

# Introducing Arachnet



## Introduction to Arachnet,

- Arachnet is a medical diagnostic tool based on principles of artificial intelligence, machine learning and deep learning.
  - The field of medicine that Arachnet deals with is the field of musculoskeletal disorders.
  - User of Arachnet is a physical therapist.
  - Arachnet is accessible and can be used by visually impaired physical therapists as well.
  - Arachnet is being developed by Mr. Jan Mura who is visually impaired also in close cooperation with Adrian Corba
  - Arachnet Project's aim is to help and support visually impaired physical therapists to broaden their knowledges and create circumnutates for growing quality of their life
- Arachnet Project is open to all visually and physically impaired experts for cooperation and common success



## Arachnet Workflow

- The therapist obtains information of the problems of therapist's client by the client himself.
- The therapist transforms unprofessional description of the client's problems to the medically correctly defined signs and syndromes.
- The transformation to the correctly defined terms is done with a help of Arachnet, using a sophisticated method based on mathematical principles.

- After all signs and symptoms are identified they are sent from the therapist's mobile device to [Oracle Cloud](#) with Web Server, Relational Database Management System and trained Machine Learning Model.
- The signs and symptoms sent by the therapist are processed by ML Model.
- If the input information is sufficient for determining the diagnosis of the client's disorder or disease:
  - the diagnosis is sent back to the therapist's mobile device
  - based on obtained diagnoses the therapist can ask for additional information regarding the diagnosis, e.g. way of therapy or information on anatomy and physiology
- If the input information is not sufficient:
  - Arachnet can ask for clarifying questions



## The problem Arachnet is trying to solve

- Problems of prevalence of musculoskeletal disorders:
  - costs of treatment musculoskeletal diseases that is among the highest cost diseases of modern society
  - the shortage of health professionals in general and in the field of musculoskeletal disorders in particular
  - long waiting times for an appointment with a doctor
  - neglect of possible serious diseases which symptoms can be mimic by musculoskeletal disorders
- Employment of disabled people, i.e. visually impaired people, can overcome the problems of:
  - lack of rehabilitation doctors and rehabilitation professionals
  - high rate of unemployed disabled people
  - problems with real integration of people with serious disabilities (visual impairment) to the mainstream society
  - lack of a sense of self-worth and selfconfidence of visually impaired people



## Proposed solution

- The application is built on principles of artificial intelligence, machine learning and deep learning
  - Use of [cloud solution](#) for application development and operation .
  - Modular solution of the application, Arachnet is built of several independent modules connected by standard interfaces.
  - The user of the application is not a highly educated expert (doctor) nor a person of general public.
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- The secondary user is a client and therefore input data to the machine learning model is provided by him/her unlike similar tools that needs of expensive medical equipments or sensors.
  - Cooperation with Universities., e.g. faculties of medicine, sports, mathematics, informatics.



## The benefits of proposed solution

- Using of promising and popular technology can:
  - will add value to patients
  - will add value to doctors
  - will create database which could be used for identifying of hidden correlation between different types of disorders
  - will give doctors more time to deal with more demanding problems
  - be in high demand
  - be successful on the market.
- Using of the [cloud](#) solution enables flexibility and scalability of the application.
- Thanks to the modularity of the application Arachnet can easily:
  - provide more accurate results with new data
  - determine diagnosis from other field of medicine
  - get other type of input, i.e. video, photo or natural language

- get other type of output, i.e. natural language output
- The use of technologies that are reliable enough can:
  - improving the level of health services and responding more quickly in the event of problems
  - reduce medical care costs
  - enable better access to health care
- Participation of therapist in the whole process can:
  - be a way to solve legal problems connected to using tools based on artificial intelligence as therapist should be trained appropriately
  - be a correction to underestimation or overestimation of the problems by the client/patient
  - increase general confidence in artificial intelligence and modern technologies
- The cooperation with Universities can:
  - help find solutions to problems that rely on highly specialized theoretical knowledge
  - propose alternative and more progressive methods
  - detect and minimise proposed solution errors
  - help to get access to trusted medical data needed for training of Machine Learning Model of Arachnet



## Our visions to the future

- Processing patients' data gradually increasing in the database using the data mining techniques.
- The Arachnet's input can be enriched with additional elements:
  - photos of patient's posture that can be specific for the specific musculoskeletal disorders
  - videos of patient's way of walk that can be also specific for specific disorder
- Replacement of the currently proposed input:
  - input based on Natural Language Processing, the application would process conversation between therapist and patient using added Machine Learning Model

## The benefits of proposed visions



- Processing patients' data can:
  - identify patterns in datasets to assess risks
  - help predict falls in elderly patients
  - analyse data to provide information such as severity, location and date of a disease outbreak
- Adding additional input types like photo or video of the patient can:
  - give more accurate results in determining diagnosis
  - give a lot of possibilities in valuable predictions, e.g. predicting of perspectives of professional athletes and their tendencies to injuries or disorders
- Using the NLP type of input can:
  - be a high valued accessory to the system like telemedicine or fully automated systems of medicine

## Project team



- **Jan Mura** has knowledge and experience in:
  - development of large systems for telecommunication companies in Czech republic and Germany
  - development of large system for insurance company
  - communication with customers from many business fields
  - IT technologies, i.e. RDBMS, IP, AI wide used technologies like PyTorch or TensorFlow based on Python
  - analysis of customer requirements, see [here](#)
  - SW engineering, see [here](#)
- **Adrian Corba** has knowledge and experience in:
  - financial management of companies from many businesses fields
  - project management in different projects in the Slovak republic and abroad
  - operational management
  - EU funds - sourcing and management

- Daily operational management
- Processes coordination
- **Jitka Koropecka** has knowledge and experience in:
  - web development and design
  - managing an e-shop with medical devices
  - managing massage studio with visually impaired physical therapists
  - dealing with legal issues of website operation, commercial law and consumer law



## Our investments

- What are we investing in Arachnet:
  - Our abilities and experience
  - our enthusiasm
  - Our time (we have invested a lot of it by this point)
  - fully set [Oracle Cloud](#)
- For some of us, i.e. **Jan Mura** Arachnet is the only project he takes part in and he devotes all his time to it.

- **Adrian Corba** takes part also in the other projects.



## Other stakeholders

- The partners involved in Arachnet:
  - We are in contact with [Oracle Company](#) and we have asked them to assess the project and we hope that Oracle will support us in our efforts

## Project status

- The idea of the Arachnet Project has been subjected to a thorough examination by the creators of the project.
- The AI/IT concept of the project was approved by experts from Faculty of Electrical Engeneering of Czech Technical University in Prague.
- The medical concept of the project was approved by experts from Faculty of Medicine of Comenius University in Bratislava.
- The project is ready to development.
- [User requirements](#) are defined.
- [Detailed design](#) is in progress.
- [Development environment](#) is ready.
- The tasks status can be seen [here](#).



## Costs and needs

- Time estimation of the certain parts of the project can be found [here](#).

## Conclusion

- We believe that:
  - our project is innovative
  - our project is inventive
  - our project can arouse interest of people in many ways





## Have you found the Arachnet Project

- interesting
- innovative
- with potential
- born for success

## Would you like to know more

- about the status of the project
- about the financial conditions of the company and the project
- about us

## Would you like to support us

- by donation to buy another Pizza&Coke
- by investment, on the basis of a binding contract
- any other way

## And why you should support us?

Simply because we love Arachnet and want to see it live and grow..

Feel free to [contact us](#) or write directly to [jan.mura@volny.cz](mailto:jan.mura@volny.cz) or call to +420 605 74 97 84 (Czech republic)