



Voice User Interface-Based Artificial Intelligence enables Child Daycare Assistance System Framework

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ABSTRACT

Daycare is a child-care alternative that permits guardians to drop off their kids during the day for care, management, and learning. Significantly, kids who participate in early child-care programs will be more beneficial and more fruitful in school. Child-care educators can share assets, thoughts and even get together in a nearby play area. Each parent has an alternate thought of what they need for their kids. There are various sorts of child-care offerings, Private child-care chains: An organization normally runs these as establishments, Private or independent nurseries: These are controlled by people or a group of people, home-based child-care: In India, this is a typical type of child-care, most of the time run by homemakers, Daycares connected to schools: Certain schools may decide to set up child-care appended to their school, Workplace childcares: Companies now and again have nearby child-care for youngsters. Several companies offer onsite child care support for their employees. Few organizations are Google, Johnson and Johnson, Boeing, Nike, Procter, Gamble, etc. Parents have the main concern that they want to know how their child is doing while they are away. Are their child's needs being met? Are they being heard when sharing important details about their child's care? Can they reach the facility at any time, and can staff reach parents regardless of where they are during the day? A central communication hub can help parents

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communicate important information such as dietary restrictions or special drop-off or pick-up instructions to address all these above concerns. Also, touch-free devices that would allow teachers to communicate hands-free, leaving them to focus on their most important task caring for children, require the hour. In this paper, a framework of voice user interface-based AI enables child daycare assistance system has been proposed that reviewed by baby sitters and parents.

Keywords: AI; babysitter; child care; daycare; user experience design; voice user interface.

1. INTRODUCTION

Like never before, guardians depend on child-care offices to think about their small kids while they work. It is an important societal function; children who participate in early child-care programs tend to be healthier and more successful.

The initial scarcely any long stretches of a kid's life are basic. However, as more guardians work, there is a little framework to offer what science says youngsters need: a personal situation that sustains kids, is fun-loving, and is appropriately invigorating as the kids get more seasoned. Child care educators can share assets, thoughts and even get together in a nearby play area. Each parent has an alternate thought of what they need for their kids [1].

Today, it becomes necessary to rejoin work after maternal leave. Hence, several ladies continue their profession not long after giving birth. There is, nonetheless, one reasonable concern that she cannot generally get away from taking care of the child. With the mother at the office and, undoubtedly, the dad, who might deal with the little youngster? Families are getting progressively nuclear so leaving the baby with grandparents or family members is not generally a choice [2].

2. LITERATURE REVIEW

The recent commercialization of several AI enables platforms and devices by corporate like Amazon's Alexa, Google assistance, apple's Siri, etc. With the features of Voice, interactive interfaces had grown in day-to-day life. Semio, in one of his research at the University of Southern California, has developed a cloud-based stage to permit people to utilize robots through normal correspondence discourse and non-verbal communication. The stage permits engineers to make and convey dialogue/motion-based applications to be executed by robots and permits non-master clients to access and utilize those robot applications through normal

communication [3]. Several technical models like the ASR model have been developed by researchers that accept the input from a microphone and, with the help of a cloud-based system, interpreted the command [4]. The Voice interactive framework is a functioning zone that numerous organizations invest in and design to improve their new projects. As per CHM Research, before 2030, a large number of people will be utilizing "voice" to collaborate with the machine, and voice-driven administrations will turn out to be a vital part of cell phones, smart glasses, smart home centers, kitchen gear, TVs, games controls, vehicle system, etc. [5]. Multimodal Virtual Personal Assistants that used speech, graphics, video, gesture for interacting with users have also been developed by researchers [6].

The literature reviews following insights related to daycare facilities, child development, and technology use have been discussed in this section.

2.1 How can a Daycare Assist In a Child's Development?

At the child-care, every kid is appointed one guardian who obliges their individual needs. According to their rest time, the youngster is associated with exercises like block building or music, according to their age and intrigue, and cared for and put to bed. Parents' food is given since pediatricians recommend that babies be taken care of from one specific food source to increase immunity. The maximum age up to which most child-care communities take youngsters is six or seven. That is when the youngster begins going to elementary school and is normally selected for other regular classes.

