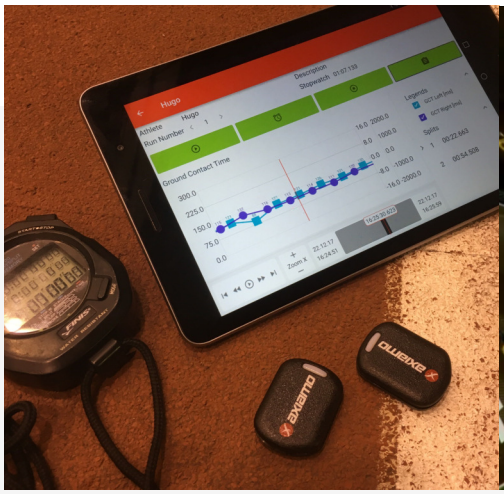
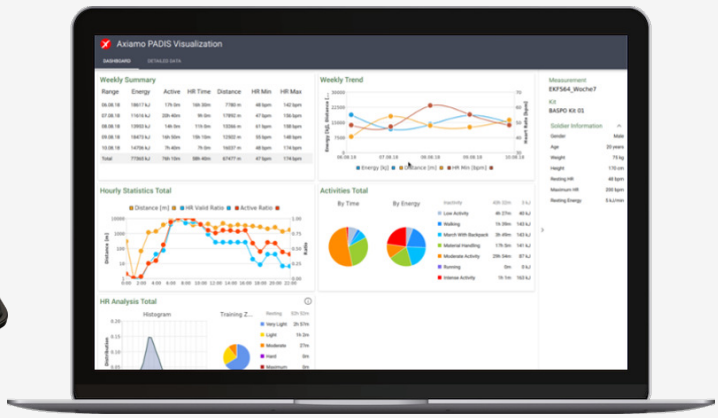
axiamo

spin off Bern University of Applied Sciences





Engineering Portfolio

Axiamo is a Swiss tech startup located in Biel BE and was founded in 2015. Our technology and production know-how evolved and has been proven with numerous successful development projects. Our core competences are in complete customer project development from first specification to customer delivery.

We believe in direct communication and customer oriented product design. With our experienced engineers and continuous integration tools, we are able to deliver fast and to adapt to dynamic customer requirements.

www.axiamo.com

Success Story

Elite Running Analysis System

Product description

With our elite running analysis product Axiamo XRUN, we have created an innovative sprinting and running analysis tool for elite level coaches. Developed in cooperation with Swiss Athletics and continuously improved by Axiamo, it proves our experience and strengths in body worn gait analysis tools.

The system is able to precisely measure ground contact times of both feet for every step. Step length measurement capability implementation is planned for fall 2018. With this information, running parameters as asymmetry, speed and horizontal acceleration can be examined.

For successful operation, the system needs to be operated directly on the track. This is possible since we also deploy our applications to mobile devices as tablets with full sensor control through Bluetooth. After a run, the coach simply stops the running session and gets all results presented instantly.

Customer

This product has been developed for Swiss Athletics in continuous cooperation with the Swiss head coach middle & long distance Louis Heyer. Thanks to the professional know how of the customer, all requirements were clearly defined to the essentials concerning functionality and usability.

Keywords

Motion analysis, Real time signal processing, Mobile Android application, Touch screen interface, Ground contact time

Success Story

Ultra Wide Band Positioning / Data Transmission

Product description

In a CTI-Project between Axiamo and BFH. the high accuracy wireless positioning system XLOCATE capable of measuring positions of multiple objects in real time has been developed. It uses Ultra Wide Band (UWB) technology for Time Difference Of Arrival (TDOA) based object localization. All receiver nodes placed around the field to be measured are connected together with a WiFi network also providing access for system configuration and data link.

The nodes to be tracked are of very compact size and can be integrated in custom casings with application specific battery and antenna. Dependent on the required run time and wireless range, very small sized nodes can be realized.

