

DomoPrev



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Summary: The DomoPrev project aims to provide assistance to the elderly by means of smart sensors and symptom detection. Using data from the different sensors, DomoPrev will issue prognoses, and will alert the user and his doctor to conduct in-depth diagnosis. In case of emergency, an on-site robot will administer first aid to the user.

Keywords: IoT, OM2M, prevention, robot, medical assistance, elderly assistance, domotics, prognosis, SOAP, semantics

I. Introduction

This project was done as part of the INSA Toulouse Innovative Smart System curriculum. This project was developed with the help of LAAS-CNRS, who gracefully provided access to LAAS-CNRS's smart house project (**ADREAM**) and on-site robots.

DomoPrev's main goal is to provide a base for disease prevention, that can be easily modulated for advanced uses. Using DomoPrev, an elderly person would be able to detect the early signs of diseases, and treat them before they became too dangerous. In case of emergency, an on-site robot will dispense treatments to the elderly person.

II. Structure

The project is structured in different submodules, each developed and improved independently.

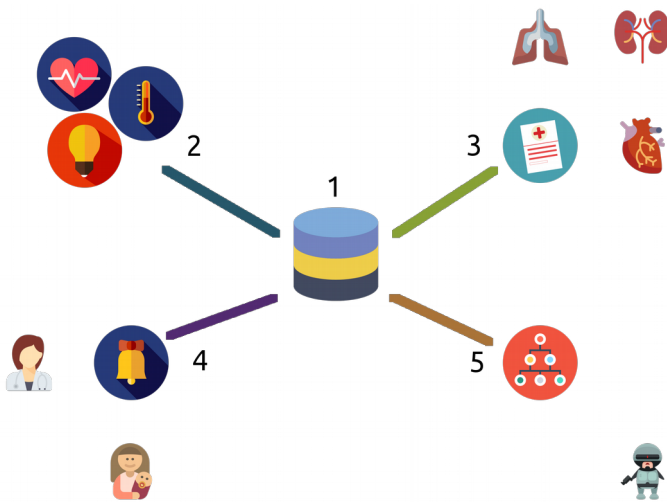


Figure 1: structure of DomoPrev

DomoPrev is structured as shown in Figure 1. The central node (1) can be considered as a database for Internet of Things (IoT), using LAAS's OM2M in order to enable machine-to-machine communication. Each submodule can represent itself on OM2M to allow other submodules to use its data.

Several sensors (2) will be deployed in the house, or will be worn by the patient. OM2M allows DomoPrev to ignore the communication protocols used by the sensors, so that it can focus on the usage of the data generated by different sensors. We can easily imagine specialized sensors (heartbeat, blood pressure, etc) that upload their data to OM2M.

That data will be enriched by means of semantics, which is a way to make the data computer-understandable to enable complex processing by later modules.

A prognosis module (3) will use that data to establish a diagnosis, depending of the context. For instance, it will ignore a high heart rate while the patient is in his gym, but will raise an alarm in other cases.

Depending on the prognosis, an alert module (4) will send alarms to the family and/or the doctor, and can even interact with the robot (5) so that it can provide first-aid depending on the situation.

III. Acceptability

One of the biggest challenges of DomoPrev is to be accepted by the elderly. Indeed, they are generally suspicious of technology, and could reject the idea of being watched permanently by a machine. Even the family could react negatively toward DomoPrev, since their parents' life will be entrusted to a computer system.

This is why DomoPrev needs to be fully reliable, and even enhance the interaction between family members. A scenario where the family member can communicate and interact through the robot can be envisioned, and can be extended to include other seniors using DomoPrev, so that they can watch over each other.

The body of the patient can also react negatively to sensors, since the skin is much more sensitive to external objects. If possible, DomoPrev needs to use ways of remotely monitoring the patients.

IV. Results

Most of the work was done though documentation, and in the design of the project. The implementation has yet to be done, but is out of the scope of this project. Disease prevention using smart sensors will be a reality in the coming years, and we hope to have developed a reliable base for further improvements.

V. Future of DomoPrev

The most important part to be developed yet is the prognosis part. The project will need to include medical researchers in order to construct diagnosis models for disease prediction, since we lack the necessary knowledge.

The acceptability issue needs to be resolved too, since it will determine the economic potential of the project.

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