Kids at the child-care are not so much compelled to follow a timetable. The thought is to keep the day connecting with and intuitive. Child-care could be an incredible spot to enable your little one to interface with many other youngsters. Furthermore, that is substantially more ideal than giving them an electronic device like a versatile.

Sympathy and social advancement are the key things a kid is acquainted with in child-care. It also enables such children to begin talking ahead of schedule since they are continually conversing.

2.2 Is the Daycare Safe Enough?

One of the significant worries for guardians while picking child-care is well-being. The kid is left at daycare and being taken care of by new individuals, away from the guardians, for a long term. In any case, when a baby is kept in a shut room alongside numerous other kids, the person is more in danger of being tainted. Along these lines, the plan of the child-care is significant. It ought to have an enormous play zone with enough daylight and outside air. Few child-cares follow global standards and guidelines, which guarantee the equivalent. The guardians must be aware of the same. Regardless of how flawless child-care may be, leaving a baby in an obscure space is not simple, either for the guardians or the youngster. Parents will be generally concerned while the kid is unconscious of why they have been isolated from the guardians. Besides, the reason guardians should be complete would intellectually understand to allow their kid to daycare. A ton of guardians discover this progress extremely troublesome, for which they ought to counsel specialists.

2.3 Daycare System in India

1 out of 3 Indians lives in family units, i.e., ~400mn individuals. 20% expansion in the proportion of working ladies is in urban territories over the most recent 45 years. 1 out of 4 youngsters conceived in urban India does not have the backing of a talented specialist.

Amrita discusses various sorts of child-care offices; private child-care chains: An organization normally runs these as establishments, Private or independent nurseries: These are con-trolled by people or a gathering of people, home-based child-care: In India, this is a typical type of child-care, for the most part, run by homemakers, Daycares connected to schools: Certain schools may decide to set up a child-care appended to their school, Workplace child-cares: Companies here and there have nearby child-cares for kids [7].

2.4 Problems with Child-Care

As Jenny would see it, guardians do not have governmentally ensured downtime to bond with

their kids, despite crowds of exploration demonstrating how connections framed in the most punctual long periods of life shape infants' minds establishing the frameworks for kids' future enthusiastic, instructive, and physical prosperity. When guardians return to work, regularly soon-er than they would like, their youngster care choices are restricted. Meanwhile, youth instructors and daycare laborers are woefully come up short on, yet it is excessively expensive.

Matt pointed out one of the major problems in a daycare discovered that end-of-day pick-up was incredibly chaotic. Teachers hurriedly handed daily activity sheets to parents while still maintaining order in their classrooms. Trying to interact with the teachers over the activity sheets so she could understand what her child had done that day proved almost impossible [8].

Joe Waters says that getting reasonable kid care is just one bit of a bigger issue of how we can uphold families before the children get the chance to class around age four or five. It is unmistakably a significant concern: a study of 1,858 people between 20 to 45 years of age, directed before breakfast Consult for The New York Times survey, demonstrated that a fourth of respondents who either had kids or intended to have children expected to have smaller families than they would like. The main explanation: "kid care is excessively costly." Average week by week costs for baby care: Daycare \$211, family care \$195, babysitter \$580. 71% of family's burn is through 10 percent or a greater amount of their all-out yearly salary on child-care [9].

2.5 What do Parents Want?

For parents, exceptional service means open communication. Parents want to know how their child is doing while they are away. Are their child's needs being met? Are they being heard when sharing important details about their child's care? Can they reach the facility at any time, and can staff reach parents regardless of where they are during the day? A central communication hub can help parents communicate important information such as dietary restrictions or special drop-off or pick-up instructions. Moreover, wearable devices allow teachers to communicate hands-free, leaving them focused on their most important task caring for children [10].

