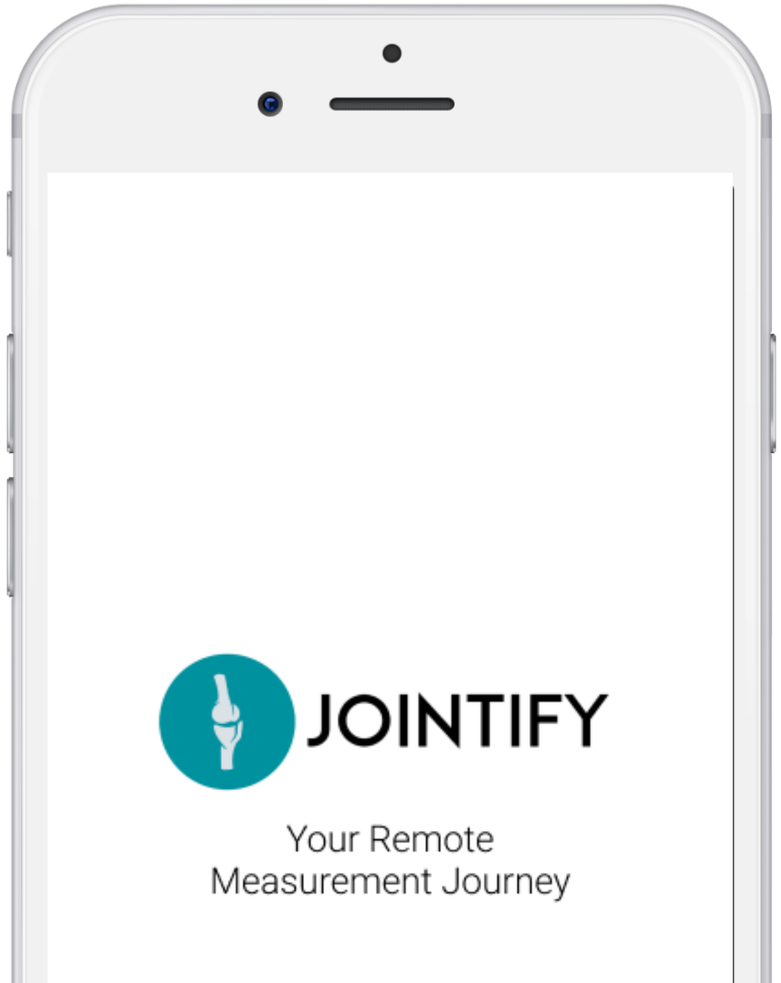
In cooperation with

tech TALENTS

Klinikum rechts der Isar

JOINTIFY

revolutionizing the health industry



MRI Health Challenge
Niklas Bergmüller, Annalena Feix,
Lukas Gerhardt, Lennart Jayasuriya

ROM measurement today.

JOINTIFY

Every year, many people hurt one of their joints and require surgery. To track the healing progress after a joint surgery, the doctor regularly has to monitor the ROM (Range of Motion) development.

What is the range of motion?

The range of motion is the extent of movement of a joint, measured in degrees of a circle. It is the joint movement (active, passive, or a combination of both) carried out to assess, preserve, or increase the arc of joint motion.[1]

How is the range of motion measured?

The ROM values are measured by the “Neutral-Null-Method", which is an orthopedic index for measuring joint mobility. The mobility of a joint is expressed in three angle degrees originating from the neutral-zero position, which is defined for each joint specifically. [2]

- (Hyper)-Extension = movement away from body
- Zero position = neutral-null position
- Flexion = Movement towards body

Currently doctors use a medical device called goniometer to measure the range of motion.

Sources: 1 Physiopedia 2 Flexikon

Taking a closer look at the measurement.

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Pain Point	Afftected Target Groups	Severity	
Time and access: travel, waiting, treatment ...	Doctor Physio Patient	●●●●● ●●●●●	Remote and independent measurement by patient
Inaccurate & subjective measurements	Doctor Physio Patient	●●●●● ●●○○○	Uniform and objective measurements with AI
Data chaos due to lack of digitiazion	Doctor Physio Patient	●●●●● ●●○○○	Automatically generated PDF files
Non-transparent information	Doctor Physio Patient	●●●●● ●○○○○	Overview of past measurements

We asked...

