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SPIRITUAL DESIGN ELEMENTS AS EMOTIONAL THERAPY FOR MALAY MUSLIM ELDERLY WITH ALZHEIMER'S DISEASE USING THERAPEUTIC ROBOT

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ABSTRACT

The world's population of people aging over 60 years will double from 11% to 22% between the year 2000 and 2050. Malaysia is expected to become an aging nation by 2030 in which 15% of the population is aged 60 years and above which entails a rise in the number of elderlies in the nation. In addition to that, results obtained from a preliminary study concluded that the early stages of the Alzheimer's disease effects elderlies' memory in terms of performing tasks in their daily lives which needs assistance and support from family members or caregivers. This paper is focused on identifying the spiritual emotion words for the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI), determining spiritual design elements for the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI) as well as proposing a design guide for spiritual practices in the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI). The methodology used for this research is a qualitative method using the KJ method for objective 1 and an interview with spiritual and elderly experts is deployed for objective 2 whereas for objective 3, an in-depth user study is conducted with elderlies that suffers early stages of the Alzheimer's disease. The finding revealed that utilizing the therapeutic robot which is embedded with spiritual design elements of spiritual practices is able to derive positive effects as well as enhance spiritual emotions towards elderlies. This research is significant for elderlies suffering from early stages of the Alzheimer's disease where they benefit the technology in terms of performing spiritual practices.

Keywords: *Robot; Therapeutic Robot; Elderly; Aging; Alzheimer; Spiritual Practices*

1. INTRODUCTION

The growing concern of an increase in the population of old and aging people became the main reason for robotics to be one of important fields that strive to provide assistive care for elderly [1], [2], to increase the quality of life (QoL), as well as providing therapeutic playing sessions for children with autism [3], [4].

A robot is a mechanical device that is proficient of accomplishing a variety of tasks on command or based on instructions programmed in advance ([1], [2]). The increasing number of elderlies in the population had initiated a growing demand for rehabilitation services and thus placed the robots as a therapeutic tool in assisting elderlies who are facing difficulties due to their old age [5]. Robots are believed of having the ability of multitasking similar to humans, considering the rapid advancement of robots [6]. Several scholars have considered to look from the therapeutic aspect of robots to enhance elderlies' Quality of Life (QoL) [1], [2], while others explored the aspect of robot interaction (RI) [6], [2], as well as therapeutic robot interaction (TRI) [7], [8], [9].

There are three problem statements that instigated this research. Several studies only focus on Human Robot Interaction [10], where the focus on spiritual elements is absent [11]. Moreover, in comparison to the Japanese culture which is renowned in using robots for treating dementia and Alzheimer's [12], the study of robot interaction in Malaysia is scarce specifically in the Malay culture particularly in relation to spiritual elements [11]. This is supported with a preliminary study conducted by [13] which concluded that early stage Alzheimer's disease affects elderlies' memory in performing routine tasks in their daily lives that includes the difficulty to perform obligations of their faith without the assistance of caregivers.

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This research aim is to formulate a design guide for emotional spiritual practices in the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI) to assist elderlies with early stages of Alzheimer's in performing their spiritual practices. The research questions for the research are 1) What are the spiritual emotion words suitable for the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI)? and 2) What are the spiritual design elements for the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI)?. To answer the questions, three objectives were developed. These are; 1) To identify the spiritual emotion words for the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI), 2) To determine the spiritual design elements for the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI) and 3) To propose a design guide for spiritual practices in the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI).

This research is conducted to deliver benefits to the society especially the elderly. The successful application of the model could raise local robotic implementation which could help boost health services in line with the Healthcare agenda (the 12th NKEA) and thus promotes success of assistive services and enhancing the people Quality of Life (QoL).

2. Literature Background

2.1 Therapeutic Robot Interaction

The interest in the field of robot therapy applications have been increasing since the 1990s [14]. This can be seen in the excellent development of Human Robot Interaction(HRI) in the field of healthcare as well as nursery, surgery, physical therapy and rehabilitation [15], [16] as well as in supporting health and quality of life of elderlies [3]. Studies about human and robot interaction were aggressively conducted [17] where the collaboration between human intelligence and robot's determination will certainly reveal great opportunities for the future while flourishing new fields of robotics [18]. In Malaysia, there are several studies regarding the use of robots in therapies like the study conducted by [10] where they discovered older adults' perspective and emotional responses during robot interaction and a study by [4] where they studied humanoid robot therapy for children with autism. Thus, with the rapid progress of robotics [19], current research also includes the aspect of emotion or affect in robot interaction. For instance, there is a study that revealed the overall shape of a robot arouses any of these three emotions named 'concerned', 'enjoyable' and 'favourable' [20], [21].

