

LAI3
SCIENCE

LAI F ST A T S

LAIF STATS

1 MILLION IN REVENUE IN 2018

20 EMPLOYEES FOCUSED ON **AI** | **SW** | **HW**

17 SENIORS **2** MIDS **1** JUNIOR / **6** PhDs **8** MScs

PROJECTS

PROJECTS

Conversation Intercept

PoC Implementation

A web-based application for information extraction from an audio phone call, including emotion analysis, topic extraction, and probabilistic intent extraction.

Voice Assistant

PoC Implementation

A mobile voice-activated assistant which is capable of discussing several health-centric intents and then adjust restaurant selection and menu choices based on user's intents, in a restaurant recommendation application.

PROJECTS

Situation and Intention Awareness

Product Research

The challenge is to determine what is the user intent concerning user's long term goals, from a variety of data channels. We have reviewed the SotA and made proposals for an experimental architecture and possible products.

Smart City, Intelligent Personal Assistant

Technical Overview

We have written a technical white paper containing Literature Review, an Ontology of user's intent, Architecture proposals, Technology and Infrastructure solutions. We have detailed products and functionalities, described experimental approach and estimated the needed effort for implementation.

PROJECTS

IntentCare

Technical Design Solution

Smartphone-compatible stereo earbuds with machine learning, hearing assistance and medical-grade biosensors for remote patient monitoring and real time neurodiagnostics. Proposing a non-permanent integrated solution for unobtrusive monitoring of activities of daily living. The device is a platform for biometrics with the following features:

Hearing aid for impaired patients | Wireless audio streaming device and hands-free headset with noise cancellation | Neural activity monitoring (EEG) using dry electrodes made of conductive rubber | Electrocardiography (EKG) | Core body temperature infrared measurement of tympanic membrane | Breathing Rate and Heart Rate monitoring using an accelerometer | Activity Tracking | Blood oxygen saturation measurement (SpO2) | Blood Pressure Monitoring using PTT (Pulse Transit Time) and PWV (Pulse Wave Velocity) | PPG (Photoplethysmography) optical measurement of blood volume change

The current progress involves a preliminary electrical diagram of the front end, power budget calculations, proposed electrical components, mechanical design, embedded system architecture, and wireless charging considerations. We have also studied the market and available technical solutions for the Migraine and Pain Detection use-case.

PROJECTS

Object and Activity Detection

PoC Implementation

Jupyter Notebook presenting implementations of several State of the Art AI/ML models for object and activity recognition, with their appropriate metrics.

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Dangerous Situations

PoC Implementation | LAIF IP

A web-based application for Detecting Weapon Presence (Gun & Knife), Detecting Panic, Face & Identity Recognition, in both offline and online settings, with a delay smaller than 2 seconds.

We have done a comprehensive market analysis to determine the state of the art and most valuable product features. We have designed and implemented a cutting edge live streaming architecture and also found solutions for improving the performance and accuracy of the ML models based on the SotA.

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NoCode AI

PoC Implementation | LAIF IP

The final product is envisaged as a web based drag & drop environment which incorporates specific domain knowledge and provides artificial intelligence tools and abstractions so that non-technical users and researchers could leverage artificial intelligence in their context.

The PoC is domain agnostic, presenting a wrapper over AI Tools which can be used in a drag and drop environment for creating AI pipelines. This should be followed by new versions that shall incorporate specific domain knowledge and levels of abstractization (ex. Healthcare, Finance).

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Hebbian Learning

Research and Implementation | LAIF IP

Research in unsupervised learning with no feedback mechanism, using Spiking Neurons with Hebbian Learning, Long-term Potentiation, Long-term Depression and Growth Cone. The learning is done locally without any global knowledge or wrong/right guidance. The potential of such a system would be:

- Creating models that are closer to the way human brains work
- More efficient computation, given that such models could work on CPUs only.

LAIF IP

Identity Recognition based Video Analytics

Research and Implementation | LAIF IP

We have proposed a new solution for identity recognition using a combination of face recognition using images, infrared sensors and depth sensors, person detection and other model analytics. We have reviewed and documented the available sensors, as well as the available face recognition datasets and State of the Art.

EEG Act

Academic & Market Research | LAIF IP

This is a Brain - Computer Interface Software System for control of external systems based on interpreting brain waves. Our technical overview involves a review of available EEG headsets, Academic Literature Review, Technical Approaches, and Market Overview.

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Meta Learning

Academic Literature Review | LAIF IP

Engineering systems that learn how to learn is a major focus of the AI researchers' community today. We want to contribute in these pressing subjects, therefore we have reviewed the most recent literature and approaches. Our report identifies the main efforts around transfer learning, neural architecture search, one/few shots learning, and others.