15 Patients

8 Doctors

4 Physios

Additionally, Jointify has a positive sustainable impact

- Easy access for people living in areas with low doctor density
- Decreased exposure to diseases while visiting the hospital/ doctor
- Stable recovery through increased patient compliance

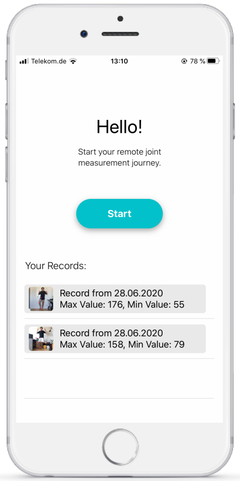
SUSTAINABLE DEVELOPMENT GOALS — 3 GOOD HEALTH AND WELL-BEING — 10 REDUCED INEQUALITIES

Get a feeling for our app.

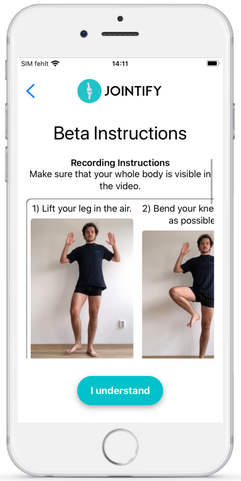
JOINTIFY

Get Jointify in TestFlight or take a look at below wireframes to get a feeling for the user flow.

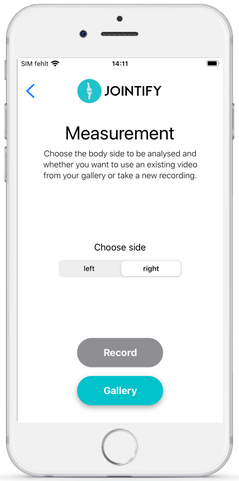
1) Start your measurement journey on the first screen by selecting start. This is where you can also see your previous recordings



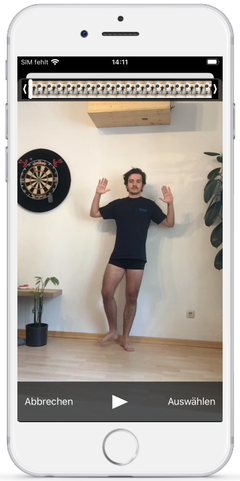
2) Read through the instructions and click submit. Understand that the analyzed videos will not leave the device.



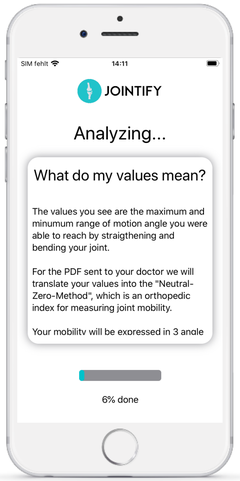
3) Select for which side of the body you want to do the measurement and whether you want to start a new recording or use an existing video.



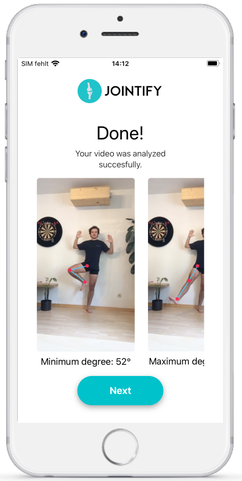
4) Take the recording of the measurement and trim the measurement to the starting position visible below.



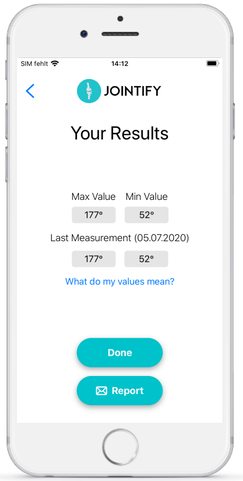
5) While the machine learning model analyzes the frames in the backend, you can learn more about what your values mean.