According to Caitlin, peace of mind is hugely important to consumers in the care market. They

want to know that their child, parent, or grandparent is well cared for and enjoys a reasonable quality of life. They want to know how their loved ones go through each day and what activities they participated in that day. Care providers find themselves wrestling with how to communicate and demonstrate to their customers their care effectively. Paper forms are an outdated and inefficient mode of communication.

2.6 Childcare Entrepreneurship

As per Tech Crunch, Wonder school has a platform that enables authorized teachers and overseers to dispatch in-home preschools or daycares. Tech Crunch says the organization tries to be the Airbnb of daycare: It lets proficient parental figures and educators set up for business at home. At the same time, Wonder school handles the organization and coordination. Along these lines, the Wonder school offers to overcome any barrier for youth teachers who need to go into business yet may not know-how. The platform can help clients get the essential qualifications, dis-patch a site, pick a preschool program from Montessori to Reggio Emilia or Waldorf and oversee enlistment. In return, The Wonder School takes a 10% cut in educational cost [11].

The Wonder school acts practically like Airbnb by transforming them into independent ventures procuring cash from home. A year ago, Capita collaborated with Auburn University's School of Architecture in Alabama to plan another lodging item. This house is moderate, productive, sturdy, and explicitly intended to address the issues of in-home kid care suppliers in-country America precedence.

2.7 Workplace Daycare

Working environment child-care is an on-location service at the office that gives kid care to employees' children. The age of the child restricts the service. The administrations are typically accessible at an expense sponsored by the business. Few organizations may offer this advantage for free. As with off-site care suppliers, these projects must be authorized, protected, set up with prepared instructors and colleagues, and give a sheltered domain to children's gatherings. Several companies offer onsite child care support for their employees. Few organizations are like Google, Johnson and Johnson, Boeing, Nike, Procter, Gamble, etc.

2.8 Is Automation the Future Of Child Care?

With an end goal to advance social development and language improvement, numerous Chinese organizations make robot "buddies" for little youngsters. One such robot structured as an ally to kids is Avatar Mind's iPal. iPal is a child-care robot who speaks Chinese and English, plays interesting games, gives math exercises, and makes quips to little youngsters. Humanoid robot fills in as a social buddy, instructor, and well-being screen for kids, just as senior grown-ups. It additionally has numerous different applications in a claim to fame care, instructive, and business settings. iPal is intended to enhance crafted by guardians, instructors, parental figures, and individuals in different abilities to broaden their range and positive effect. There is also how diminished communication with guardians and different people may influence these youthful personalities' advancement [12].

Regnard has stated in his research guidelines and principles may set the benchmarks of value for kid care. However, what its society state truly matters in his research. He states that dissimilar unlike human daycare staff, The Or-B, Care Droid prototype, does not experience the ill effects of mental or physical exhaustion. They will never feel worn out on rehashing similar stories and playing out similar everyday undertakings [13]. As a parent to a preschooler, most cases felt envisioning that they would be reluctant to depend on machines to deal with my kids 100% [14].

3. METHODOLOGY

A detailed literature review has been conducted through several online research search tools (e.g., Scopus document search, Research Gate, Google Scholar, etc.) on different keywords related to daycare, child care, Technology in child-care, child-care robots, and working parents, voice user interface, User Experience Design, etc. Few related Research papers and articles were selected out of eighty-four papers to meet the review process requirement. A combination of In-person interviews and a contextual inquiry was conducted with babysitters, child-care educators, and parents. The contextual inquiry has also been conducted in several daycares based in Pune city to get a real insight into the current scenario. According to the findings, and AI enables voice user interface-based child-care assistance system

framework has been designed that baby sitters and parents reviewed.

3.1 User Study

A user study has been conducted on 45 samples, 30 parents, and 15 babysitters between the ages of 25 to 38 years using a questionnaire to know the issues related to communication between parents and child-care educators. All the sample sizes are varying economical and educational backgrounds. The convenient sampling method has been used, and the inclusion criteria were working parents. The study has found that 86.67% of parents (26 users) feel disconnected from their babies. 73.33% (22 users) parents can interact only once in a daycare time with the babysitter to know the baby's status.