2.2 Psychotherapy

Psychotherapy or also known as talk therapy is a therapy to treat people with mental disorders by assisting patients to understand their illness [22]. Results from a study conducted by [23] shows that daily greetings from a robot can have a strong impact towards the perceptions of others' feelings which directly affects the feelings of elderlies and become a comforting element that makes them value the greetings while perceiving positively towards the robot. In conclusion, the robot is able to provide emotional therapy to elderlies where they feel cherished and occupied with the conversation.

2.3 Therapeutic Robot (Robot for Therapy)

The evolution of robots has always been an interesting subject for both generalists and technologists alike [3] which eventually resulted in the idea to use robots as a form of therapy. According to [24], a therapeutic robot is defined as a robot placed in health care facility that is well-designed for providing rehabilitation services as well as assisting with daily personal activities. Therapeutic robots have become a trend for medical purposes which have attracted various interests around the world and have stimulated the new definition of robots as social technologies [25], [26].

2.4 Possible Designs for Robot

The increasing technology and growing expectations from the machines have altered the overall expression towards robotics where humanoid robotics research have reached a remarkable maturity level within the past decade [27], [28]. Human robot interaction should be natural and applicable to reduce training needs for both users and robots [29].

Table 1 shows the possible designs that is able to be implemented into the robot.

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Table 1: Possible designs for robot

Designs	Authors and Year	Literature
Audio (Voice)	[61], [62]	Communication between humans and robots using voice is an area that is receiving a considerable attention as humans will feel more comfortable.
Movement	[63]	Human–robot collaboration is a vital goal of the field of robotics where humans and robots work jointly together on shared tasks.
Touch	[64], [5]	Robots must be programmed to nurse aging and disabled people. These robots are needed to work as well as being able to touch humans.

2.5 Malay Muslim Elderly

Malaysia defines elderlies as persons who age 60 years old and above [30], [31]. With a total population of 29.6 million, Malaysia has an elderly population of 1.8 million where it is expected to rise to 3.3 million by the year 2020 [32]. The overall increase in the elderly population is a global phenomenon. Being a multi-ethnic country, Malaysia is dominated by the Malay ethnic that constituted approximately 63.1% in 2010 [33]. For centuries, the Malay has been the main ethnic group in Malaysia where the Malaysian culture and beliefs are very much affected by what is being practiced by the Malay society [34]. The conversion to Islam and the adoption of Malay language and customs typically allows a person of any ancestry to be considered Malay [30]. Thus, a Malay Muslim elderly can be understood as a person who was born as a Malay, born as a Muslim and currently facing old age.

2.6 The Alzheimer's Disease

The Alzheimer's disease causes problem with memory, thinking and behaviour is the most usual form of dementia that is a primary disease faced by elderlies [35], [36], [37], [38]. Symptoms can be diagnosed at any stage of the disease and the progression through the stages of the disease is observed after an initial diagnosis that dictates how care is managed [39]. The types of behaviour change as well as the length of time for symptoms to be present are different for each person [40]. The symptoms of Alzheimer's disease typically develop quite slowly [41]. The Alzheimer's disease typically progresses slowly in three general stages: mild (early), moderate (middle), and severe (late) [36]. Currently, there is no cure for the disease and there is no way to stop the underlying death of brain cells [42], [43].

2.7 Emotion

Emotion can be defined as a certain stimulus that triggers emotional bodily reactions and perception of those changes constitutes the conscious experience of emotions and feelings [44], [45], [46]. Emotions are specific reactions to a particular event that are usually of a short duration. Mood is a more general feeling such as happiness, sadness, frustration, contentment, or anxiety that lasts for a longer time. Besides, human emotional information can be obtained from various indicators such as speech, facial expressions, gestures, pulse rate, and so forth [47]. In summary, emotion can be defined as one's feeling that is caused by a certain situation that had occurred. Emotions also play an important role in everyday life and can affect one's quality of life. The study of emotions in the field of robotics is still new and not all areas have been explored.