Auto ML

Academic Literature Review | LAIF IP

Building an autonomous learning system based on AI, which is able to formalise a specific problem schema and search efficiently for a solution plan to the problem: White Paper | Diagrams Proposals | Market Research | Healthcare: Market Competitive Research | Finance: Brainstorming Ideas.

LAIF IP

Kiwi MVP

Research and Implementation | LAIF IP

In its final iteration, Kiwi is a wireless implant that can be implanted in different locations in the brain, and with different mechanical features, depending on the use-case. Currently, Kiwi is developed for research labs whose endeavor is to better understand how the brain works. The emphasis in this use-case is more on high signal accuracy and large number of recording and stimulation channels. Later Kiwi will be developed as a therapeutic device for neurodegenerative diseases like Parkinson's and Alzheimer, memory loss, epilepsy, and others. A high level description of the progress to date is given below:

We have done a comprehensive market analysis which has resulted in detailed reports that describe and compare existing solutions, useful for the development of our product, for the following areas:

- Neural Probes connecting to the brain that are both commercially available and in research
- Optogenetics technology that can be used in the future iterations of the product
- Other commercially available acquisition systems
- Data Formats used in the industry and existing processing software

LAIF IP

Kiwi MVP

Research and Implementation | IP Ownership

- We built an experimentation device containing the RSL10 bluetooth System on Chip, a 64:8 analog multiplexing board and Texas Instruments ADS1298 8 channel ADCs together with the needed firmware. Using this device we managed to validate the SPI and multiplexer drivers, along with determining critical timing parameters (synchronisation of SPI and multiplexer control).
- We built a research platform for analog ultra low power signal transmission. This is a custom RF solution focused on ultra low power consumption and high data throughput.
- We built a board for interfacing the Intan RHD2xxx with the RSL10 Bluetooth chip. The main purpose of this is to have an electrical layout similar to the one in the actual device (transmission lines between the two chips as short as possible) while, at the same time, have full debugging capabilities which will be provided by two debugging ports, serving both the ARM and the DSP cores in the RSL10.
- We studied and characterised the noise sources applicable for our application.
- Analysis of radio propagation inside the human body for energy efficient communication.
- We experimented with charge coupled device based signal acquisition but abandoned this solution due to high power consumption.

LAIF IP

Kiwi MVP

Research and Implementation | IP Ownership

- We implemented basic digital signal processing functions to test the DSP core.
- We implemented the basic communication functionalities on Bluetooth 5 low energy.
- We developed a suite of PC based SW tools that offer basic functionalities to analyse and plot the acquired signals.

In work:

- We are working on an ultra low-power custom analog front-end for electric reading and stimulation.
- We are working on a proprietary method for detecting the geometrical position of the neural activity sources.
- We are working to increase communication speed over Bluetooth and implement data streaming capability

CLIENTS

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Ni2o

A medical device company developing an AI-driven brain-computer interface for the treatment of neurological disorders and cognitive enhancement.

Novai

A spin-off of the global telecommunications technology provider Ericsson, focused on Artificial Intelligence based SaaS and PaaS platforms.

Cogni

A free mobile banking service, checking account, and debit card with perks, benefits, and lifestyle integrated features. Its goal is to offer an ultra-personalized banking platform incorporating a user-intention centric AI engine.

CONTRACTS

CONTRACTS

We have worked with **Novai**, providing PoC applications in the area of Computer Vision and Natural Language Processing. We are currently discussing the terms of a long-term contract and expect them to bring an important work inflow in a couple of months time.

We have a signed contract with **Ni2o** for SW and HW R&D Services. This is the first contract that Laif started with. After an interruption in their activity, it is now foreseeable that Ni2o will become again a key collaborator.

We have signed a Collaboration Agreement with Babeş-Bolyai **University** in Cluj-Napoca to get involved with our expertise in a 20 Million Euros European research grant. Together with them, we are part of the RoHealth cluster from where, due to our skills and interest in research, other collaborations can spark.

We have started discussions with consultants and identified big opportunities for non-reimbursable financing from **European grants**.

BOARD

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Richard Wirt

Advisor

Dr. Richard Wirth was Managing Director and General Partner at Oxantium Ventures and a senior fellow/Corporate Vice President of Intel Corp. from 1981 to 2007 where he started and grew a large worldwide software group responsible for supporting Intel chips, founded and managed the Intel Microprocessor research labs, and was a founding member of the Linux foundation and served on its board.

Newton Howard

Board Member

Prof. Newton Howard is a partner in LAIF. With PhDs in Mathematics, Neuroscience and Psychiatry, Newton founded the MIT Synthetic Intelligence Lab and he is Professor of Computational Neuroscience and Functional Neurosurgery at the University of Oxford where he directs the Oxford Computational Neuroscience Laboratory.

