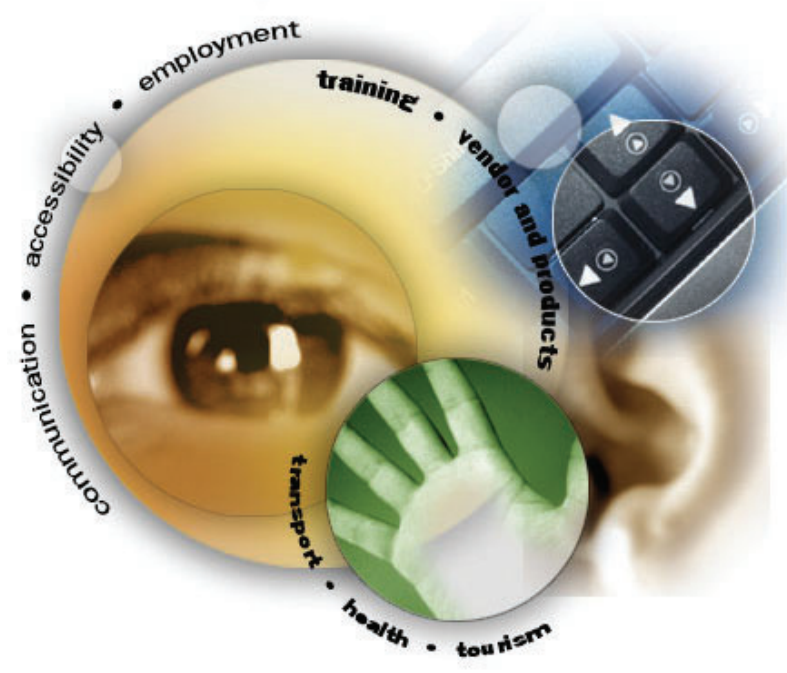# South African Sign Language Human-Computer Interface in the Context of the National Accessibility Portal

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ABSTRACT

The subject of this research is to enable the interaction between Sign Language users and the National Accessibility Portal that is currently under development at Meraka Institute.

INTRODUCTION

The project aim is to research and develop technology that will increase the level of independent living of people with disabilities, by addressing the localised communication challenges faced by such individuals. This includes human interaction with computers and other systems, as well as interaction with other humans. (For example, between a deaf person who can sign and an able person or a person with a different disability who cannot sign).

METHODOLOGY

A signing avatar is set up to work together with a chatterbot. The chatterbot is a natural language dialogue interface that can converse and reply to user queries using Artificial Intelligence (AI) and natural language processing techniques. It can be used to assist and guide Sign Language users across the National Accessibility Portal.

Feedback and guidance are then offered in sign language as the replies are interpreted by a signing avatar, a living character that can reproduce human-like gestures and expressions.

To make South African Sign Language (SASL) available digitally, computational models of the language will be built by adapting and building on existing technologies. The potential breakthrough is to find the underlying grammar of SASL which has never been standardised. The research is conducted at different levels:

- Sign Language Processing: Study the computational aspects of sign language grammar production with a combination of linguistics rules [1], animation scripts generation [2,3] and prosody [4].
- Human Computer Interaction: Research alternative ways of capturing sign language users' queries: natural sign language [5] queries (e.g. Sign Language as opposed to Signed English) using input templates or using a pictograph symbol input interface [6].
- Digital Gesture Recognition: Training a computational model to recognise the difference between 3D gestures as an alternative input interface [7]. The recognition is not from real world video input but from the user moving body parts of a virtual manikin into position and it could serve as a reverse gesture look-up dictionary. [8,9]*

The SignBot is the piece of software that wraps together the computational linguistic rules and handles discourse and interaction with sign language users. A natural language engine binds multi-modal inputs with sign language production animation scripts.

