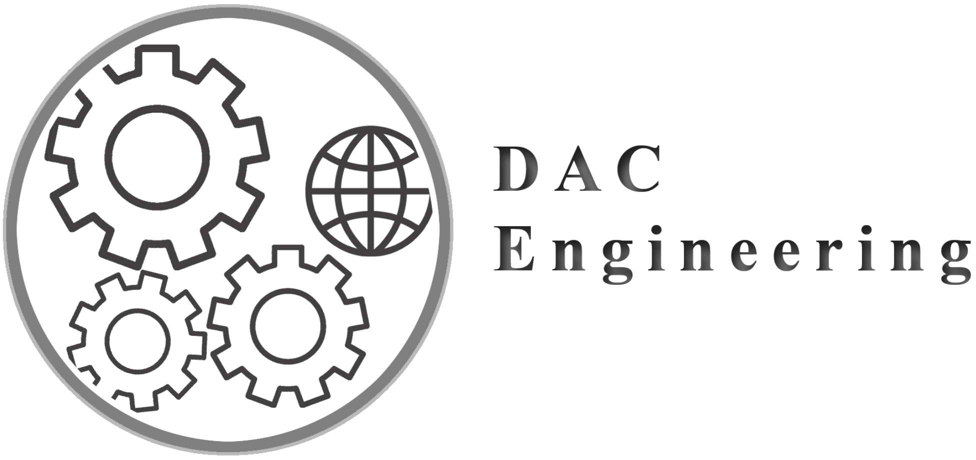
Contents

1 Introduction

1.1 Our company



The DAC is a german organization dedicated to developing individual software solutions for their customers that help them simplify their business processes and improve productivity.

The founders of the company are Dennis, Antonio and Christoph, hence the name of the company DAC, whereas this abbreviation also stands for "Digital Analog Converter", which is a reference to the technical area in which we work.

We pay special attention to the usability of our products and have the desire to provide our customers with a software solution customized to their specific needs.

We believe that a software-assisted approach can help to make a company's activities more environmentally friendly and efficient.

1.2 Staff

1.2.1 Dennis: Frontend Designer

The role of the Frontend Designer is to create an eye-catching and easy-to-use user interface for the job. Thereby it is important to be in close contact with the customers and to ask for feedback based on concepts and prototypes.

1.2.2 Tony: System Designer

The role of the system designer is to ensure the reliable intercommunication between the backend and the hardware components. Its job is to keep the costs for the hardware and implementation within the budget provided by the customer.

1.2.3 Christoph: Software Architect

The role of the software architect is to divide the software solution into smaller sub-components and to ensure the cooperation of these sub-components. It is important to identify problems and evaluate special software solutions. His task in our team is also to develop the backend system that the frontend is accessing.

1.3 iCare - our product

Our product iCare, which we have developed as part of a customer order, is supposed to be a software solution for a care home that is meant to make the daily routine easier for all parties involved, as well as guaranteeing safety and comfort.

It was taken into account that these care homes are mainly inhabited by elderly people who are uneasy about new technologies. For this reason, we have set ourselves the goal of ensuring that residents have as little involvement with the system as possible and that most of the interaction is carried out by a staff member.

1.4 Aim

In addition to implementing customer requirements, we also focus on respecting environmental standards. Our product is designed to provide patients with a feel-good experience that excels in terms of high technological requirements and efficient energy consumption.

1.5 Objectives

We want to ensure that 90 percent of our customers are extremely satisfied with the software solution and that it is still in heavy use after 5 years. Also, 90 percent of the employees who use our software on a daily basis claim that their daily work routine has been significantly simplified.

Customer satisfaction is important to us, but not everything can be taken into account if the given budget of the contract is not sufficient. We aim to achieve a 10 percent increase in sales each year.

We want to invest 30 percent of our revenue in training courses in order to invest in the know-how of our employees.

Our product helps customers to better monitor their water and electricity consumption and thus make an ecological contribution to environmental protection. The aim is to reduce their consumption by 25 percent once the product has been introduced.