We use the TDMA principle to locate multiple nodes with constant sampling frequency. Number of nodes and sampling frequency can be adjusted to the application requirements. For Soccer as an example, we use 20Hz sampling of 22 player nodes which results in a total positioning rate of more than 400 positions per second.

The existing system is successfully used in soccer with nodes integrated in the players shin guards. The application fields of the XLOCATE are countless, from smart agriculture to logistics to visitor tracking.

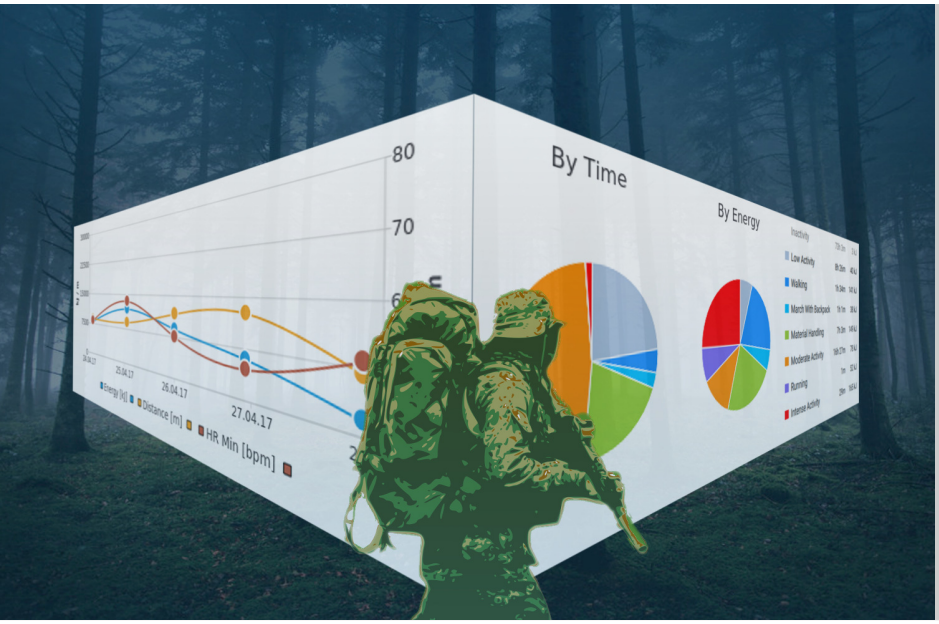
Custom payload can be integrated to each position measurement package transmitted, enabling live measurement data to be collected from every node of the network.

Keywords

Ultra Wide Band, Positioning, Data Transmission, Object Tracking

Success Story

Long Term Activity Monitoring For Soldiers



Product description

Axiamo PADIS is a complete system for long term activity measurements and analysis. It contains wearable motion sensors, a heart rate monitor and extracts precise and relevant features about the subjects using dedicated algorithms. Completely developed and industrialized by Axiamo, it demonstrates our strength for complete product design.

The system application is scalable from small short time performance measurements of several soldiers up to continuous data collection for big amounts of squads. Remote control and visualization of results is possible thanks to the integrated data synchronization with end to end encrypted data transfer.

Each equipped soldier delivers continuous data which is fed in the Axiamo PADIS system for automatic analysis. Axiamo PADIS enables gaining accurate and relevant measures of troops with very little effort for the operator and without distracting the soldiers in their service activities.

Compare each squad's performance score and improve their configuration based on objective and scientifically validated feedback.