2.8 Spirituality in Islam

Spirituality in Islam is described as the elevation of the human circumstance on which the mind is focused on a higher of a godly existence [11], [48]. An interview with [49] mentioned that in Islam, the act of worshipping God is divided into two which are *Ibadat wajib* (compulsory obligation) and *Ibadat sunnah* (Sunnah of worshipping). Worship in Islam encompasses all human activities in terms of spiritual and physical. According to [48], while *solat* is an essential part of the faith, *zikir* also leads to a pious life, the practice of *zikir* has tended to be organised according to a structured practice involving the chant and repetition of either one of Allah's Divine Names or Attributes named in the Al-Asma Al-Husna. Thus, from the literature indicated that there are many forms and elements of spiritual practices in Islam. Islam is universal and claims peace. This research is focused on *Ibadat Sunnah* to be embedded into the therapeutic robot while considering the issues pertaining to the religion and *syariah* law.

2.9 Kansei Engineering

Kansei engineering (KE) is one of technique to capture emotion. Kansei is a Japanese

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word which represent user's impressions and emotions regarding a new product, service concept or surroundings [50], [51], [52]. Kansei Engineering (KE) was invented by Mitsuo Nagamachi at Hiroshima University in the 1970's and widely used as a method to translate a customer's ambiguous image product into design specifications [53], [54] and has been effectively applied in the field of product design [55], [56] to discover the relationship between the emotional state of the users and the design features of products. Example of research using Kansei is a study of Kansei semantic space for emotion in online learning [57].

3 METHODOLOGY, ANALYSIS AND FINDINGS

This section discusses about methodology, analysis and findings for the research. This research is under the project named A New Hybrid Kansei-Spiritual Therapeutic Robot Interaction Model (KS-TRI) under Fundamental Research Grant Scheme (FRGS) Grant 600-RMI/FRGS 5/3 (105-2014) and the methodology created for this study was verified by the qualitative expert. Based on a preliminary study conducted by [13], elderlies with Alzheimer's disease in an early stage suffers from cognitive impairment where they face difficulties in memorizing daily routines as well as practices including routines pertaining to their faith and spirituality. Although suffering from the disease, these elderlies are still at their best physical conditions and mostly do not require physical assistance. The caregiver stated that these elderlies are emotionally affected whenever they face difficulties in remembering especially pertaining to spiritual practices. These elderlies choose the humanoid robot as their preference since they believe that using a robot with human resemblance will be more courteous as the robot will assist them to perform spiritual practices as well as it will enable them to build confidence using the robot to assist them in performing spiritual practices.

3.1 Objective 1: To Identify the Spiritual Emotion Words for the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI)

The methodology used for objective 1 is a qualitative method by conducting the KJ method. Objective 1 is to identify the spiritual emotion words based on the Kansei concept. The experts involved are elderlies, spiritual and robotic experts. The experts are required to have an experience over 3 years in the respective fields.

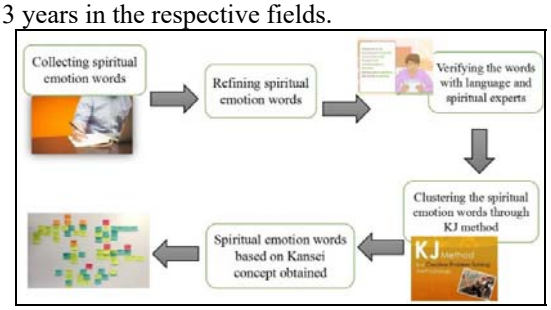

Figure 1: The Methodology to identify spiritual emotion words for KS-TRI

The methodology used as below:

1. **Collecting Spiritual Emotion Words**
   The process of collecting spiritual emotion words are through reading the journals, articles, books and proceeding papers related to the spiritual concept that caters specifically to the emotion of elderlies. During the process of collecting the words, numerous words were collected based on the objective's requirement which totals to 135 words.

2. **Refining the spiritual emotion words**
   The words then were checked using the thesaurus, glossary and dictionary to check the precise and accurate meaning while comparing these words to the existing words. Any redundancy or inaccuracy found will result in the exclusion of those words. The finalized words were then sent to the experts for verification.

3. **Verify the spiritual emotion words with language and spiritual experts**
   The selected words were sent to the language and spiritual experts for verification. During the process of verifying the words, these experts verify the words in order to classify the words as spiritual emotion words.