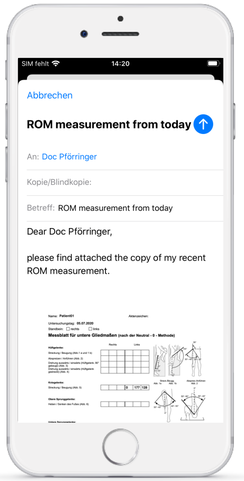
6) Take a look on the analyzed screen and provided ROM values.



7) Now, you can compare your measurement with the latest values and decide to send your values to the respective doctor.



8) Just with one click you can send an email with an attached PDF prefilled with your measurement results to your doctor.



How does Jointify work?

JOINTIFY

Jointify analyzes the joint range of motion by means of an AI algorithm and a smartphone recorded video. The Jointify application currently runs on iOS devices and is implemented based on an open source machine learning model called PoseNet. Take a look at the individual steps to understand how the AI algorithm analyzing the individual joints is embedded into our app.

Load and preprocess user video

First, the app splits the video into separate frames (3 frames per second). The frames are then transformed to squared images, which are required as input in the model.*

Run frames through ML model

In the next step the edited frames are analyzed by the ML model. During the analysis, the model estimates the location of 17 different body features and returns their location with the respective confidence values. The analysis happens directly on the device.

Assess model output

After the analysis, the frames are assessed and selected based on pre-defined quality criteria. In the next step, the ROM degree value is computed for each frame.*

Screen accepted output

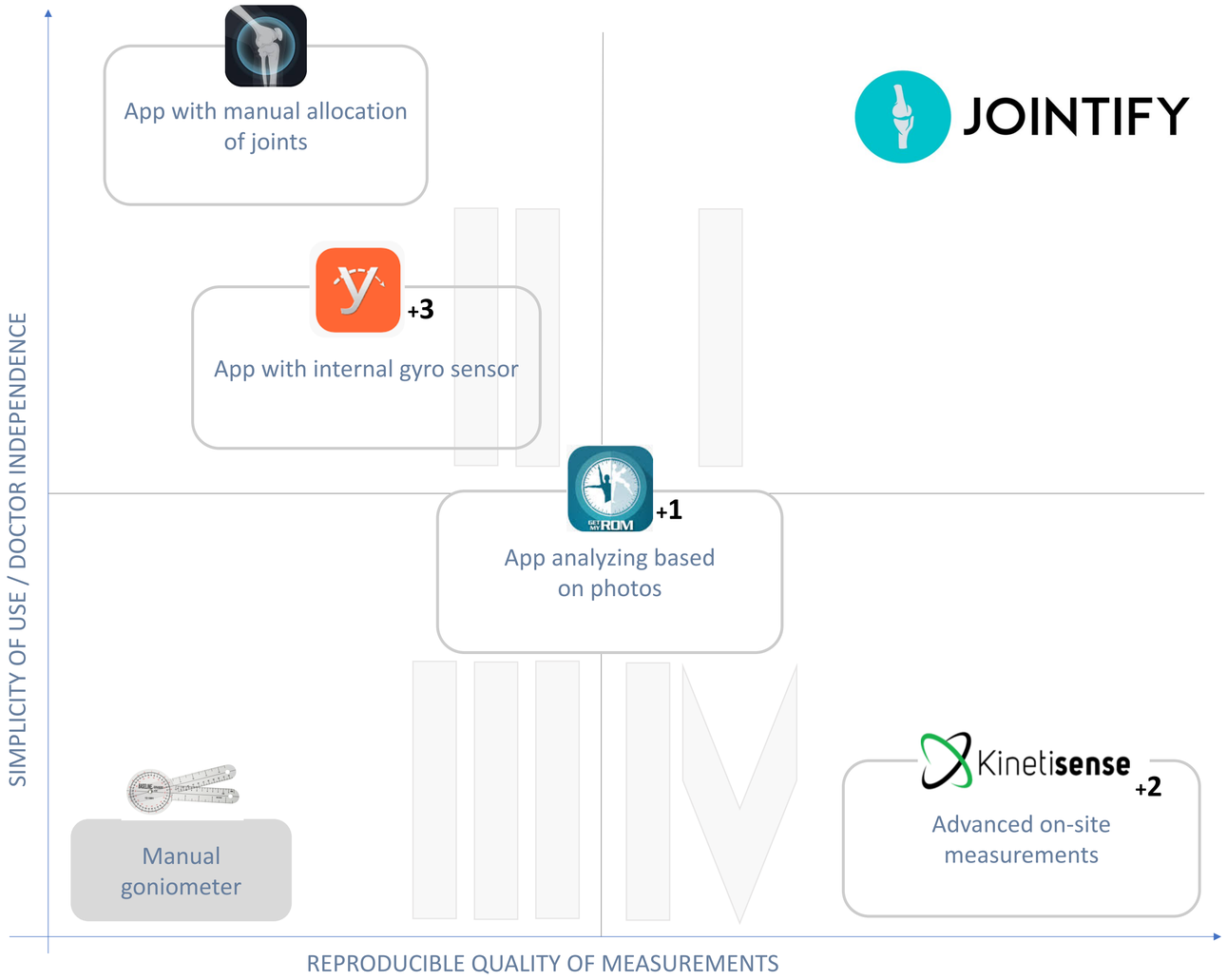
The app selects the frames with the highest and lowest ROM values and shows these to the user.

