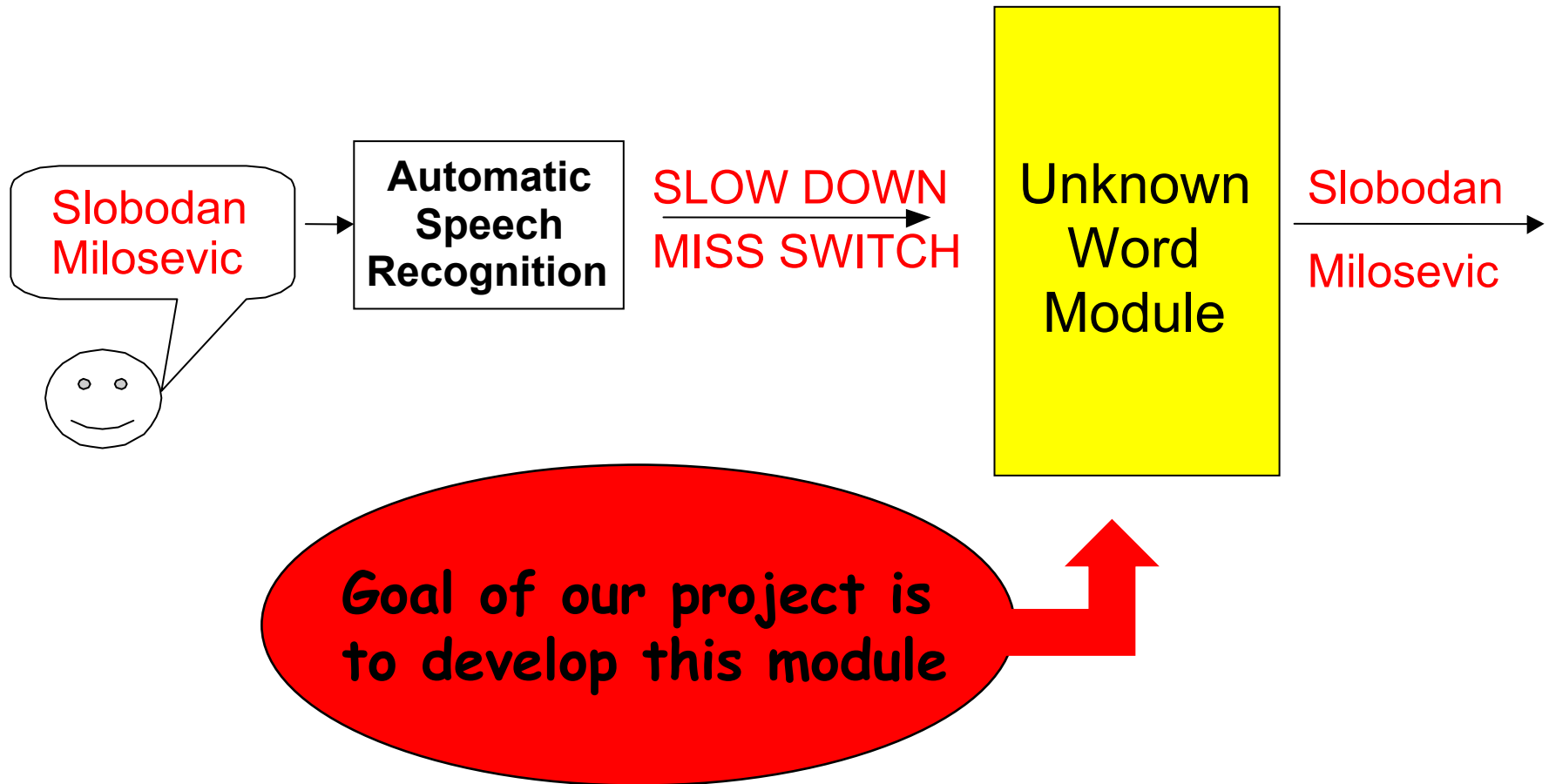
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# Problem

- **Speech recognition systems have a limited vocabulary (usually  $< 64,000$  words), yet human language has an unlimited vocabulary**
- **Out-of-vocabulary words are guaranteed to produce recognition errors, and these errors adversely affect further processing of the speech data**

**Challenge: Can we detect and correct speech recognition errors resulting from out-of-vocabulary words?**

# Background



# Objective

- **Four main tasks addressed**

- 1) Identifying name phrases in ASR output**
- 2) Identifying word errors in ASR output**
- 3) Improving word confidence estimation**
- 4) Correcting ASR errors**

# Activities

- **Multilingual name phrase identification (English, Arabic, Chinese)**
- **First successful joint decoding of name phrases and ASR errors**
- **Significant improvements to word confidence estimation**
- **Phonetic distance technique applied to ASR error correction and to multilingual text transliteration**

# Highlight

## Automatic transliteration of OOV words in output of ASR+MT systems

“AlFarimi”