4. **The KJ method**
   The KJ method works where experts choose, groups and clusters the words accordingly to the same meaning. These experts have more than 3 years of experience in their respective fields required which are spiritual, elderlies and the robotics experts. The KJ method required the experts to categorize the spiritual emotion words under the same concept. The header is considered as the spiritual emotion words. The procedure of the KJ method was adapted from Ulrich (2003) [58] and Spool (2006) [59].

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Spiritual emotion words are based on the Kansei concept is constructed into the emotion checklist scale. The checklist is an adaptation from the Semantic Differential (SD) which is widely used in the investigation of Kansei. The SD scale was originally founded by Osgood [60] in the intention to recognize the space of word meanings.

Analysis and Findings for Objective 1

There are 135 spiritual emotion words underwent the KJ method process in order to produce spiritual emotion words based on the Kansei concept. There are 10 spiritual emotion words selected which was produced from the KJ method process. The experts grouped all the words based on its similarity in meaning and concept. Once the spiritual emotion words were grouped based on their similarities in meaning and concept, the experts then brainstormed to choose the most suitable words to represent each group. Thus, from the groups of emotion words based on spirituality, there are words that were chosen as the header to represent the rest of the words in each group. The words chose as headers are Pious, Calm, Strive, Devout, Good deed, Feel, Cheerful, Knowledgeable, Religiosity and Blessed.

Table 2 shows the result from objective 1 using KJ method. KJ method is a process to identify the spiritual emotion words based on Kansei concept. There are few words which originally obtained in *Bahasa Melayu* as the words are taken from the Malay's journals and related sources, while the rest of words were originally obtained from English journals and related sources. The Malay' words were translated into English with close meaning using dictionaries and thesaurus.

Table 2: Spiritual Emotion Words derived from the KJ Method

SEW as dimension	Emotion (words related to SEW)	Definition	References
Pious	Piety, Humility, Moderate and Meditation	A person feels near to Allah S.W.T. while worshipping.	1.From experts in the KJ method 2.Merriam-Webster (2017)
Calm	Calm, Confident, Peaceful, Restful, Convenient, Fearless, Relieved, Secure, Warm, Undisturbed, Quiet, Relaxing, At peace, Fine, Serene, Comfortable, Tranquility, Peace-loving	1.Effects to the person's feeling when they worship Allah S.W.T. 2.The feeling of willingness to strive and learn more on spiritual practices. 3.In a free, serene and spiritually calm state.	1.From experts in the KJ method 2.Merriam-Webster (2017) 3.Cambridge Dictionary, (2017)
Strive	Pray, adhere to advice, resigned to fate, give effort, Amused and Well-nourished	1. A person's feelings of trying to draw himself/herself closer to Allah. 2. An elderly's feeling of willingness to give effort in which they strive to learn more on spiritual practices. 3.Something produced by effort or trying.	1.From experts in the KJ method 2.Merriam-Webster (2017)
Devout	Godly, bow to Allah, Devout and Obey	1. A person's feeling when they devoted to Allah S.W.T by performing obligations as commanded by Allah S.W.T. 2. Committed or devoted to religion or to religious duties or exercise	1.From experts in the KJ method 2.Merriam-Webster (2017)

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Good deed	Good deed, repent and courtesy	A person's feeling when they try to find ways to being closer to God (Allah S.W.T).	1. From experts in the KJ method 2. Merriam-Webster (2017)
Mystic	Thankful, Patient, Sincere, Accept, Think well and Humble.	An elderly's positive feeling of being surrounded by normal elderlies when they are still able to perform all spiritual practices similar to normal elderlies.	From experts in the KJ method
Cheerful	Easy, Cheerful, joyful, Lively, Positive, Fun, Playful, Jolly, Mercy, Wonderful, Celebration, Enjoyable, Happy, Carefree, Fantastic, Exciting, Festive	1. An elderly's emotions when they able to learn, remember and capture knowledge despite of their health conditions 2. Act of promoting or inducing cheer, pleasant, bright.	1. From experts in the KJ method 2. Dictionary.com (2017)
Knowledgeable	Creative, Smart, Grantable, Optimistic, Intelligent, Clever, Adorable, Responsive, Brainy, Bright, Ace, Admiration, Interested and Well-chosen, Well-informed	1. Someone with knowledge and willing to learn 2. A person's feelings when they able to learn and gain knowledge.	1. From experts in the KJ method 2. Merriam-Webster (2017)
	Gratifying, Religious	1. An Belief, Devotion, Merciful and Hopeful.	1. From elderly's feeling after they have learnt the spiritual practices. 2. Affected or excessive devotion to religion.	experts in the KJ method 2. Dictionary.com (2017)
	Blessed	Pleasant, Contented, Complacent. Blissful, Abundant, Thankful, Gladsome, Blessed, Satisfied, Plenty, Lucky, Feel special, Glad and Grateful.	An elderly feeling after they are able to remember and learn the spiritual practices, they feel blessed when they are able to practice the spiritual practices perfectly.	1 From experts in the KJ method 2. Dictionary.com (2017) 3. Merriam-Webster (2017)