3.2 End User Interview

An In-person interview round has been carried out with several child-care educators and parents. The insight from the interview was discussed in two-phase:

i) The Issues faced by Parents: Few parents quoted the following things: 1. Sometimes, they are forgotten to call or inform 2. "I feel the lack of security and confidence in them," 3. "I would like it if they call twice a day to inform about how my baby is doing," 4. "I would love to see pictures of my baby once a day so that I do not keep worrying," 5. "I want them to record my baby's

Voice. If it says something new, I would not want to miss it."

ii) The Issues faced by the child-care educator: Few child-care educators quoted the following things:

1. "It is impossible to communicate every moment of the baby to its parents," 2. "It gets very tiring to fill in the log sheets and then show them to the parents every day," 3. "Talking to each parent in detail every day cannot be possible as there is much rush when they come to pick up their babies," 4. "It gets very difficult to handle insecure parents, because no matter how much we try to convince they keep calling ten times a day." These insights were driven to conceptualize several features in the proposed design.

3.3 Contextual Inquiry

The contextual inquiry was conducted to find reasons behind the problems found in the survey and interview. Also, the contextual inquiry had shown the practical issues faced by the child-care educator. The research objective was to ask, converse and observe with the user to empathize with them concerning their real working environment. Several contextual models like the sequence model, cultural model, and flow model have been made from the study.

Flow model: The Communication and coordination between people in the context have shown in Fig. 1.

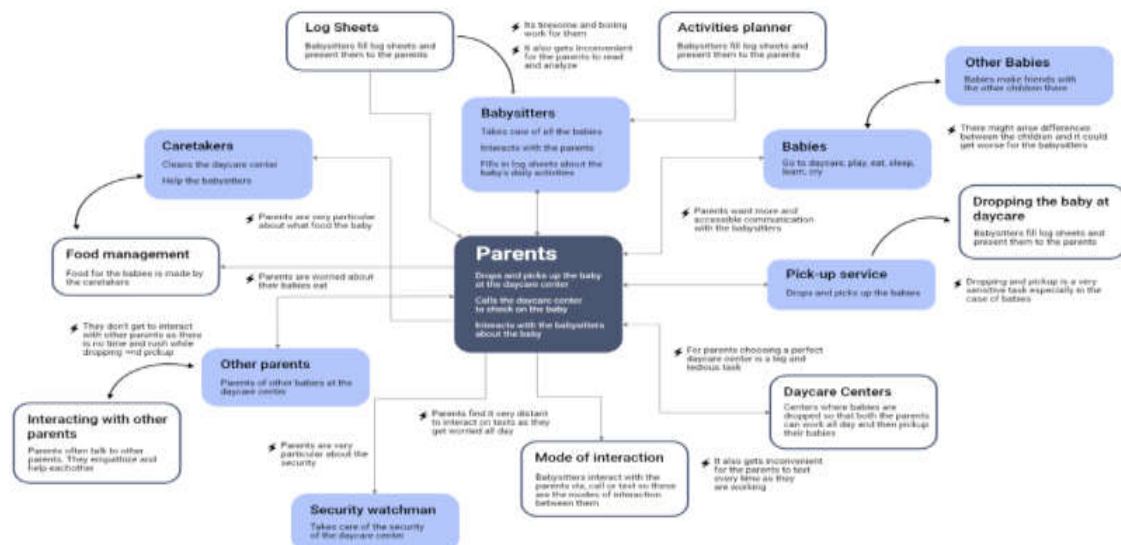


Fig. 1. Flow model of child daycare

Cultural Model: Defining expectations, desires, policies, values, languages, tone of the place has shown in Fig. 2.

Sequence Model: Step by step information about the work is done, triggers behind it, and respective pain points have shown in Fig. 3.

From the study, a problem raised how to design a system that would help babysitters and parents

interact more efficiently, and the parents feel more connected throughout the day while they are at work places. Voice User Interface (VUI) based child daycare assistance system is a framework designed in the paper that assists parents and babysitters to connect more effectively and efficiently with each other. In the next section of the paper, the complete system diagram and methodology are described.