PROJECTED OUTCOMES

* Augmentative Assistive Input Interfaces for Sign Language users;
* Interactive Sign Language assistant and virtual guide for the National Accessibility Portal; and
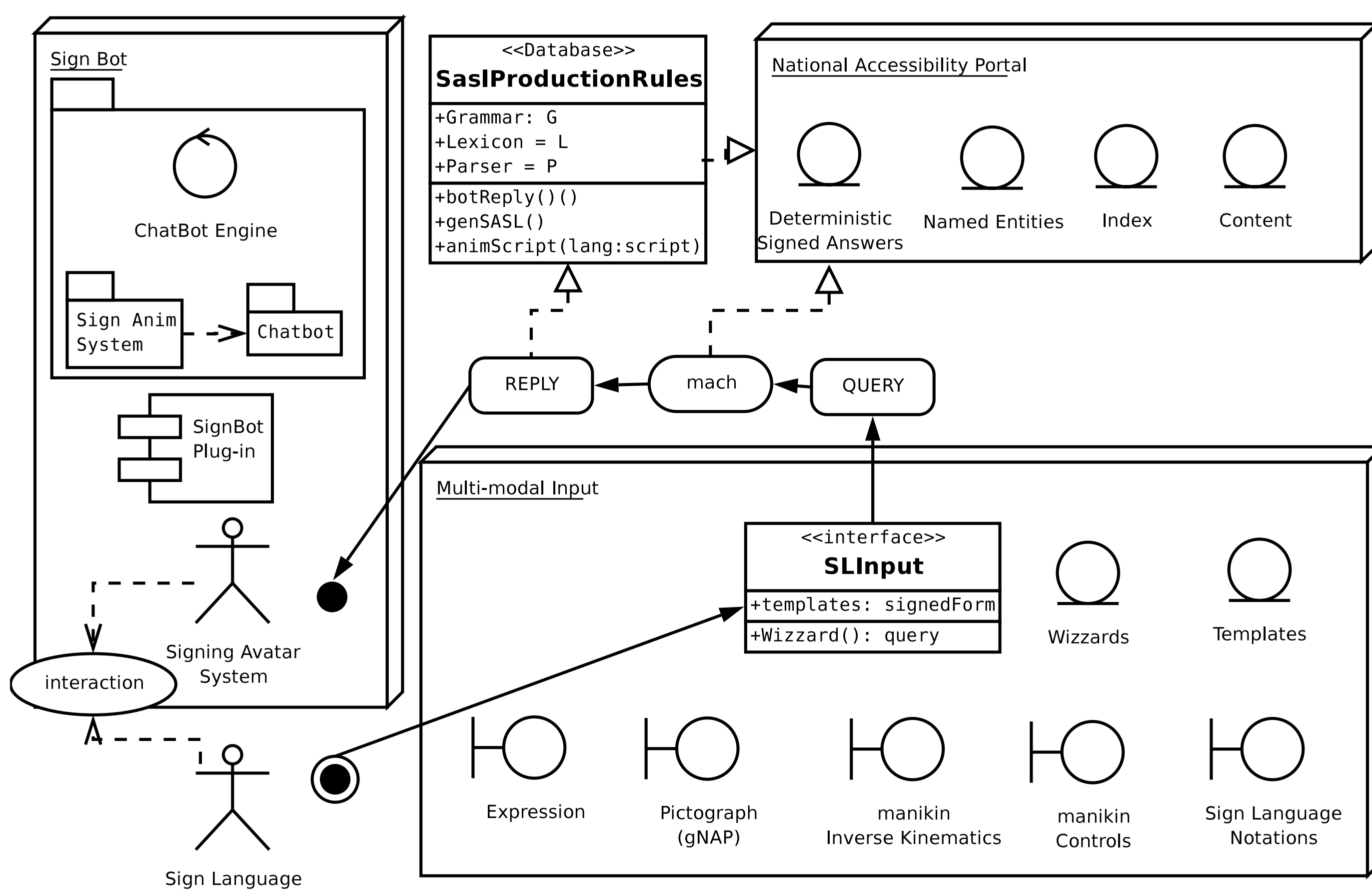* A SASL gestures look-up dictionary prototype (digital 3D sign recognition computational model).

DISCUSSION

The field of Sign Language processing is held back by the inefficiency of sign recognition from real world input and by the lack of consensus that surround the definition and representation of Sign Language grammars. Deriving linguistics models directly from digital 3D gestures can lead to better understanding and interpretation of Sign Language modalities (spatial, concurrent and multi-modal). Growing a database of SASL gestures into NAP is very important because it can be used to test linguistic theory and tools, and it can also be used to develop new tools based on statistical models.

CONCLUSION

Building a living example of a communication and interaction system in the National Accessibility Portal is also a way to sensitise the public to the localised communication challenges faced by the Deaf community. Intuitive or natural access interfaces, with a wider diffusion of SASL throughout the internet, will create appeal for sign communication. South African Sign Language is a complete and efficient language that can benefit all as a second language if we get more exposure to this form of communication in our daily life.

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Integrating signing avatar and chatbot technologies - Signbot- in the National Accessibility Portal

Figure 1.

* Contemporary sign language dictionaries only work one way, looking for a word and finding the associated gesture. The proposed technology would allow the sketch up of a gesture and find all related signs that closest match, enabling the user to find the meaning of a gesture from the pose itself.

NATIONAL ACCESSIBILITY PORTAL

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