3.2 Objective 2: To Determine the Spiritual Design Elements for the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI)

Objective 2 is conducted to determine the spiritual design elements of spiritual practices for the KS-TRI. The process of determining is by interviewing the spiritual and elderly experts with the experience of over 5 years in their respective fields.

The spiritual design elements were programmed into the humanoid robot "Nao" that was used in conducting the user study in objective 3.

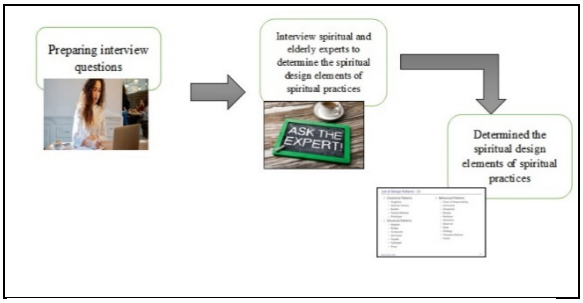

Figure 2: The Methodology to determine spiritual design elements for KS-TRI

The methodology used as below:

1. Preparing interview questions

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Before conducting the interview with the spiritual and elderly experts, the researcher has prepared in advance interview questions based on the findings from a preliminary study to determine the suitability of spiritual design element regarding spiritual practices for the elderly with early stages of the Alzheimer's disease.

2. Interview with Spiritual and Elderly Experts

The spiritual and elderly experts have listed the most suitable spiritual design elements regarding spiritual practice that is appropriate for elderlies with Alzheimer's disease to be implemented into the humanoid robot. During the interview, experts also provided a suitable design that is compatible with each spiritual design elements. All potential spiritual design elements were determined from the interviews and supported by the literature review.

Analysis and Finding for Objective 2

Prior to the interview, the researcher has explained in detail pertaining to the research and described the intention of the interview session in order to produce a successful spiritual design element for spiritual practices. The researcher also mentioned the interview might differ from any other interviews and a few questions that was not in the question set was also asked to explore as well as attaining a better result. The possible design features for the robot are based on the literature review, the designs were informed to the experts and innovative design features other than the ones that are being mentioned that are suggested by the experts were also welcomed. The experts have chosen the designs based on their experiences, suitability and needs of it to meet user requirements.

Table 3 summarizes the experts' opinion pertaining to design features for spiritual design elements of spiritual practices for the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI).

Table 3: Expert opinion on designs for the robot

Experts	Design Features		
	Audio	Movements	Haptic
Expert 1	✓	✓	✓
Expert 2	✓	-	-
Expert 3	✓	-	-
Expert 4	✓	✓	✓
Expert 5	✓	✓	-

In sum, audio is believed to be the design feature that is able to attract the attention and focus of elderlies. A significantly loud and clear audio is believed to be the best choice as the functional design feature for the therapeutic robot. The second-best design is the movement of the robot. The experts choose the movement of robot as an additional feature hence to complete the design features for the therapeutic robot. The robot's movement as a design feature was chosen to be used alongside audio in order to enhance elderlies' comprehension of the therapeutic robot's intentions in assisting them with spiritual practices.

Table 4 summarizes the finding for spiritual practices and it design features for spiritual design elements to be embedded into the therapeutic robot. The designs and elements were finalized by the spiritual and elderly experts during the interviews.