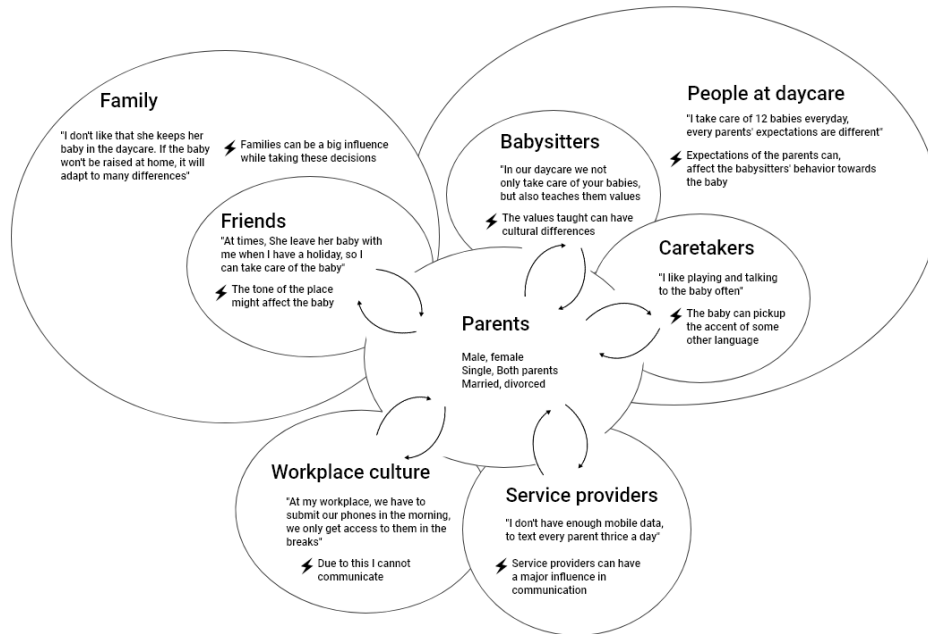


Fig. 2. The cultural model of child daycare

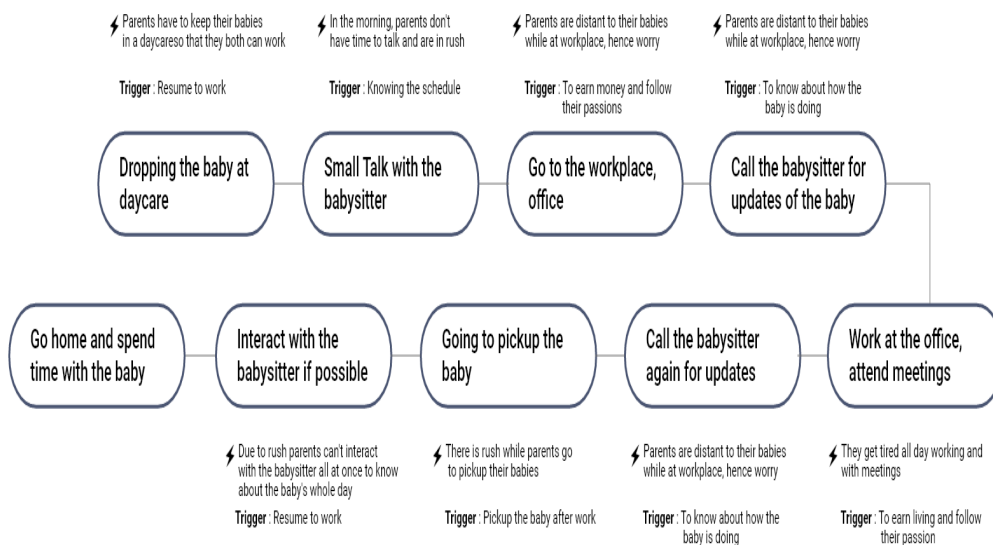


Fig. 3. Sequence model of child daycare

3.4 Ideation of the System

After user study, it has been found that there is a communication gap between parents and the child-care educators, which makes parents feel a disconnect from their ward. In this paper, a framework of voice user interface-based AI enables daycare assistance system is proposed that allows parents and babysitters to communicate easily and efficiently, which would help reduce the concern about the child while the parents were at a distance for several hours in a day.

