HTL LEONDING

Project Proposal

Dahoam

Project Name	Dahoam
Project Leader	I. Gattringer
Responsible	B. Schröder
Processing State	In process
Version	V1.1
Last Changed	2019-11-11.

Further Product Information

Participating	Ivonne Gattringer, Alexander Kapsammer, Manuel Kommenda, Marcel Pölzl
Creation	Initial Intern

Contents

1 Introduction

Since Smart Homes are getting more popular in the last few years, a big new market has appeared. Today's situation is that devices which are managing all the different gadgets and other appliances in houses are needed. In most smart homes there is a small tablet which can be mounted on a wall in the entrance room. Which means an extra space is wasted. *Dahoam* should prevent the waste of extra space and combine a commercial mirror with a smart home hub, despite that a mirror is way more flexible in where to install it.

2 Initial Situation

An initial prototype of Dahoam was built between 2018 and 2019.

The mirror is capable of

- detecting people via a built-in face recognition
- understanding spoken commands
- displaying weather, email, calendar
- turning on/off lights

as well as a "Dahoam-Connect-App" to manage profiles of users. Each functionality runs in its own microservice. These services run in their own Docker-container and are handled through a master service. All services are started within a single build.

Current problems/bugs are

- No aborting when building with errors
- Building only with sudo
- Face/Speak stops during runtime
- When selecting weather intent in the Dahoam-Connect-App, all other panels stop working
- CRUD management of users not existing
- Complex procedures to setup new Raspberry Pi
- Aborting user registration not possible
- MQTT-Topics are static
- Wheater location is static
- QR-Code scanning while in light environment
- Logout on mirror client not possible
- Displayed mails can't be opened
- Emails only via POP3

3 General Conditions and Constraints

Our know-how:

- Java
- Angular
- C#
- SQL
- Typescript
- C/C++
- MQTT
- Unity

Constraints:

- Hardware prespecified (limitation in performance)
- Speech and face recognition run locally (high performance impact)

4 Project Objectives and System Concepts

- Setup and Build
  - **Enable full dockerized runtime environment**
    To simplify the setup of a new Raspberry Pi, every microservice will run in its own docker-container. This will also ease error handling
  - **Development environment**
    Each microservice will have its own logfile and throw specific exceptions, which will simplify searching for errors. All services can be tested individually via Node-RED. Building will be possible without "sudo"
- Documentation
- Dahoam-Administration
  - **Dahoam-Connect-App and web-frontend for browser-clients**
    Find an alternative for QR-Code on user registration.
    Add the possibility to login via face recognition.
  - **User administration**
    An admin role will be added which can manage all users via CRUD functionalities. Further there will be a simplified usage of calendar, email and weather location configuration. Encrypting user passwords will add security in saving them in the database.
  - **Smart home configuration**
    Change smart home configuration from static to dynamic values and add features for IOT integration.
- Demo mode
  - **24/7 runable**
    Add kiosk startup system to automatically start the mirror without any additional IO-hardware. The dockerized services can be set to sleep mode to enhance runtime of the mirror and reduce heat problems. An extra movement sensor will detect activities in front of the mirror and wake needed services up again.
  - **Easter egg**
    Add "easter egg" feature for presentations.

  - **Hardware integration**
    Integrate speakers into the mirror and add cooling to the Raspberry Pi.

- Dahoam flows
  - **Improve session management**
    Only logged-in users can show emails and calendar. Each user must have an unique username and the possibility to log themselves out.
  - **Face recognition**
    Solve the recognition problem when several registered users stand in front of the mirror.
  - **Registration flow**
    While registration there is a live camera feedback to help the user placing his/her face in the right position. When the registration is aborted there has to be the possibility to register again after that.
  - **Improve speech recognition quality**
    Find an alternative speech recognition to "sphinx".
  - **Optional**
    Make the user dashboard customizable.

Used technology:

- Java
- Docker
- Ionic
- Kotlin
- Angular
- Typescript
- Python
- Git
- MQTT
- Nginx
- HTML
- openHAB
- Node RED
- phpMyAdmin

5 Opportunities and Risks

Opportunities: Dahoam is one of the leading projects of HTL Leonding. The mirror is exposed on various events and is meant to raise the reputation of the school. It combines both of the main focuses of HTL Leonding, IOT and machine learning.
Risks:

- Due to space problems, the mirror has limited cooling available for the Raspberry Pi, so a full usage of the resources is not possible for a longer time.
- Compatibility issues when switching from Raspberry Pi 3 to Raspberry Pi 4.

6 Planning

Start: 6. September 2019
End: 11. November 2019

7 Milestones

Title	Date
Enable full dockerized runtime environment	15. Dec 2019
Development environment	
- Improve logging	TADEOT Jan 2020
- Isolated testing of services with Node-RED	TADEOT Jan 2020
Dahoam-Connect-App	
- Alternative to QR-code	TADEOT Jan 2020
- Admin account	TADEOT Jan 2020
User administration	
- Full CRUD functionalities	TADEOT Jan 2020
- Login procedure	TADEOT Jan 2020
24/7 Demo mode	
- Kiosk for autostart	TADEOT Jan 2020
- "Easter egg" feature	TADEOT Jan 2020
- Sleep mode	TADEOT Jan 2020
- Hardware integration	TADEOT Jan 2020
Dahoam-Flows	
- Handling of registration aborted	TADEOT Jan 2020

8 List of Abbreviations

Abbreviation	Explanation
Dahoam	Name of the Project

9 List of Literature

Dahoam-Wiki