Table 4: Spiritual Practices and Design Features

Spiritual practices	Design Features	
	Audio & Voice	Movements
Zikir	• Male adult's voice • Soft and clear voice	Moving both hands inwards and outwards
Doa	• Male adult's voice • Moderate speed and volume	Sitting on its knee and raised both hands imitating a person's body language while reciting prayers.
Surah	• Male adult's voice • Clear audio and medium volume	Sitting on the floor with cross legs imitating a person's position in reading Quran.
Nasyid	• Male adult's voice • Soft and clear voice	Moving head and hands while dancing lightly to the songs.
Solat	• Male adult's voice • Clear pronunciation • Moderate volume	• Demonstrates the steps taken to perform a complete ablution • Demonstrated the position in reciting the *niat* before performing

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		solat which is standing straight on two feet.

3.3 Objective 3: To Propose a Design Guide for Spiritual Practices in the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI)

Objective 3 is to propose a design guide for spiritual practices in the Kansei Spiritual Therapeutic Robot Interaction (KS-TRI). Objective 3 was achieved with the implementation of the spiritual design elements into the humanoid robot as well as completing the user study and evaluation of the therapeutic robot using elderlies as respondents. The robot is identified as a therapeutic robot as the spiritual design elements were implemented into the humanoid robot. The user study was conducted in Pusat Jagaan Warga Emas Darul Insyirah, Bangi Malaysia. The user study involved 5 Malay Muslim elderlies that suffers from the early stages of the Alzheimer's disease. The elderlies selected are female since all the residents in the nursing home are female. The number of elderlies selected represents the overall population of elderlies suffering early stages of the Alzheimer's disease in Malaysia. The elderlies involved in the user study are aged from 60 years old and above.

Abbreviations are used to identify the elderly respondents' participation in the user study. Table 5 shows abbreviations used for elderly respondents.

Table 5: Abbreviations used for elderly respondents

Abbreviation	Elderly Respondents
ER1	Elderly Respondent number 1
ER2	Elderly Respondent number 2
ER3	Elderly Respondent number 3
ER4	Elderly Respondent number 4
ER5	Elderly Respondent number 5

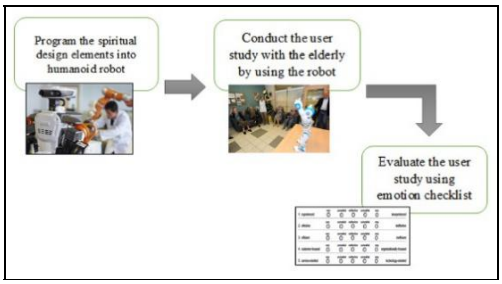

Figure 3: The Methodology to propose a design guide for the KS-TRI

The methodology used are as below:

1. **Implement the spiritual design elements of spiritual practices into the humanoid robot**
   The type of robot selected for the research is a humanoid robot which was obtained from the preliminary study. The humanoid robot is programmed with spiritual design elements and is known as a therapeutic robot.

2. **Conduct the user study using the robot with the elderly**
   The user study was conducted using the therapeutic humanoid robot. The user study was conducted on 5 elderly respondents separately with the consent given from caregivers as well as the respondents themselves. Every module of interaction between the robot and the respondent lasted for a minimum of 30 seconds and a maximum of 2 minutes.

3. **Evaluate the user study using emotion checklist**
   The elderlies were requested to fill in an emotion checklist for all 5 of modules presented. The researcher evaluates these responses. The result from the user study is calculated by measuring the scale of positive emotions on the checklist. The scale of positivity uses the five-point scale where number 5 indicates most positive. The level of positive emotion from the checklist indicates the successfulness of the user study.

Analysis and Findings for Objective 3

In the third objective, the thematic analysis was performed to identify the key features of data that reappeared across the elderly respondents. Based on the data collected and analysis, the third objective is to propose a design guide for the KS-TRI by conducting the user study with elderly respondents suffering the Alzheimer's disease. The user study utilised the emotion checklist that was constructed with the spiritual emotion words for evaluation.

