

Review on Smart Reminder Systems

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Abstract— It is quite normal to forget things from time to time and it is normal to become somewhat more forgetful as we age. But forgetting things might lead us in missing something important, either an event, a task, an important day or carrying an essential thing for our day out. These memory problems are normal and are termed as 'Transience' & 'Absentmindedness'. So there is need of Artificial Intelligence and IoT based Reminder system that will not only remind us about anything but also will keep us updated with recent news. It will make us aware about missed calls and will help us follow our daily routine. So to avoid such kind of problems 'Smart Reminder Systems' has proposed. Multipurpose Adroit Reminder System (M.A.R.S) is focusing on giving a helping hand to the people in their day to day activities like setting alarms, reminders, notifications and interactive voice system. Review focuses on the various technologies used in the smart home concepts. The main thing which lacks in many of the systems is IoT. Thus it would be ideal if you do not forget things, but sadly it is not always that easy, since many causes like stress, tension, hurry and many more.

Key words: M.A.R.S, IoT, Transience

I. INTRODUCTION

The current smart home concepts which are used are based on the technologies like RFID, Context-aware Reminding system for Daily Activities, voice activity detection (VAD) based on Short Term Energy (STE) and Zero Crossing Rates (ZCR) or location reminder location. Above mentioned are the various technologies that are used in smart home concept. But these technologies have some flaws like RFID system requires RFID tags to be carried. And most of these systems lack interactive voice systems, IOT and many more.

II. LITERATURE SURVEY

The survey is about to review the various aspects of the technologies in home automation/ smart home concept. The literature survey compares the various technologies used for developing a smart home. Technologies used such as RFID based technologies, context aware reminding system for daily activities CoReDA, voice activity detection (VAD) based on short term energy (STE), zero crossing rates and etc. The review focuses on different systems available and its applications.

1) In RFID technology people bring RFID tags along them through which they get detected. In an object database the object is recorded with its class, name and a unique RFID number. Major three components of RFID systems are the reader, the antenna and the tags. When a tag enters into the detection range the number is read. There are two types of RFID tags, active and passive. Active tags have longer detection range whereas passive tags have shorter detection range. An RFID tag is usually attached to the object and information of the object along

with the RFID number are recorded in the database. Whenever an RFID tag is sensed, object can be identified.

An RFID reader is installed near the front door and RFID tags are attached to the objects the user would take out. Whenever the user goes out, the objects he/she brings along with are detected by the reader and saved in the database. In general, the objects are strongly related to the date in a week. For example, Rina is a student and she has English classes on Tuesday. Therefore, she usually brings the English textbook with her on Tuesday. Vicky plays tennis with his friends on Saturday morning. He brings his tennis racquet with him on Saturday.

When the front door is open, the RFID reader is triggered to read the nearby tags and send their ID numbers to the server. The maximum detection distance should be set at around 1 meter. The server compares the list with the object list generated by a number of rules following the historical data and the calendar events. The missing objects are arranged in a reminder list. When the door is closed, the server sends the list to the mobile phone or PDA of the user.

2) Another technology used is context aware reminding system for daily activities (CoReDA). This system was especially created to help elderly with 'Dementia'. In such cases caregivers are needed. But we found two important principles of dementia patients care:

- Keep the dementia patients do ADLs as they did before. Therefore, a guidance system must have the capability to learn different patients' routines of ADLs.
- Only minimal prompts should be provided to them.

This guarantee the elderly with dementia will try their best to exercise their brains and delay the deterioration of their dementia. Another requirement from caregiver is that the explicit feedback from caregivers and care recipients are not desirable. According to the problems of previous works and the requirements of caregivers, we consider the following criteria are important for designing of our system:

- It should detect the user's process through their ADLs.
- It should learn and provide personalized guidance to different users.
- It should provide the minimal prompt the user need.
- It should easily generalize to other ADLs.
- It should operate without explicit feedback from care recipients or caregivers.

According to the five criteria mentioned above, we propose a ubiquitous ADL guidance system called CoReDA (Context-aware Reminding system for Daily Activities) to help elderly with dementia complete different ADLs instead of caregivers. CoReDA can obtain elderly people's information of tool usage in the process through their ADLs by using the wireless sensor node - PAVENET, which can easily generalize to other ADLs. Based on the tool usage information, CoReDA uses TD (λ) Q-Learning technique to

learn different users' routines of ADLs and provide elderly personalized and minimal guidance for ADL completion. Since Q-Learning has a reward mechanism, it does not require explicit feedback from care recipients or caregivers.

3) Eye contact reminder system is also one of the reminder system. This system was created to help people with 'Autism'. Autism spectrum disorder (ASD) is a set of developmental disabilities affecting how the brain processes information, causing delays and changes in how a socialization, communication, and overall behavior occurs. Although there is no cure for autism, there are many therapies to improve symptoms. Robotics is also used to assist such people but its bulky and difficult to carry.

Whereas this system is extremely wearable and portable. The system consists of two microphones, computerized eyewear (STAR 1200XL) [13], and a computation unit (a laptop for the prototype). The microphones are mounted onto two sides of the eyewear. They collect audio data and send it to the laptop which has the program to calculate source angle of a voice. The laptop sends the calculated result back to the eyewear which then displays a prompt. We use two audio processing technologies. One is voice activity detection (VAD) based on Short Term Energy (STE) and Zero Crossing Rates (ZCR). This splits the signals into overlapping frames, extracts STE and ZCR features of framed signals, and compares the calculated thresholds to determine the onset and termination of speech boundaries. Another one is the voice localization Jeffress Model algorithm. This is a hypothetical model of how neurons in the brain make use of minute time differences. With these two technologies, the system can determine if someone is speaking as well as localize the speaker.

4) One of the emerging reminder technology is location based reminder technology. In this technology a user can mark a location when a reminder is added. The smart device alerts when the user is near to the marked location. The closeness to the reminder location is set by the user. We denote this closeness as the reminder distance. One approach to implement the location based reminder is based on a single smart device. The user stores all reminder messages and associated reminder locations in the smart device. The smart device periodically queries the localization sensor to detect the user's current location. If the user is within the reminder distance, the smart device alerts the user and pops the reminder message on the screen. This approach is feasible for a single smart device. But when multiple smart devices are used there may be errors due to the lack of synchronization. As the development in cloud computing technologies this problem is reduced. A typical example is iCloud, which can synchronize users' data between their iDevices.

A user can add a reminder on her iPad, and upload an encrypted copy to iCloud. iCloud pushes the copy to the user's other devices, such as iPhone or iTouch. In this way, the user can get the reminder from whichever device she takes with her. The disadvantage of this approach is that multiple copies exist in different devices.

III. CONCLUSION

Thus different technologies are used for the practical realization of the smart home concept. One of the finest concepts are the Context Aware Reminding for Daily Activities (CoReDA) and voice activity detection(VAD). These systems were especially created to help the people with 'Autism' and 'Dementia'. We can also use simple technologies like RFID and location reminders. But in case of RFID it is essential to carry RFID tags to get detected. Also it compromises the security as anyone can use those tags. Whereas systems like location reminder systems require a smart device, PDA or smart phone.

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