Never done before

+ Cross-field innovation between medical science, thermography and AI
+ Off-the-shelf mobile diagnostic solution
+ Based on automated AI-powered imaging analysis
+ For non-invasive and non-destructive screening and monitoring at home
+ Constantly improved through Big Data Machine Learning
Amendment analysis
Performing a direct analysis of the overall change in the parameters of the POI.

Medical analysis
Comparing the collected medical information for viral disease to the Amendment Analysis results.

Generating results
Calculating the probability of having a Viral Infection and identifying it, based on the Medical Algorithm.

Kelvin Platform

1. Thermal camera
   Take a thermal photo of your upper body four times a day

2. Analyzing with AI
   Performing a direct analysis of the common picture obtained by shooting.

3. Medical analysis
   Comparing the collected visual and medical information.

4. Preliminary Diagnosis
   Establishing a general preliminary diagnostic evaluation based on a series of recordings.

Analysis of the common picture
Determination of POI on the basis of available photographs of a similar nature allowing the individual to be distinguished from the surrounding environment.

Analysis of the POI
After mapping - defining boundaries of discrepancy with the underlying data. Building a comprehensive up-to-date model of the captured individual based on comparison with basic data of a healthy individual.

Analysis of the identified discrepancies between the input of shooting + ML model for comparison. Technical storage of incoming data and mathematical calculation of % of mismatch (creation of mismatch index).

Amendment analysis
Performing a direct analysis of the overall change in the parameters of the POI.

Medical analysis
Comparing the collected medical information for viral disease to the Amendment Analysis results.

The results are formed on the basis of a medical algorithm and mathematical calculations and give information about the percentage probability of a viral infection in the body. The assist in the timely detection of a progressing infection process.
Respiratory diseases

- Ongoing active monitoring of inflammatory/infective diseases of the upper airways (sinuses/pharynx)
- Monitoring of active inflammatory diseases of the lower airways/chest (pneumonia, autoimmune diseases)
Vascular diseases

- Longitudinal (ambulatory) monitoring of diagnosed and staged vascular diseases (diabetic, autoimmune, cardiac)
- Risk groups triage (family history – relatives) early symptoms – blood flow distribution (thrombosis, embolization)
- Treatment response (pre/post)
- Daily monitoring (peace of mind)
- Early identification and follow up of additional/resolving foci of activity
Oncology

+ Longitudinal (ambulatory) monitoring of diagnosed and staged oncology cases (e.g. breast and solid tumor cancers)
+ Risk groups triage (family history – relatives) early symptoms – blood flow distribution (fibrosis)
+ Treatment response (pre/post)
+ Daily monitoring (peace of mind)
+ Early identification and follow up of metastatic lesions
Kelvin Core AI

+ Maps different temperature levels coming from thermal sensor
+ Analyses in real-time the overall distribution of heat/blood in the body
+ Spots anomalies in key anatomical points of interest
+ Reveals inflammatory processes
+ Suggests diagnostic/additional testing taking into account other risk factors
Use of NVIDIA technologies

- CUDA
- CuDNN
- NCCL
- DGX Station
- DIGITS
- NVIDIA Caffe
- NVIDIA Docker
- DeepOps

**Experimental environment:**
- 3x NVIDIA GTX Titan
  - 2x 6GB VRAM
- Intel Xeon E5-2620 @ 2.10GHz
  - 6x CPU Cores
  - 64GB RAM

**Rapid large-scale training & retraining:**
- DGX Station
  - 4x NVIDIA Tesla V100
    - 4x 16GB VRAM
  - Intel Xeon E5-2698 v4 @ 2.20GHz
    - 20x CPU Cores
    - 256GB RAM
Kelvin App

- Personal medical record and demographic data
- Snaps temperature distribution on the go
- Tracks changes over a suggested schedule
- Alerts in case of inflammatory progress
- Collects pseudonymised and anonymised data for re-use and ML
Minimal Hardware Requirements

- Thermal resolution 160x120
- Dynamic range of 30-40°C
- 36 degrees FOV
- Firmware supporting iOS and Android
- The thermal sensitivity <70mK
- Speed 4-6 Hz

Affordability for mass consumers (< $150 USD target price per device)

- Cheaper sensor due to lower resolution
- No additional CMOS sensor (Most available on the market cameras like Flir One have it)
- The thermal dynamic range is narrowed
- Camera sensor does not require high capturing frame rate
- Small focal length (domestic use)
Pandemic (COVID-19) use-case

Target groups
+ Infected patients under home quarantine
+ Not infected but quarantined patients
+ Risk groups (elderly, chronic cardiovascular and respiratory diseases, diabetes)

Benefits
+ Alerts 1-3 days before conventionally felt symptoms and prevents premature hospitalisation
+ Centralised monitoring system and localisation of infection outbreaks
Post-pandemic use-cases

+ Domestic monitoring for early detection of system diseases
+ Smart tool for telemedicine
+ Risk-mitigation assistant for health insurers
+ Statistical data re-use for pharmaceuticals, vaccine developers and researchers
+ Professional use in sports, veterinary medicine, first aid
Social and healthcare system benefits

+ Preventing risk stratification regarding deaths of people left for home treatment with sudden complications
+ Significant reduction of healthcare costs avoiding unnecessary hospitalisations
+ Objective snapshot of the health condition of population
+ Minimising loss of efficiency and days of work missed
Stage of development

- Initial trials and cross-check with X-ray ML model (100K+ images)
- Thermal image processing AI and ML models in active development
- iOS (TestFlight) and Android applications for data collection
- Access to hospitalised patients and ongoing medical trials
- Negotiating with thermal camera manufacturers
- Identified public sources of funding
Connecting the dots

+ Extended clinical trials and regulatory compliance - from current 12 to 200+ patients
+ Massive data collection and improvement of AI
+ Partnering with large-scale thermal camera suppliers - 1K+ initially, 1M+ in first mass cohort
+ Refinement of business model and commercialisation strategy (post COVID-19 pandemic)
Team and expertise

Core team
- Dr. Nevena Dimitrova
  Medical Research
- Georgi Kadrev
  Biz Dev & AI
- Georgi Kostadinov
  AI Tech Lead
- Georgi Mutafchiev
  UX/UI & Marketing
- Tania Rainova
  Public Relations
- Evgeny Kosev
  Biz Dev EU
- Chris Georgiev
  Biz Dev Asia
- Pavel Andreev
  Product Design

Team members
- Petko Ditchev
  Sr. AI Researcher
- Mihail Mladenov
  Data Scientist
- Ina Toncheva
  Marketing
- Alex Dimitrov
  Software Lead
- Emil Dimitrov
  Software Dev

Advisors
- Dr. Nick Levi
  Medical Advisor
- Dr. Alex Simidchiev
  Medical Advisor
- Dr. Anatoli Todorov
  Medical Advisor
- Dr. Petko Ruskov
  Business Advisor
- Dr. Stavri Nikolov
  Research Advisor
One of the pioneers and global leaders in computer vision A.I.

Has analysed and tagged more than 15B client photos via its cloud and on-premise APIs.

Has trained possibly the largest image classifier in the world containing 320K+ classes and used in PlantSnap - the top 5 best seller on the App Store for 2018.

Top 3 in precision and top 1 in recall in an independent Israeli evaluation of the leading image tagging solutions*.

Invited speakers at events like GTC, CEPIC, DMLA, BAPLA.

*Source: https://arxiv.org/abs/1903.09190