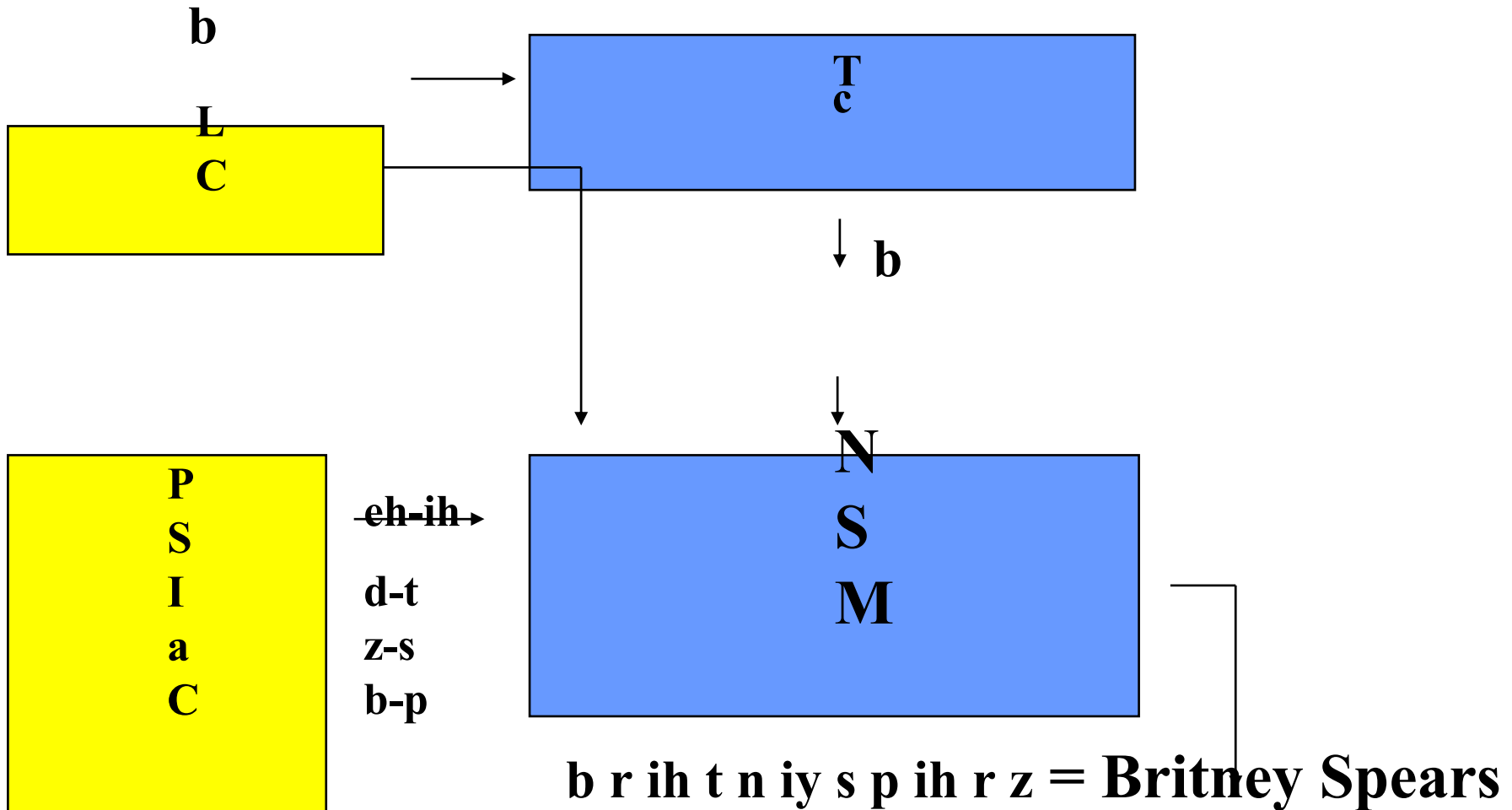
“Ysir”

For the individual is and a other supply two prisons be scared on and a profit to be sick him civilians the channel in of the island the bulletins of the predicates drafts generous not prepare be silent forces to you newscast **<Arabic OOV>** The gates are borderline for of a village delivery reinforce and of marines the American confiscated United Nations rule out accessing **<Arabic OOV>** in Bonn Afghanis Iran declare her denial the switch of strike hardship military aim Iraq Conflicted the news mentioned from Afghanistan about an area Al-Sabaa there Afghani and certify the accent is her still of her authority on the area breaking while a male some leaders of **<Arabic OOV>** the southerner tribes to the

“Alpaston”

# Highlight

## ASR Error Correction as (Phonetic) Spelling Correction



# Impacts

- **Successful tech transfer of research results**
- **Development for multilingual speech data (Arabic, Mandarin, etc.)**
- **Extensions of phonetic distance tool to several relevant problems**
- **Distribution of name phrase tagger (phrag)**
- **Positioning of MITRE in speech research community**

# Future Work

## GUI for phonetic distance experiments

**Select item from ASR output, highlight reference word in ranked list**

**Rank and distance statistics for selected items**

Statistics for Hypothesis: HOT TO ME  
Primary Reference: KHATAMI  
Primary Distance: 11.0  
Range of Primary Rank: (15 - 35) of 76223  
Worst Case Top x Percent: 0.0459

Hypothesis	Reference	Distance
HH AA T T AX M IY	K AA DX AE M IY	
HOBBY YEAR	11.0 HASBNI	
HOLE AND	11.0 HODSON	
HOMAGE	11.0 HONANIE	
HONOR	11.0 HOPSON	
HORNBECK	11.0 HOSTIN	
HOSTILE AND	11.0 HOTAKI	
HOT OR	11.0 HOTTON	
HOT TO ME	11.0 HUSSAINI	
HOT TOMMY	11.0 HUSSEINI	
HOUSE	11.0 HUSTON	
HOUSE OFF	11.0 ITANI	
HOWIT	11.0 KHATAMI	
HOW TO ME	11.0 PATTUM	
HOWTOM	11.0 TADEMY	
HOWDY	11.0 UDANI	