Daniel Lar

Board Member

Daniel Lar has played a key role in his 20-year career shaping a leading nearshore software development partner for ISV's or software product companies. He is the Managing Director of Yonder, overseeing different Yonder Business Units with more than 300 employees. Daniel has a technical background with a Bachelor degree in Computer Science and a Master degree in Entrepreneurial Management.

BOARD

Ovidiu Savencu

Board Member

Ovidiu Savencu is a research engineer and inventor with a PhD in Nanomechanics from Cardiff University. Previously, he worked on a number of diverse topics including numerical simulations, cyber physical systems modeling, and Artificial Intelligence.

William Richard

Board Member

William is a researcher, entrepreneur, artist and technology visionary. His research interests are in Artificial Intelligence with a focus on Reinforcement Learning. He also has a long experience building SW and HW products where his interdisciplinary approach has brought together powerful teams and has sparked innovative solutions.

COLLABORATORS

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Institut du Cerveau et de la Moelle Epiniere (ICM), Paris

Through Ni2o which is incubated at ICM, we can use their infrastructure for in-vitro and in-vivo testing for the KIWI.

The National R&D Institute for Isotopic and Molecular Technologies, Cluj-Napoca

Leveraging ITIM's expertise in nanomaterials, our collaboration focuses on probe research for the KIWI.

The International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health, Cluj-Napoca

The institute has several high-tech systems that Laif is interested to support developing. Also, there are several product ideas that can be developed together in the future.

Transilvanian Institute of Neuroscience, Cluj-Napoca

The relationship with TINS is highly valuable due to their expertise in in-vivo electrophysiology and neuroscience. Also, with AI as a common passion, our collaboration will be very fruitful.

HIRING PIPELINE

HIRING POTENTIAL

The list below contains some of the profiles of people that are really interested to join us:

- Senior SW Engineer, ML Engineer, Embedded SW
- SW Architect
- AI, Computer Vision, Medical Imaging, PhD, Postdoc at Oxford
- SW Architect
- SW Frontend
- Fullstack SW Engineer, Big Data, 10+ yrs experience
- SW Architect
- Backend
- ML Engineer
- ML Engineer, PhD NLP
- ML Engineer, Reinforcement Learning

EXPERTISE

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LANGUAGES

Python | C | C# | Java | JS | C++ | HTML/CSS | Bash | .NET

AI KNOWLEDGE

Machine Learning | Data Science | Natural Language Processing | Recommender Systems | Computer Vision | Dialogflow | Reinforcement Learning | Web Scraping | Big Data Processing

AI TOOLS

SciKit | Keras | FastAI | Matlab | Tensorflow | Pytorch | OpenCV | LightGBM Xgboost | Weka

EXPERTISE

SW KNOWLEDGE

Container Management | Cloud Computing | Deployment Strategy | Control Theory | Distributed Systems
| CI-CD | Database Management | Docker | Devops

SW TOOLS

Spring | SQL | Android | iOS | Elasticsearch | React | Maven/Gradle | Kafka | Ionic | Jenkins Pipeline | Flask |
RabbitMQ | Azure | Google Cloud Platform | Gearman | Angular | GIT | Kubernetes | Swarm | Rancher |
Anaconda | NodeJS | Hibernate | Liquibase | Jenkins | Spinnaker | scrapy | FlytOS | Junit | Mockito | Azure
Cloud | Dataflow | Apache Beam | Tomcat | Kibana | Grafana | Amazon Cloud | SQLite | Firebase | Logstash
| Fluentd | Linux | Docker | Unity 3D | ROS |

EXPERTISE

HW TOOLS

RSL10 SDK | Matlab | Eagle | Solidworks | AUTOSAR | LabView | Catia

HW KNOWLEDGE

Altium Designer | LTSpice | Low level drivers | Firmware Test | Mechanics | Radio Communication | ASIC Driver Development | Memory Mapping | Signal Processing | Requirements Engineering | Embedded Applications | DSP | Signal Conditioning | Systems Control

HW DEVELOPMENT COMPETENCES

Simulation Modelling | Software | Firmware | Analog Design | Digital Design | Mechanics

EXPERTISE

OTHERS

Medical Imaging | Mouse NMR | FSL | Dynamic Light Scattering (DLS) | Medicine | Clinical MRI | SPM | EEG Remote Sensing | fMRI | NeuroDebian | EKG | Geospatial Data Processing | Structural MRI | Matlab | Numerical Simulation | Scientific Writing | Diffusion MRI | Data Acquisition & Analysis | Neuroscience | Relaxation (NMR) | Perfusion MRI | MRI Acquisition | Diffusion | Spectroscopy | MRI Data Analysis | NMR & MRI Hardware Assessment/Manipulation | MRI Data Interpretation | Fast Field Cycling (FFC) | AFNI | Atomic Force Microscopy (AFM)

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