

GAIT QUALITY MONITORING

TECHNOLOGY OWNER

University Hospital Hradec Králové



INVENTORS

Oldřich Vyšata, Martin Vališ, Ondřej Dostál

IPR STATUS

CZ Patent application PV 2021-331
(priority 8.7.2021,
PCT/CZ2022/050062)

STAGE OF DEVELOPMENT

Third research prototype is available and being tested in relevant real-world patient-physician scenarios. TRL 3.

Deep Learning for
Gait Monitoring



Classification of
Ataxic Gait

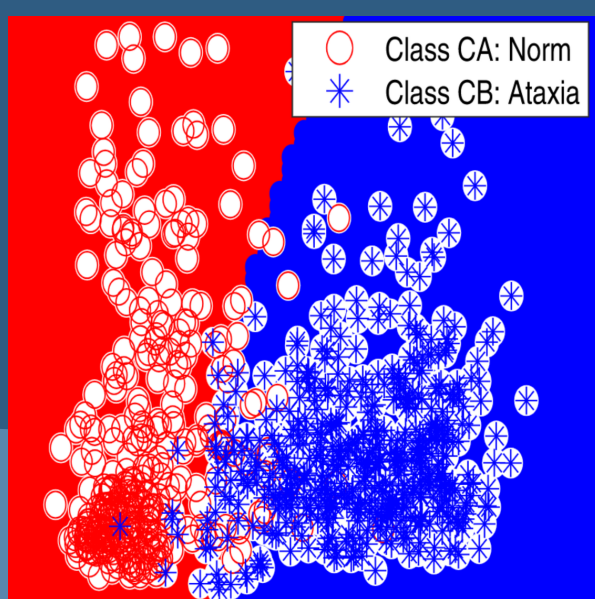


JIŘÍ MOŠNA

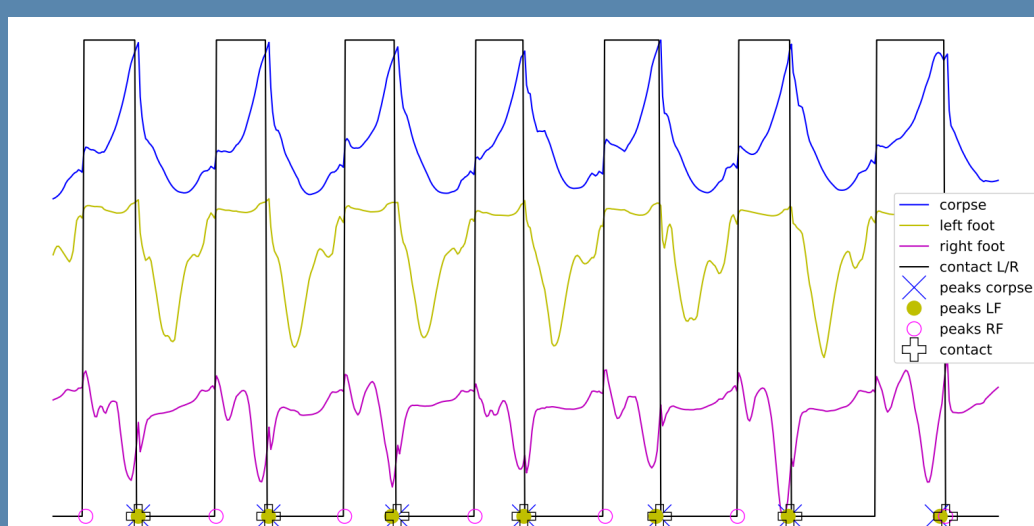
JIRI.MOSNA@FNHK.CZ

+420 727 802 314

Ataxic patients can be identified by more than 90% accuracy from healthy controls.



Example of step detection method



Background

Multiple sclerosis (MS) is the most common cause of **neurological disability** in young and middle-aged people. MS has a physical, psychological and financial impact on patients and their families. Up to 85 % of patients with MS identify gait disorders as a major problem. The ability to monitor the development of the disorder over time is highly valued diagnostic measure. Falling because of old age, neurological disorders, movement disorders and injuries **can be predicted by the assessment of change in gait quality**.