Export measurements

A standardized medical form for the tracking of joint ROM values is automatically filled with the patient's measurements.

* For more information please refer to the Technical Description

Our competitors and why Jointify is better.



There are already different solutions for digitalizing the range of motion measurement.

4. Highly technical systems with external cameras or sensors which give very reproducible measurement values, but are inconvenient and hard to use and often require a major setup, which usually can not be done from home.
3. Manual Goniometer, no reproducible values
2. Apps that are simple and can be used independently from the doctor but deliver no or little reproducible measurements.

1 Jointify combines the best of both worlds.

- \+ Remote measurement by smartphone, no additional sensors needed
- \+ Reproducible measurements based on AI algorithm
- \+ Patient can hardly impact the measurement in a negative way
- \+ USP: Can export measurements into official clinical paperwork

What‘s next?

IMPROVE ML MODEL

Retrain ML model to allow ROM measurement while sitting or laying down.

ALL JOINTS

ROM measurements for all possible joints

START GESTURE

Introduce gesture that signals the measurement start (e.g. clapping)

August 2020

Start implementing proposed new features

October 2020

Start of development for other platforms

Early 2021

Finish production-ready ML model

Summer 2021

Get certified as DiGA (Digitale Gesundheitsanwendung)

Autumn 2021

Release Jointify v01 to all supported platforms

Milestone: Late 2022

100k Users

Jointify – the next DiGA*

*Digitale Gesundheitsanwendungen are digital helpers in the hands of the patient.

”App on prescription”

Digital Treatment Law (Digitale-Versorgung-Gesetz) on December 19th, 2019

Legally insured persons are entitled to prescribed DiGA care and reimbursement from the health insurance company

Prerequisite:
DiGA has successfully passed test procedures at the Federal Institute for Drugs and Medical Devices (BfArM) and is listed in a directory of reimbursable digital health applications

→ 3-month fast-track to become a DiGA if five conditions are met

Jointify fulfills all the conditions to become a DiGA.

- main function is based on digital technologies
- app does more than just read data from the device or external sensors
- app is not used for primary prevention
- patient uses the app alone or with a doctor
- app supports detection, treatment, relief, or compensation for injuries

Jointify takes data privacy seriously.

- videos of the patient never leave the device
- only the ROM measurement values are sent via mail-attached PDF

Team work makes the dream work.

JOINTIFY

Annalena

User Interface & Design

aka the

"Visionary"

Lennart

Project Management

aka the

"Communicator"

Lukas

iOS Developer

aka the

"Hacker"

Niklas

Machine Learning

aka the

"AI Guru"

Jointify – soon available in the App Store and Play Store

1) Download TestFlight on iPad or iPhone from the AppStore

2) Scan to load Jointify:
https://testflight.apple.com/join/IA0AEBW3