4. RESULTS AND DISCUSSION

4.1 System Framework

VUI-based proposed Daycare assistance system is an artificial intelligent enable voice interactive system framework. It has five blocks: Input-output block, AI-based Interpretation & Processing Block, Content Creation Block, Cloud-based Data storage block, and Data retrieval block. Fig. 4 described the system block diagram.

The proposed VUI-based AI enables the Daycare assistance system framework to function using five blocks to coordinate. The first block, 'Input /Output block, 'is responsible for taking command and giving output in an interactive voice. As the proposed system concept is a VUI-based system, speech recognition and accepting voice command features are available in this particular block. The second block, 'AI-based Interpretation & Processing Block', is the brain of the system. This part of the system is functioned to interpret the command and process accordingly. The third block, 'Content Creation Block' is responsible for

creating the content for individual Childs. Each of the content would have linked with a particular child, then forwarded to the cloud storage. The next block, 'cloud-based Data Storage Block,' is made to store the data in the cloud to be accessible through any device connected with the system via the internet. The fifth block, 'Data Retrieval Block', has a program to retrieve the cloud data for individual parents based on their choices using voice command. The whole system would always have connected with the internet and the cloud to provide real-time access for data creation and retrieval of children in the daycare facility's timeframe.

4.2 Scenario-Based Validation of the Concept

To validate the proposed child daycare assistance system framework concept, a scenario-based focused group user discussion was conducted with ten users. The user group was consisting of five parents and five child-care educators. A focus group discussion aims to discover what users want from the product, their thoughts, and preferences and find potential product issues.

Few considerations for the validation of the concept:

Name of the baby is Rishita (Girl) & Arnav (Boy).

The name of the daycare's Child Educator is Ms. Gupta.

Name of the Mothers of the kids are Mrs. Mehta & Mrs. Sharma, respectively and

The name of the daycare's Child Educator is Ms. Gupta.

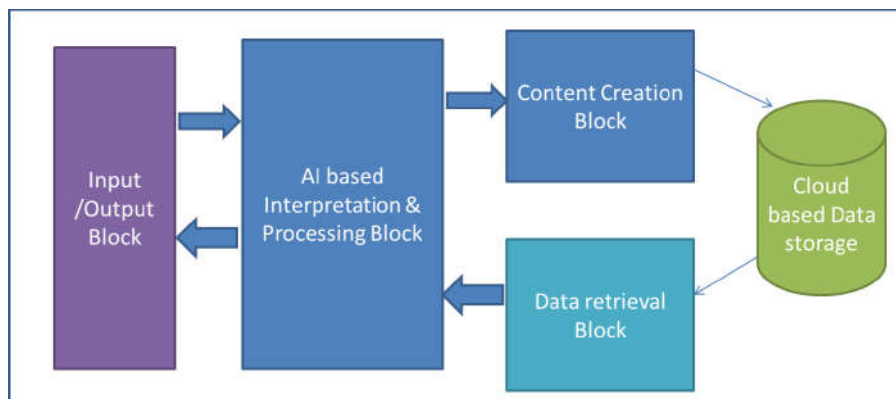


Fig. 4. VUI based AI enable daycare assistance system framework

Amazon's Alexa has been considered the interactive device for the concept scenario discussion considering the users' familiarity. Several scenarios had been discussed in the focused group discussion. As per the suggestion & recommendation by the real end-users following properties of the proposed VUI-based AI enable daycare assistance system framework had been modified & validated by the user.