2 Planning

2.1 Requirements

2.1.1 Safety and Security

• Access control with different levels of security for different purposes e.g. medical cabinet, and 24/7 building access. • Surveillance of the public spaces • Smoke detection • Window and door status listed in the central hub • Safe deposit of monitoring feeds

2.1.2 24/7 real-time Health Monitoring facilities

• Monitoring of inhabitants without breaking the laws of privacy • Heart rate • Location tracking • Blood pressure • Emergency button

2.1.3 Engineering services

• Central hub that lists the status of the building infrastructure • A silent alarm to the personal if a critical device is failing

2.1.4 Energy and water consumption

• Monitoring of water and energy consumption • Central heating control

2.1.5 Cleanliness and outbuilding services

• Tracking of cleaning services • An easy way to report contaminations

2.1.6 Residents satisfaction

• A pleasant living temperature all year round that each individual can set in his own room • Optional registration for health services like heart rate and location tracking • Info board for events

2.2 Specifications

2.2.1 Safety and Security

1. Access control with different levels of security for different purposes e.g. medical cabinet, and 24/7 building access.
    - Authorization / Authentication (REST, OAuth2.0)
    - Roles

	Admin	Medical Staff	Technical Staff	reside
survaillance of public spaces	x		x	
state of windows and doors	x	x	x	
smoke alarms	x	x	x	
heart rate / blood pressure	x	x		
location tracking	x	x		
managing information for info board	x	x		
technical state of all devices	x		x	
update cleaning status of a room	x			
confirming cleaning status of a room	x			
reading reports	x	x	x	
access the info board	x	x	x	x

2. Surveillance of the public spaces
    - video cameras for (hardware purchase and installation)
        - parking lot
        - entrances
        - lunch area
        - chill room
        - communical area
        - elevators
    - archive backup file system
        - NAS with redundance (RAID 2)
        - Backup also with (RAID 2)
        - label the files with location and timestamp for searching later
3. Smoke detection

    - In every room or corridor
    - Smoke detectors with network capabilities
    - Tracking the alarms with within the system (location and time)
    - Dashboard should be able visualize alarms origin

4. Window and door status listed in the central hub
    - Buy wireless detectors/ sensors for doors and windows
    - Create interface for sensors to communicate with the central system
    - Dashboard should visualize the state of the doors and windows
5. Safe deposit of monitoring feeds
    - Central system needs a database for persitent data storage
    - Redudant backup system

2.2.2 24/7 real-time Health Monitoring facilities

1. Monitoring of inhabitants without breaking the laws of privacy
    - Buy motion detectors (+ installation)
    - Create interface for detectors to communicate with the backend
    - Dashboard should visualize the data of the motion detectors for each room
2. Health Monitoring
    - Heart rate monitoring with smart wrist bands
        - wrist band communicate with the backend
        - not mandatory for every resident - resident can decide for their own (or doctor orders it)
        - realtime monitoring via frontend for each resident who has a wrist band by their location (GPS)
        - implement alarm logic, when monitored health data shows critical state
        - alarm when dementia patient is near entrance (though RFID)
    - Emergency button
        - purchase emergency buttons that can communicate with a central hub or backend
        - installation and create interface for communication with backend
        - log the frequency of the usage of each button (location / time) and store it in the database
        - provide access to the logs by the frontend and implement searching and filtering features

2.2.3 Engineering services

1. Central hub that lists the status of the building infrastructure
    - A silent alarm to the personal if a critical device is failing
    - technical staff should be able to access the state of devices that are out of order
        - sensors
        - lights
        - elevators
        - heating
2. ticket system for manual issue managment and tracking their state
    - technical staff and medical staff can manage the issues (add, update, delete)
    - design and implement a GUI for the staff that allows them to manage the issues

2.2.4 Energy and water consumption

1. Monitoring of water and energy consumption
    - Design and implement a GUI for the technical staff to monitor the consumption
    - Buy smart power meters and water meters that can communicate with the backend
    - Log and aggragate the data in the database
    - Implement filtering and searching features for the stored data
2. Central heating control
    - Residents can control the room temperature
    - Purchase heating controls that can communicate with the backend (installation and integration into the system)
    - Purchase temperature sensors that can communicate with the backend (installation and integration into the system)
    - Dashboard should visualize the temperature and heating settings of each room

2.2.5 Cleanliness and outbuilding services

1. Tracking of cleaning services
    - design and implement a GUI for the medical staff to save the date and room for which the cleaning service was done
    - implement backend and database for storing the data
2. An easy way to report contaminations

