DESIGN AND DEVELOPMENT OF AN INTERACTIVE ROBOTIC CONVERSATIONAL COMPANION FOR ELDERLY PEOPLE

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Department of Electrical Engineering

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Declaration of the Candidate & Supervisor

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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Abstract

The ageing of population is rapidly accelerating worldwide and as a result countries are facing social and economic challenges. Hence, the majority of the elderly population all around the world is facing difficulties.

The loss of ability is typically associated with ageing and the elders require special attention in both physical and mental concerns. The requirement of a suitable caretaker becomes very important in caring for an elderly person. A human caretaker would be the ideal solution. But the availability of such genuine resource is a very rare luxury in the modern society. Hence the society and the elderly population are in need of a suitable alternate solution. Introduction of service robots has become a very promising development in addressing problems faced by elderly population in the world. This research work proposes a robotic conversational companion capable of vocal interaction with elderly users in human like dialogues, during service assistance.

A Finite State Interaction Module (FSIM) and a regular expression based language identification method have been introduced for facilitating this task. A Knowledge Database (KDB) containing specific data has been designed, implemented and connected with the robot system to enable more meaningful and natural dialogue creation. State transition diagram and event flow diagrams explaining the functionality of the states are presented. The robots performance has been evaluated by user rating.

Experimental results including a selected segment of conversation are presented with an analysis including the change of FSIM states. Human user has been asked to interact with the experimental setup and rate the user experience varying from “Very Bad” to “Excellent”. The evaluation results have indicated a high user satisfaction rate close to “Good”, validating the robots capability to interact in a human friendly manner during service assistance.

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List of Abbreviations

ABNF	Augmented Backus-Naur Form
API	Application Programming Interface
DOF	Degree of Freedom
FSIM	Finite State Interaction Module
HMM	Hidden Markov Model
IDE	Integrated Development Environment
MFCC	Mel-frequency Cepstral Coefficients
NLP	Natural Language Processing
ROS	Robot Operating System
TTS	Text to Speech