# Spoken Dialogue Robot for Watching Daily Life of Elderly People

Koichiro Yoshino, Yukitoshi Murase, Nurul Lubis, Kyoshiro Sugiyama, Hiroki Tanaka, Sakti Sakriani, Shinnosuke Takamichi, Satoshi Nakamura

Nara Institute of Science and Technology, JAPAN RIKEN Center for Advanced Intelligence Project, JAPAN PRESTO, Japan Science and Technology Agency, JAPAN The University of Tokyo, JAPAN

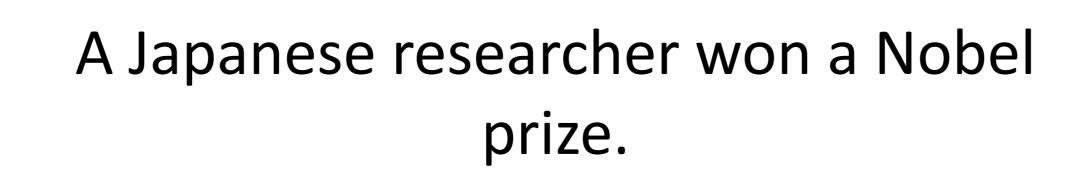


### A prototyping of dialogue systems for elderly care taking

- Building a system for elderly watching, caretaking based on dialogue technologies toward super-aged society
- Integration of base technologies to evaluate a total system

# Information Navigation

The system starts to talk about news of the day



Would you give me the detail?

Prof. Honjyo in Kyoto university is awarded by a Nobel prize for medicine, who is working on immunotherapy for cancers.



What do you feel

I'm very happy when any Japanese people are awarded

# **Attentive Listening**

Move to attentive listening mode when the system predicts user interests

I think so

## **Anomaly detection**

Anyway, what day is it today?

Insert questions to predict dementia at topic segments

April 24<sup>th</sup>?

#### System Configuration Speech Speech **MAIN** (resp.) OpenJtalk Julius (query) → gesture CommU notification Manager Attentive **Anomaly** NLU Info. navi. POMDP listening detection doctor or family

#### T Dialogue data

- 60 dialogues, 27,986 utterances
  - between elderly people and licensed counselor, care-takers
  - The data are used for the training data of the system
- K.Yoshino et al., Japanese Dialogue Corpus of Information Navigation and Attentive Listening Annotated with Extended ISO-24617-2 Dialogue Act Tags. Proc. LREC2018

#### Information Navigation

- The system predicts user focus and select an appropriate dialogue module based on dialogue acts
  - The dialogue contents are selected from Web news
  - The system transits to the attentive listening mode once the system detects user interests
  - Action selection accuracy: 0.834-0.893
- K.Yoshino et al., Conversational system for information navigation based on POMDP with user focus tracking, CSL, 2015

#### Attentive Listening

- Select a response based on emotion elicitation
  - Considering emotion triggers (system utterances)
    and their impacts (emotion improvement)
- N.Lubis et al., Positive emotion elicitation in chat-based dialogue systems, IEEE-TASLP, 2019.



#### Anomaly detection

- Dementia detection
  - Dementia can be detected by response delays to sudden questions
  - There are some typical questions to detect dementia
  - AUC: 0.93
- Other Anomalies can be detected through a conversation
  - Delirium, Depression, Heart infraction
- T.Ujiro et al., Detection of dementia from responses to atypical questions asked by embodied conversational agents. Proc. INTERSPEECH2018

### **r** Dialogue Evaluation

- Dialogue with 10 elderly people
  - 6 of them preferred a system that consider emotion elicitation and gesture
  - Elderly people have very high expectation to conversational robots → dialogue contents of daily conversation is very important for continued use