- design an GUI for HMI-panels that provide an easy way to report contaminations
    - should be placed in all public rooms
    - the GUI should have buttons for different kind of urgent problems
        - cleaning service
        - emergency
- design and implement a GUI for the medical staff to report contaminations
- implement backend and database for storing the data

2.2.6 Residents satisfaction

1. CORE
    - automatic feedback generation based on input of manager (food quality, room temperature, cleanliness of rooms, (maybe) staff kindness)
2. Optional registration for health services like heart rate and location tracking
    - design and implement a GUI for the medical staff for storing which person was given a wrist band
    - implement backend and database for storing the data
3. Info board for events
    - Purchase flat screen (installation and integration in the system)
    - Web frontend that is also accessable on mobile devices
    - implement backend and database for storing the data

2.2.7 Technical Specification

- Settings Page
- timer for checking for critical states of
    - windows, door states
    - heart rate
- Database for data persitents
- RFID instead of GPS for location tracking
- generate templates for reports
- mobile app for android tablets (for medical staff and cleaning staff, manager)

2.3 Implementation

2.4 Basic Architecture

2.5 Project Plan

TODO: Do Grant plan and insert picture here.

2.5.1 Project Managment Report [Prmr]

	Time in hours
optimistic	65
most likely	92
pessimistic	130

- create product requirement catalog (50 / 70 / 100)
- create GANTT diagram (5 /10 / 15)
- negoitate time and costs with customer (10 / 12 /15)

2.5.2 Hardware prerequisites [Hpre]

	Time in hours
optimistic	108
most likely	182
pessimistic	256

Video cameras [HpreCam]

1. research for good product
    - investigate environment / areas / building (8/10/12)
    - estimate amounts and total costs (8/10/12)
2. negotiate with customer (8/10/12)
3. buy those products (8/10/12)

Storage [HpreS]

1. research archive backup file system

   - NAS with redundance (RAID 2) (4/6/8)
   - Backup also with (RAID 2) (4/6/8)

Panels [HpreP]

1. research for good product
   - investigate environment / areas / building (8/10/12)
   - estimate amounts and total costs (4/8/12)
2. negotiate with customer (4/8/12)
3. buy those products (4/8/12)

Control Unit (PLC) [HprePLC]

1. research for good product
   - investigate environment / areas / building (4/8/12)
   - estimate amounts and total costs (4/8/12)
2. negotiate with customer (4/8/12)
3. buy those products (4/8/12)

Server [HpreSer]

1. research for good product
   - investigate environment / areas / building (4/8/12)
   - estimate amounts and total costs (4/8/12)
2. negotiate with customer (4/8/12)
3. buy those products (4/8/12)

Sensors [HpreSens]

1. research for good product
   - investigate environment / areas / building (4/8/12)
   - estimate amounts and total costs (4/8/12)
2. negotiate with customer (4/8/12)
3. buy those products (4/8/12)

2.5.3 Hardware installation [Hin]

	Time in hours
optimistic	40
most likely	50
pessimistic	60

installation and configuration

- video cameras (8/10/12) [HinCam]
  - dependent on [HpreCam]
- storage (8/10/12)[HinS]
  - dependent on [HpreS, HpreCam]
  - connect video cameras to system
- panels (8/10/12)[HinP]
  - dependent on [HpreP]
  - configuration
- Control Unit (PLC) (8/10/12) [HinPLC]
  - dependent on [HpreP]
- Sensors (8/10/12) [HinSens]
  - dependent on [HpreSens]

2.5.4 Software prerequisites [Spre]

	Time in hours
optimistic	2
most likely	8
pessimistic	16

Matlab [SpreMat]

- Buy licence / install software (1/4/8)

PLC IDEs - Automation Studio [SprePLC]

- Buy licence / install software (1/4/8)

2.5.5 Software [So]

	Time in hours
optimistic	604
most likely	810
pessimistic	1259

create infrastructure [SoInf]

- setup wiki (1/4/8)
- setup slack (1/2/3)
- setup git respository (1/2/3)
- setup task managment (1/2/3)

System analysis [SoAn]

- design architecture (24 / 30 / 48)
- define components / communication with external systems (interfaces) (24 / 30 / 48)
- invastigate time in finding out what technologies we want to use (24 / 30 / 48)
- create diagrams(24 / 30 / 48)
- describe behaviour of components and depedencies (24 / 30 / 48)
- find out problematic and time consuming tasks and challanges (24 / 30 / 48)