Table 6 shows the sample of coding for spiritual design element which is *zikir*

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Table 6: Sample of Coding

Zikir		
Respondents	Texts	Codes
ER1	ER1 seems excited before starting the user study. Her facial expression was bright and smiling which clearly displayed that she was pleased with the presence of the therapeutic robot. During the user study, as the therapeutic robot began to perform the interaction by reciting *zikir*, ER1 seems astonished and excited when she listens to it, she moved slightly from her seat and started to follow and recited it along with the therapeutic robot. ER1 was smiling face all along the interaction. *Researcher: How do you feel listening to the zikir?* *ER1: It's soothing, I feel the calmness listening to the zikir and it is literally educating myself to be a better person.* While performing the *zikir*, the therapeutic robot also demonstrated the movements of impersonating a person's position in reciting *zikir*. With the movements portraying the type of gestures presented, ER1 looked surprised and amazed with the gestures of the therapeutic robot performing the *zikir*. She slightly moves from her seat and leaned herself closer to the therapeutic robot, and started to engage herself with the *zikir* by humming and moving her head according to the tune. She said that the therapeutic robot helps her to remember the *zikir* that she sometimes forgets. ER1 said that listening from the therapeutic robot performing the zikir, encouraged her to learn and remember the *zikir* again. In other words, she feels the sensation of satisfaction with the performance of the therapeutic robot by reciting the *zikir*.	**1. Strong engagement** • Seems excited before starting the user study. • Astonished and excited. • Surprised and amazed. **2. Attractive** • Bright and smiling expressions. • Soothing. • She slightly moves from her seat and leaned herself closer to the therapeutic robot. • Engaged herself with the *zikir* by humming and moving her head in tune. **3. Acceptance** • Followed and recited the *zikir* along with the therapeutic robot. **4. Calm** • Feel the calmness. **5. Evoke memories** • Therapeutic robot helps her to remember the *zikir*. **6. Motivated** • Educated to be a better person. • Encouraged to learn and remember the *zikir*. **7. Pleasantness** • Pleased with the presence of the therapeutic robot. • Feels the sensation of satisfaction with the performance of the therapeutic robot.

The transcripts from the user study with the elderlies were coded accordingly with the emotion words related to the spiritual emotion words.

Pious

- *"I like it since it helps me recall the zikir"* **(ER4).**
- *"The nasyid's song reminds me to Allah S.W.T."* **(ER5).**
- The *nasyid's* song reminded her to the privilege and purpose of being a Muslim **(ER3)**.

Calm

- The elderly said that hearing the *zikir* make her feels calm and eased **(ER5).**
- "I feel the calmness listening to the zikir" **(ER1).**
- The elderly feels calm listening to the th erapeutic robot reading the *surah* **(ER3).**

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Strive

- Urged her feeling to learn the *zikir* perfectly **(ER5)**.
- The elderly will learn the *doa* again **(ER1)**.
- Listening to the therapeutic robot read the *niat solat* assist the elderly to improve her reading **(ER2).**

Devout

- The elderly began to remember the *zikir* and can read it perfectly **(ER2).**
- The elderly wishes she can read the *doa* without help **(ER4).**
- The elderly said that she will learn the *doa* again **(ER1).**

Good deed

- The elderly followed and recited the *zikir* along with the therapeutic robot **(ER1).**
- Able to recite the *zikir* along with the therapeutic robot **(ER3)**.
- The elderly began to read the *doa* along with the therapeutic robot **(ER4).**

Mystic

- "It's soothing, listening to the *zikir* educate myself to be a better person" **(ER1).**
- The elderly tries to read the *niat solat* by her own **(ER4).**
- Wishes to own therapeutic robot to assist in performing spiritual practices **(ER2).**

Cheerful

- The elderly enjoyed the *zikir* presented by the therapeutic robot **(ER2)**.
- The elderly looks excited after been told that the *doa* is suitable for her condition **(ER1).**
- Facial expression revealed that she is interested to learn the *doa* **(ER3).**

Knowledgeable

- Looks energetic and enthusiastic to discover the therapeutic robot as well as to her contribution to the user study **(ER1)**.
- The elderly is willing to continue the user study as she wants to know more about the therapeutic robot and its spiritual elements **(ER2)**.
- The elderly shows an interested face in gaining new knowledge **(ER3).**

Religious

- The elderly felt more religious as she is able to learn and remember the *zikir* well **(ER5).**
- *"I feel closer to Allah S.W.T as I can remember the surah well"* **(ER2).**
- Listening to the *surah* makes the elderly happy and feels more religious **(ER4).**

Blessed

- The elderly feels blessed when she listens to the therapeutic robot reciting the *zikir* as she feels that Allah have granted her a blessing and a chance to learn again **(ER2).**
- The elderly feels delighted and blessed as she is able to remember the *zikir* **(ER4).**
- *"I feel blessed as the song reminds me to Allah S.W.T."* **(ER5).**

