

PHYSIOFRIEND

AN INTUITIVE WEARABLE DEVICE TO SPEED UP AND IMPROVE RECOVERY AFTER KNEE SURGERY

PhysioFriend is an intuitive wearable device that guides people through their physiotherapy rehabilitation after orthopaedic surgery.

Research suggests that successful recovery from an operation is dependant upon:

50% SURGICAL SUCCESS : 50% GOOD PATIENT REHABILITATION.

PhysioFriend removes the confusion and anxiety of completing exercises incorrectly at home. It accurately records Range Of Motion and Repetitions to reassure the patient, and their health professional, that they are on target with their recovery.

This prototype is aimed at knee recovery but there is no reason why the technology could not be applied to other joints.

PhysioFriend could even be used by athletes as a training aid to view and record development.

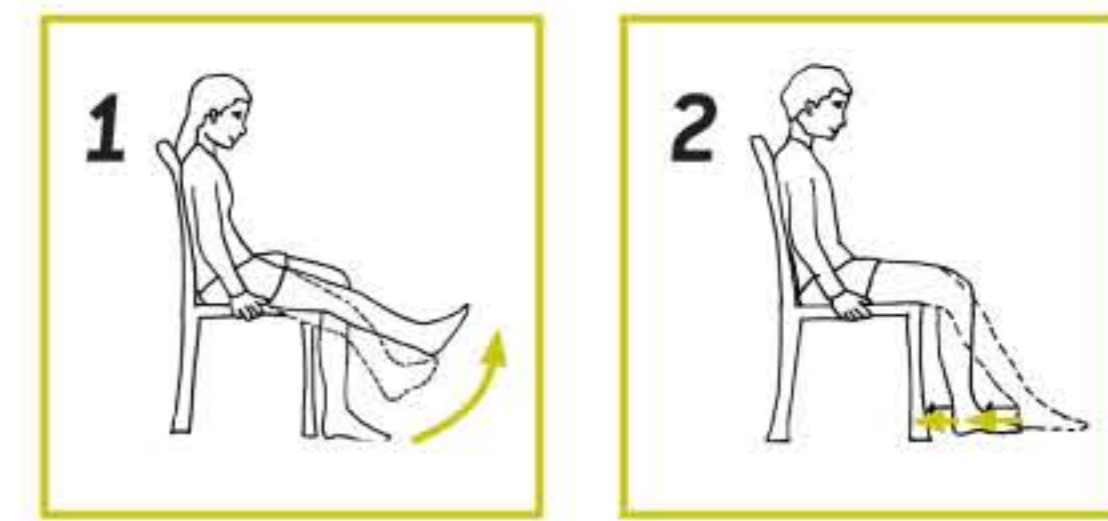
THE EXERCISE



PhysioFriend reassures recovering patients that they are doing their vital rehabilitative exercises correctly in terms of technique and volume.

Typically the patient starts with a straight leg and attempts to bend the leg to 90° and beyond (this can also work in reverse i.e. attempting to straighten the leg)

Once the leg is flexed to the angle specified by the medical practitioner it is held for a set time before returning to the start position



Royal Free Hampstead NHS Trust

HOW TO USE PHYSIOFRIEND

Once PhysioFriend is put on it is straightforward to select the exercise programme recommended by the physiotherapist.

- Select angle of flexion
- Select number of repetitions
- Press start
- Follow the illuminated guidance