4.3 Scenario 1 Being Adaptable

VUI ought to have a conversational nature and capacity to oblige human propensities, for example, feelings, character, and assortment. Individuals ought to have the option to talk as

they do in regular day-to-day existence [15]. In this scenario, the daycare assistance system automatically records the poems reciting by the child's Voice and communicates to the parents as per the babysitter's command. The being adaptable is shown in Fig. 5.

4.4 Scenario 2 Being Personal

As shown in Fig. 6, stay unsurprising and brief yet likewise astonishing when ideating voice-first UIs. In this scenario, the daycare assistance system would become great for the Daycare child educator and the parent with the name to provide a personal touch in communication.

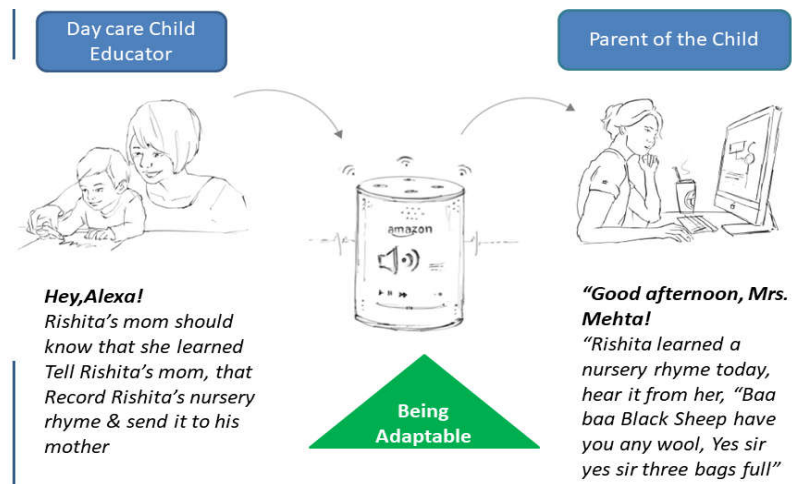


Fig. 5. System property: being adaptable

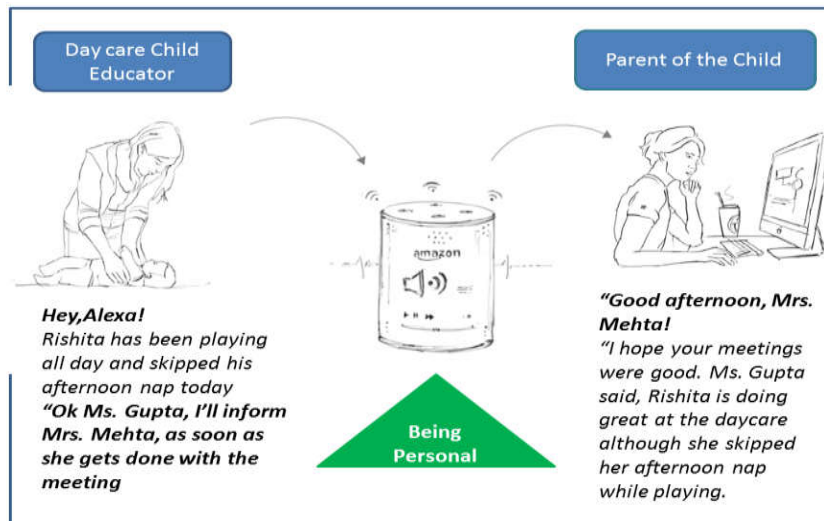


Fig. 6. System property: being personal

4.5 Scenario 3 Being Relatable

As shown in Fig. 7, the Voice User Interface chats with the client and not the client. A decent voice-first UI is helpful because discussions are agreeable. In this scenario, the daycare assistance system would converse with the Daycare child educator and the parent in an assistive and cooperative way.

4.6 Scenario 4 Being Available

Voice interactions ought to offer their involvement with the user without getting familiar with its data hierarchy. The being available

system property is shown in Fig. 8. In this scenario, the daycare assistance system would shorten the information and personalized it as per the individual child and the associated parents while transferring the information from the Daycare child educator to the parents.