The responses that were recorded throughout the user study were further synchronized and associated with the spiritual emotion words. The responses revealed the elderlies' acceptance towards the therapeutic robot. Previous researches by [15] as well as [16] depicted that robots are capable in the field of healthcare as well as human robot interaction. This study strives to find the possibility of using a therapeutic robot with the intention to bring emotional therapy to the elderlies suffering from the early stages of the Alzheimer's disease. Nevertheless, [36] has proved that the disease has no cure although using therapies can slow down the progression of the disease as well as improve the quality of life among the affected elderlies as suggested by [42] in their research that clearly mentioned that instead focusing on the pharmaceutical treatment, alternative treatment should also be put on focus.

The finding from the first objective revealed the spiritual emotion words resulted from KJ Method which is used for constructing emotion checklist to be used for user study in objective 3. While finding from objective 2 revealed the spiritual design elements of spiritual practices to be embedded into therapeutic robot. The therapeutic robot embedded with the spiritual design elements is used in the user study to propose the design guide for KS-TRI.

This research aims of using robot therapy is supported by the research from [15], [16] and [3]

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who depicted that the robotics field of study is vital in supporting the functional independence, health and elderly's quality of life. This can be synchronized with a previous study conducted by [18] showing that robot as therapy will open great opportunities for the future while elevating a new aspect in the field of robotics. The finding from the research has proven the reliability of using a therapeutic robot as therapy primarily for emotion. The purpose of a therapeutic robot is to evoke spiritual emotion within the elderlies suffering from the Alzheimer's disease. It was supported with the research by [19] saying that with the progression of robotics, the aspect of emotion or affect are also included in robot interaction. This is seen in the expression of happiness in elderlies when they are able to recall things that they have forgotten. Hence, the user study conducted with the elderlies using the spiritual design element of *zikir* have resulted positively where elderlies felt calm and blessed as they able to recall and recite the *zikir* even well after listening to the therapeutic robot reciting the *zikir*. This is considered as emotional therapy for them. The therapeutic robot used for the user study was designed with elements of spiritual practices and has no sensory features to detect human actions. Although [17] had depicted that to attain smooth interaction with humans, robots must understand human's intention as well as able to predict their forthcoming behaviours while the therapeutic robot is still able to evoke positive and spiritual emotions within the elderlies.

In sum, the findings revealed that the therapeutic robot embedded with spiritual design elements of spiritual practices is able to bring a positive effect on spiritual emotions to the elderlies suffering from early stages of the Alzheimer's disease. The assistance provided by the therapeutic robot made the elderlies felt pleased and happy as they are able to recall and remember things that they might have forgotten. The elderlies have been informed and made aware with the presence of the therapeutic robot as a tool with assisting purposes only and is not created to replace human responsibilities and beliefs.

4 CONCLUSION AND RECOMMENDATION

As a conclusion, this research has successfully achieved its main aim by completing all three the objectives. The findings from objective 1, objective 2 and objective 3 show the association of using spiritual emotion words and spiritual design elements to conduct user study in order to propose the design guide for KS-TRI by using therapeutic robot.

The robot seems to have a good visibility and are not confined to the industrial or academic environment only. The existence of robots for therapeutic purposes are not impossible, yet it is already becoming a benchmark for therapy. The presence of numerous researches using robots for therapies have become a trend in designing the therapy specifically for elderly healthcare. Hence, this research enhances the use of robot for therapy by studying it on emotional therapy particularly for Muslim's spiritual elements for elderlies suffering from early stages of the Alzheimer's disease where the results revealed a positive acceptance from the elderlies as well as the success in evoking a positive effect and spiritual emotion within the elderlies. Thus, this research has proven the reliability and viability of using robots as emotional therapy for elderlies suffering from the early stages of the Alzheimer's disease.

As in most researches, this research only gives focus to Malay Muslim elderlies suffering from early stages of the Alzheimer's disease by deploying a humanoid robot for emotional therapy. Therefore, further studies are recommended to discover spiritual elements suitable for other Muslim elderlies with advanced stages of the Alzheimer's disease using a different type of robot as well as designing the therapeutic robot for elderlies suffering from other illnesses.

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