System design [SoDes]

- design mutliple GUI and Usability concept (48 / 60 / 90)
- gather feedback from customer and redesign concepts (48 / 60 / 90)
- design prototyp with fake data (48 / 60 / 90)

System implementation [SoImpl]

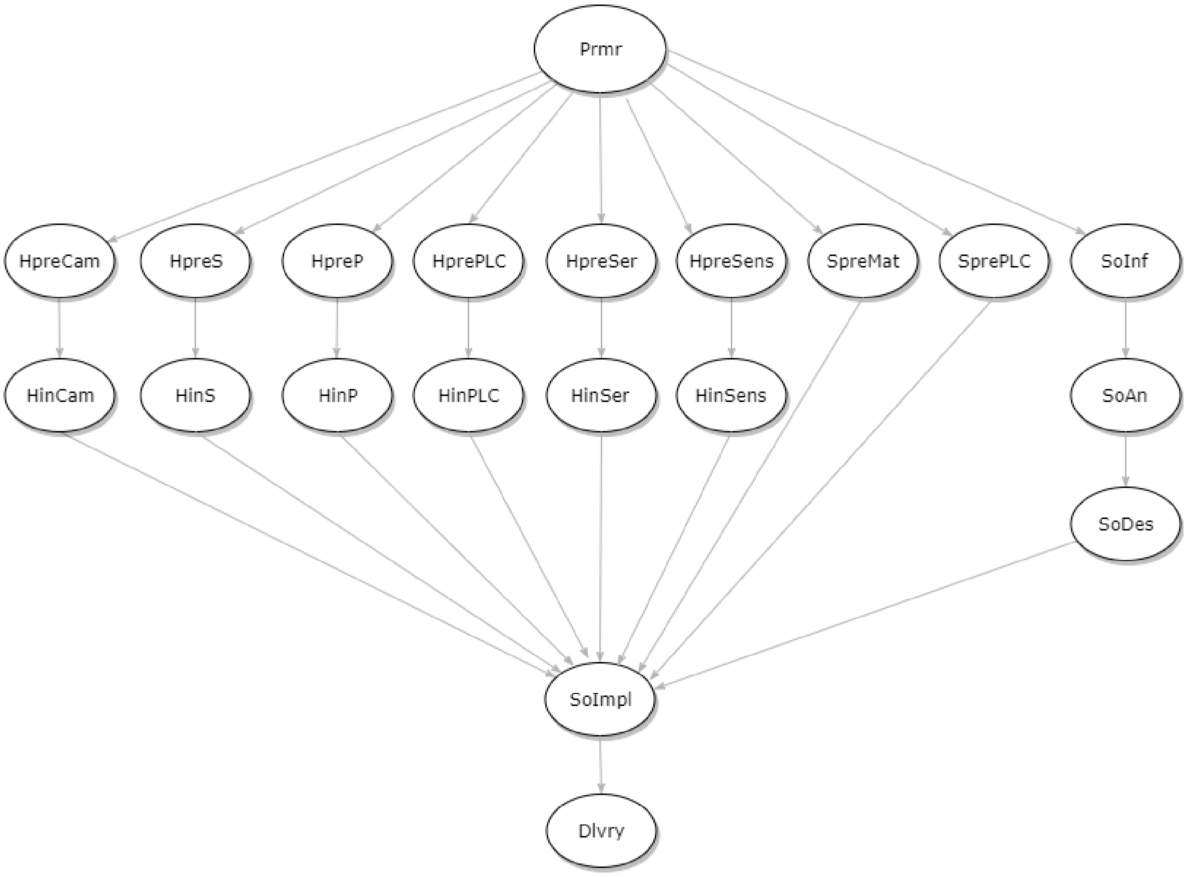
- implement components (200 / 300 / 480)
- unit tests (24 / 30 / 48)
- integration test (24 / 30 / 48)
- E2E testing (24 / 30 / 48)
- documentation (40 / 50 / 60)

2.5.6 Delivery [Dlvry]

	Time in hours
optimistic	13
most likely	30
pessimistic	50

- present / demonstrate system and software (12 / 20 / 30)
- get customer approval (1 /10 / 20)

2.5.7 Precedence Chart


Prmr
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HprePLC
HpreSer
HpreSens
SpreMat
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