After all the detailed scenario-based focused group discussions, the proposed VUI-based assistance system framework has been validated. It tends to be presumed that the proposed VUI-based assistance framework would help the child daycare instructors and parents feel more un-stressed and proficient in correspondence with one another.

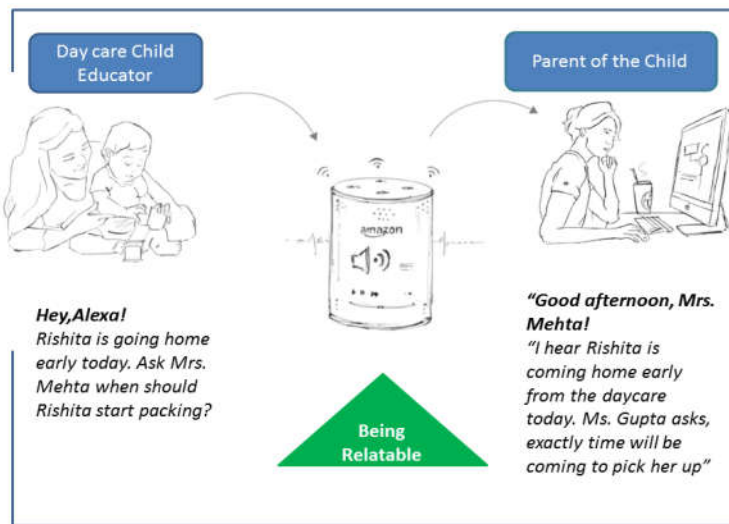


Fig. 7. System property: being relatable

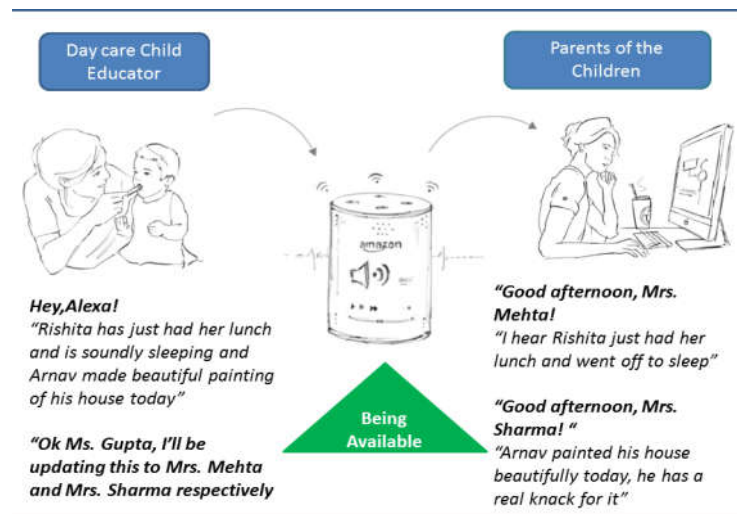


Fig. 8. System property: being available

5. CONCLUSION

In recent days, Child daycares facilities have become part of common in urban Indian society. Many nuclear families now became much dependent on daycare centers. This paper has proposed the conceptual Voice User Interface-based Artificial Intelligent enable child daycare assistance system framework. Though the complete validation of the proposed system with real-time implementation uses a large database has not been done with an appropriate case study. However, it is evident from the testing that such an assistance system makes the user feel free to use simultaneously with other unavoidable activities. The voice user interface-based AI enables a framework that enables a child daycare assistance system has been proposed that baby sitters and parents reviewed. After all the detailed scenario-based focused group discussions, the proposed VUI-based assistance system framework has been validated. It can be concluded that the proposed VUI-based assistance system would help child care educator as a parent of the child to feel more unstressed and efficient in communication with each other.

DISCLAIMER

The company name used for this research is commonly and predominantly selected in our area of research and country. There is absolutely no conflict of interest between the authors and company because we do not intend to use this company as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the company rather it was funded by personal efforts of the authors.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Ethical clearance taken from Symbiosis Institute of Design, Symbiosis International (Deemed University), Pune, Maharashtra, India.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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