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Grado en Ingeniería Informática

Creation of a voice-driven controller for home automation

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Granada, 5 de agosto de 2018

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Creación de un controlador domótico activado por voz

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Palabras clave: domótica, asistencia por voz, sistemas distribuidos, Raspberry Pi, software libre

Resumen

El objetivo principal de este proyecto es la creación de un controlador domótico activado por voz en un sistema embebido, como la *Raspberry Pi*, centrándose en el uso de software libre, obteniendo la máxima compatibilidad y el mínimo coste.

Para conseguirlo, se ha analizado la situación actual del sector, distinguiendo entre dispositivos domóticos, asistentes de voz y sistemas orientados a la automatización del hogar. A través de la Ingeniería del Software, se han estudiado las posibles necesidades de los usuarios, intentando suplir las carencias actuales del sector. Finalmente, se presenta una implementación de un sistema domótico en un entorno real, utilizable y extensible a cualquier situación cotidiana.

Por tanto, el proyecto trata de demostrar las infinitas oportunidades que habilita el reciente campo de la domótica, y la posibilidad de crear sistemas domóticos funcionales de bajo coste.

Creation of a voice-driven controller for home automation

David Vargas Carrillo

Keywords: home automation, voice assistance, distributed systems, Raspberry Pi, open source

Abstract

The main goal of this project is the creation of a low-cost, voice-driven home automation controller in a embedded system, such as the *Raspberry Pi*, using open source technologies and trying to obtain maximum compatibility with minimum cost.

To achieve this, I have analyzed the current state of the sector, distinguishing between domotic devices, voice assistants and home automation oriented systems. Through Software Engineering, I have studied the possible necessities of the users, trying to make up for the scarcities in this sector. Finally, I show an implementation of a home automation system in a real environment, usable and extensible to any daily situation.

Therefore, this project tries to demonstrate the infinite opportunities that the recent field of domotics enables, and the possibility of creating low-cost functional home automation systems.

Yo, **David Vargas Carrillo**, alumno de la titulación GRADO EN INGENIERÍA INFORMÁTICA de la **Escuela Técnica Superior de Ingenierías Informática y de Telecomunicación de la Universidad de Granada**, con DNI 76592492P, autorizo la ubicación de la siguiente copia de mi Trabajo Fin de Grado en la biblioteca del centro para que pueda ser consultada por las personas que lo deseen.

Fdo: David Vargas Carrillo

Granada, a 5 de agosto de 2018

D. **Juan Antonio Holgado Terriza**, Profesor del **Departamento de Lenguajes y Sistemas Informáticos** de la **Universidad de Granada**.

Informa:

Que el presente trabajo, titulado ***Creation of a voice-driven controller for home automation***, ha sido realizado bajo su supervisión por **David Vargas Carrillo**, y autoriza la defensa de dicho trabajo ante el tribunal que corresponda.

Y para que conste, expide y firma el presente informe en Granada, a 5 de agosto de 2018.

El director:

Juan Antonio Holgado Terriza

Agradecimientos

A mis padres, cuyo esfuerzo y dedicación han hecho que hoy esté escribiendo estas líneas.

A todos los compañeros y amigos que han estado conmigo en este camino, por haberlo hecho mucho más agradable y ameno.

Y, por supuesto, a Juan Antonio, por haber aceptado mi idea y haber hecho posible este proyecto.

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Chapter 2

Home Automation

Home automation, also known as domotics, has been a recurrent topic in Computer Science that has become a reality in the last decades, thanks to the growth and decrease in the price of embedded systems and wireless technologies, that have permitted to create distributed systems, the heart of this technology.

In this chapter, I am going to analyze this technology and its current state, including its implementation in commercial products.

2.1 What is home automation?

Although science fiction has represented the idea of smart houses since the past century, including in them an intelligence able to respond to all the dweller's needs and desires, it has never felt as close to real world as today.

The basic idea of home automation is to employ sensors and control systems to monitor a dwelling, and accordingly adjust the various mechanisms that provide heat, ventilation, lighting, and other services. By more closely tuning the dwelling's mechanical systems to the dweller's needs, the automated "intelligent" home can provide a safer, more comfortable, and more economical dwelling.[2] For example, the automated system can determine the intensity and direction of the sunlight, and adequate the house according to its condition (which would include closing the blinds and adjusting the air conditioner).

Unlike many may think, we don't actually need a very modern house, since advanced systems can be perfectly integrated in older, traditional buildings. This fact makes domotics a real possibility in every situation.

Figure 2.1: Example of a smart home with security-oriented devices

In fact, the number of home automation systems installed in Europe is expected to reach around 29 million by 2019.[1]

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[1] Statista: Installed base of home automation/smart home systems in europe from 2012 to 2019 (in millions). https://www.statista.com/statistics/286815/smart-home-systems-installed-in-europe/. [Online; accessed August 5th, 2018].

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