Description

Gait quality monitoring system processes **signals from a dedicated sensor unit** through a set of unique AI/ML algorithms and delivers information for the patient and/or neurologist/physician and/or family member with the relevant level of detail for the target user.

The system can detect a **gait disorder**, assess the overall **gait quality** in real time while walking providing immediate feedback to the user or the physician in the first step. Subsequently, in the second step (further processing) the system identifies a number of different gait disorders, their extent and severity and probable cause of the disorder.

The system **helps to monitor the development of diseases and disorders** of gait and aim to improve the quality of gait.

In both cases, the evaluation is performed using **machine learning modules**. Both approaches show relatively great robustness of the approach used and the relative simplicity of computer performance, especially in the near future. For general use the first step processing can warn patients or elderly people on the probability of falling.

The system is now being tested on diagnostic tasks for several neurological disorders in three relevant practical scenarios performed by neurologists in outpatient offices.

Advantages

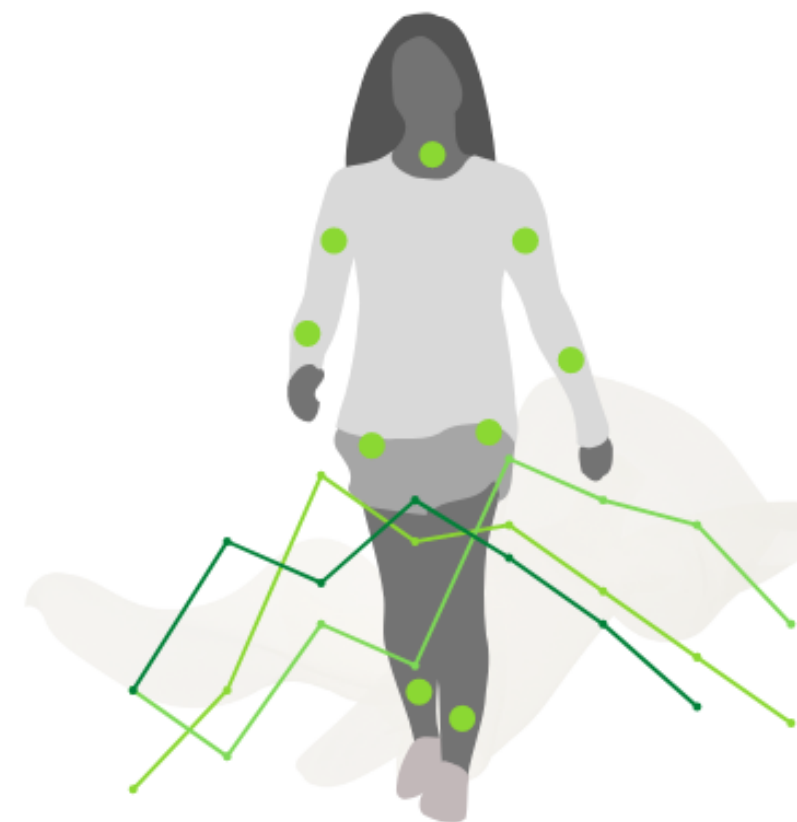
- Simple, easy to use, yet reliable and robust
- Automatic evaluation – no expert needed for daily use
- Decision support for expert physician
- No multiple joint sensors and no expensive SW/HW needed
- No laboratory assessment distortion, but real world – normal activity view

Potential Applications

Worldwide increasing incidence of MS was estimated to be 2.8 million people in 2020, in developed countries is double to triple incidence. Can be helpful for many other neurological or movement diseases and elderly in general.

1. Non-MD/Diag. device – wearable “fall prediction”
2. Diagnostic – wearable – good/bad gait indicator
3. Diagnostic – wearable + mobile/tablet - gait disorder type and severity analyser and classifier

WWW.CTBT.CZ



CTBT
Centrum transferu
biomedicinských technologií