

SAPHIRE: Semantic semi-Autonomous Processing Household repertoire

Hyeonsu Kang
hyk149@eng.ucsd.edu

Chen-hao Liao
chenhaoxd@gmail.com

Dewey Martin Nguyen
Martinnguyen0618@gmail.com

Pargat Singh
gotsingh@gmail.com

ABSTRACT

SAPHIRE aims to provide an intelligent household interface that can be applied to many future home appliances sans measure, enabling them to understand your voice command and infer the user goals and tasks. Moreover, a SAPHIRE built device will try to suggest solutions to and assist in performing the user needs while ambiently orchestrating the processes and resources of the household.

By reading QR codes to inform the SAPHIRE system of your household, you will be able to automatically get your microwave ready to defrost frozen food, turn down the heating or air-conditioning, change the lighting, start a vacuum, fill-up a bathtub, and more! This smart system will expand your control, seamlessly integrate your voice commands into your house, making it more intelligent, cozier, and more efficient.

SAPHIRE aims at extending the present home appliances' capabilities and proposing future smart device models. Therefore, we present a cyber space model of actual devices to simulate which both abstracts the current forms and functionalities as well as introduces the imaginative future-forward features of the device. Creativity is the key, enjoy!

Author Keywords

Smart Home, Service Composition, Google Glass, QR Codes, Cyber-Physical Systems

TECHNOLOGY

We would like to utilize Google Glass to analyze user voice commands and read QR codes to provide control over a household's various sub-systems. By customizing the built-in voice commands and developing an application that reads QR codes, Google Glass will serve as a front-end that understands explicit user input about his/her needs as well as a communication and notification-dispatching system that informs the user about the availability of household resources.

If this first part of the project goes well, one of the future goals is to extend the system's ability to understand the context of user requests. In this regard, an inference model can be built out of a history of request/service pattern of a specific user, and be put into the system such that it provides recommendations to the user.

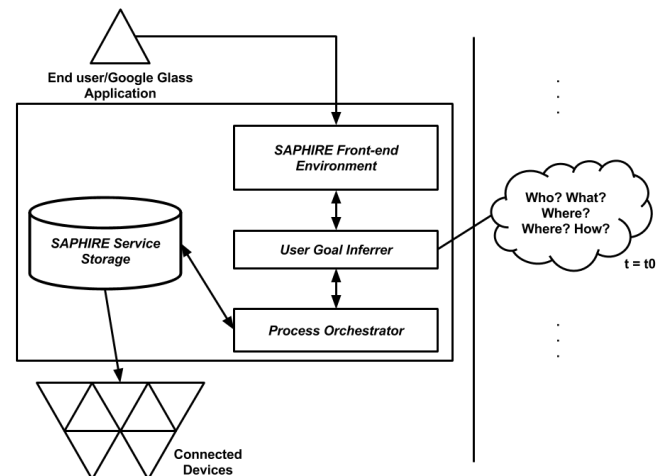
The QR codes that Google Glass processes will contain the necessary information in inferring the goal that user is trying to achieve. We will use [Firebase](#) for our prototype's database,

[Adobe Photoshop](#) to render images of the cyber-space device models, and web-programming languages as well as Android SDK to build the back-end and the front-end of the system. A sample usage scenario of SAPHIRE is as follows.

The Structure of SAPHIRE

Below is the schematic diagram of SAPHIRE

Figure 1. A Schematic Diagram of SAPHIRE



Reference: papers about the organization of service oriented systems

The ideas about how to organize the system to better serve the complex user requirements may be found in [2] and [1].

An Example Scenario: Microwave of the Future

How often do you get frustrated in front of your microwave? Have you ever wanted someone to read the small cooking instructions on the back of the food packages and pick the right timer setting for you?

Now, let's think about this: imagine that an entity reads your mind as soon as you pick up a pack of frozen chicken from the refrigerator and sets the microwave to be ready for your perfect chicken. You don't need to open the door of your microwave in the middle of cooking as to see how well it is cooked anymore. As you pick up the bag of frozen chicken,

your Google Glass will read the QR code on top of it as well as the one on top of the microwave, and the only thing you need to do is to gently command “Cook this”. SAPHIRE will take care of the rest until the chicken is perfectly ready.

With the SAPHIRE’s multi-modal command system and process orchestrating system, we would like to provide a control hub equipped with a template API which will be easily utilized to various future smart home appliances. On top of the IoT operating systems frameworks such as Nests’s Weave or Google Brillo that unifies communication protocols among the devices, SAPHIRE can greatly increase the household’s intelligence.

APPLICATION DOMAIN

SAPHIRE aims at presenting a smart and ubiquitous home interface.

IMPACT

By providing alternative methods for interacting with your home (and office) we increase the ease of living for a variety of users. Also, providing a control interface equipped with an API for different modes of input will facilitate smart home appliance manufacturers’ efforts to accommodate their products’ usability to a more diverse range of users.

REFERENCES

1. ARDAGNA, D., AND PERNICI, B. Adaptive service composition in flexible processes. *Software Engineering, IEEE Transactions on* 33, 6 (2007), 369–384.
2. WANG, Z., XU, X., AND WANG, X. Mass customization oriented and cost-effective service network. In *Enterprise Interoperability*. Springer, 2013, pp. 172–185.