GET BETTER QUICKER

PATIENT'S VIEW - STRAIGHT LEG

Align opening over kneecap

Fasten velcro tabs behind knee

Indicates leg has flexed beyond selected angle

Leg is at desired angle – hold it here until reps light comes on

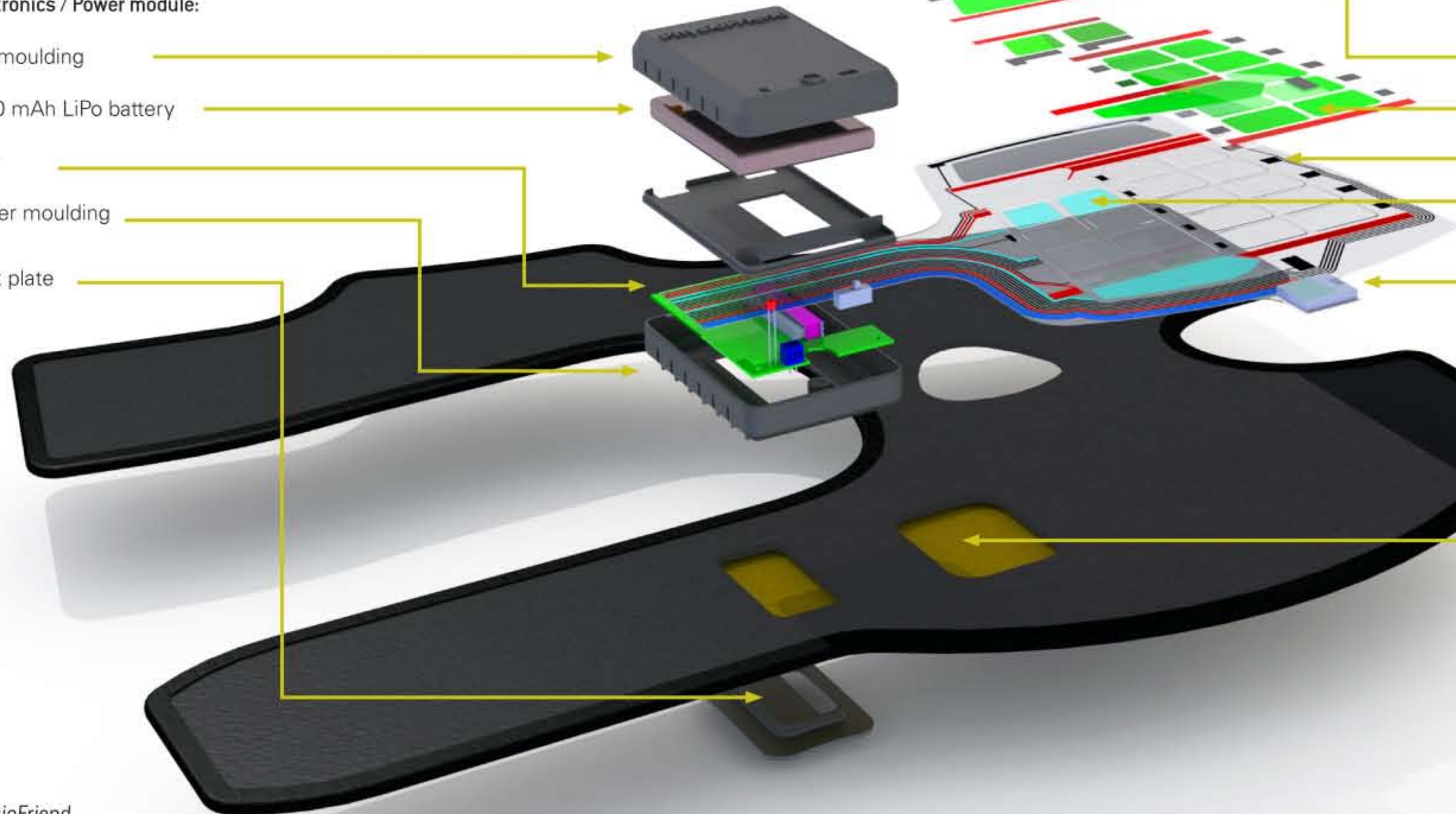
Indicates (angular) progress as leg bends

Indicates progress in terms of repetitions.

When the exercise is complete all of the fields will stay illuminated

Electronics / Power module:

- Top moulding
- 2500 mAh LiPo battery
- PCB
- Lower moulding
- Back plate



Transparent pocket / tactile layer for LTM module

Colour adjustment layer on input switches

LTM stack module:

- Visual / Graphic mask
- Printed OLED leaves joined to conductive layer by 3M 'Z' axis tape
- Flexible PCB substrate with wiring connections and capacitive touch areas for active buttons
- Upper leg accelerometer

Aperture for threading through Electronics / Power module

Lower leg accelerometer

Upper leg accelerometer

Software calculates leg angle between upper and lower leg accelerometers

PhysioFriend Customer journey for older user

GEORGE
George is a 78 old man who was a gardener. He is now enjoying his retired life with his wife in a small house in the countryside.
George still loves to work in the garden but harvesting spices is not the best hobby for an old man. Against his daughter's recommendations George does too much which caused his knee problems.

1 DAY LATER
George calls his family he has a bad knee pain.
His daughter contacts the GP who set an appointment.
The GP sees George she helps them to contact a surgeon.
The surgeon recommends a knee surgery.

3 WEEKS LATER
Physio Friend App introduced before surgery as early pre-surgery support, starting of rehabilitation process.
George has the surgery - knee replacement.

5 DAYS LATER
George meets the Physiotherapist who makes the first assessment after the surgery.
Physiotherapist accesses George's profile on the tablet form and defines the exercises he has to do.
Before the discharge from the hospital, the Physiotherapist hands PhysioFriend over to George and explains its functionalities as well as the connection with the App to the daughter.

6 WEEKS LATER
Once at home, he starts using PhysioFriend as recommended by the physiotherapist.
George forgets to do the exercises, the daughter gets a notification through the app and calls him.
It is time to check his recovery status with the surgeon. The surgeon accesses Physio app to get a fast response.

3 MONTHS LATER
George does his exercises alone at home. The bandage works independently from the App.
George meets the physiotherapist to see how things are going.
He adjusts the amount of exercises as prescribed.

ANNUAL CHECK
George gives back PhysioFriend to the hospital she is now ready to go back to his beloved garden.

PROFESSIONAL JOURNEY
A LTM ambassador - PhysioFriend representative goes to the hospital to meet the physiotherapist. He introduces PhysioFriend, with its innovative features, (affordable, efficient).
Physiotherapist installs the PhysioFriend App and warns about the functionalities.
She meets for the first time George and she sets up the first assessment with the app.
Physiotherapist accesses George's data, checks his status and defines the exercises George has to do.
She introduces PhysioFriend and demonstrates George's first exercises before he uses PhysioFriend by his own.
Once the patient is back home, the PhysioFriend is able to have George's data and check his progress. She can easily see how he is doing with the exercises and if he is choosing the correct angle. In case of inaccurate use she will be informed.
She is also able to see when the patient is going to have the check point with the surgeon so that she could receive some specific note on George's status on the app.
After the check point with George, she accesses the app and adjusts the exercises according to George's improvement.

Storyboard in collaboration with Fjord