Customers

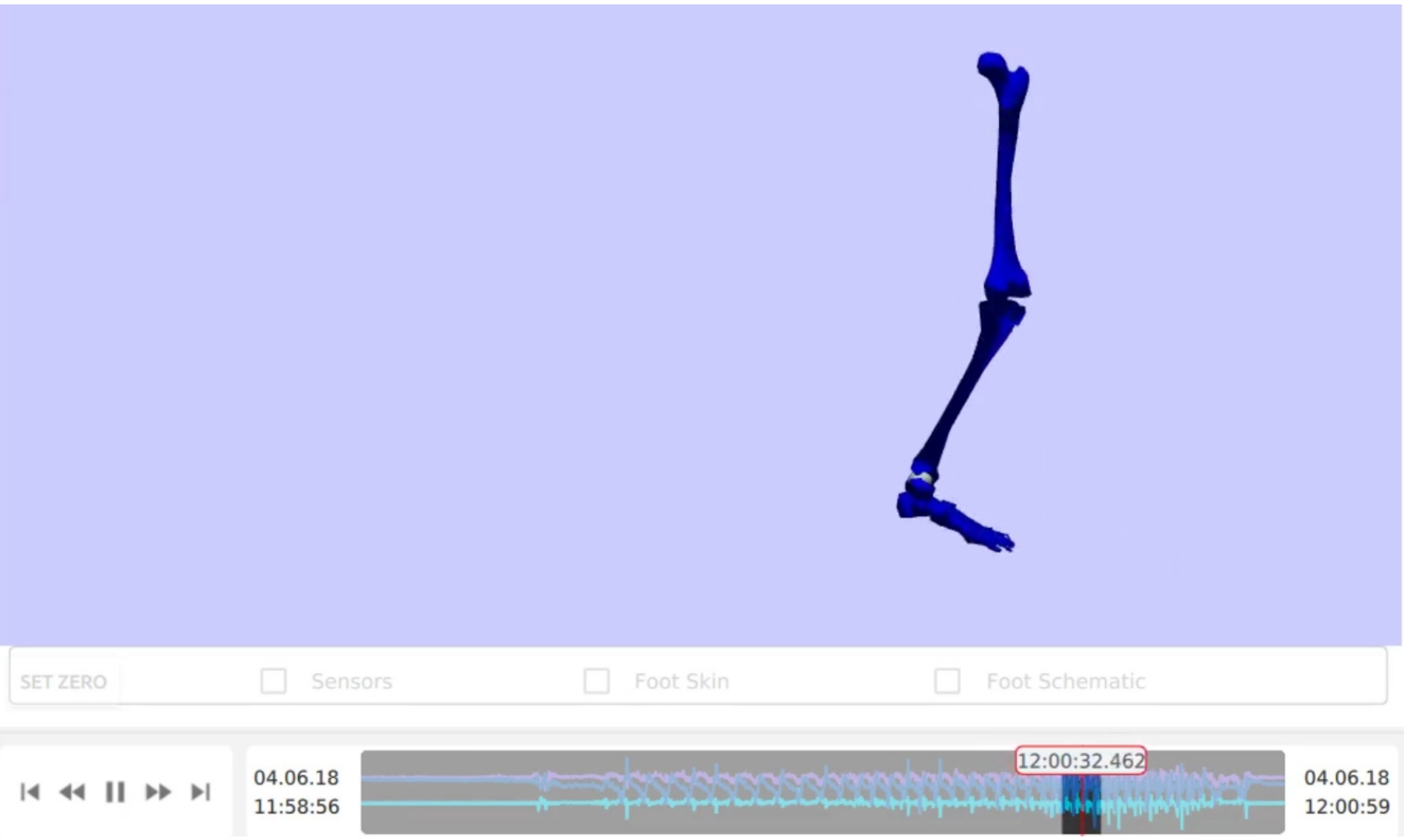
Our pilot customer and partner, the Swiss Federal Office Of Sports (BASPO), defined the requirements for this system and performed early field tests. Based on their feedback, the product has been continuously refined and optimized. Currently we sell the product to other countries in Europe, further possible customers all around the world are evaluating the system.

Keywords

Wearable Sensor, Low Power Electronics, Bluetooth Low Energy, Data visualization

Success Story

Gait Analysis For Rehabilitation Patients



Product description

CTI-Project between MOWA, Switzerland Innovation Park Biel/Bienne and BFH, using Axiamo Technology.

With MOWA, a specialist for modular custom ortheses, we are developing the electronics, algorithms and visualization of a gait analysis tool to be used in rehabilitation of patients with restricted mobility. Our smart sensor attached to the orthesis will analyze the gait parameters and inform about the patient's physical recovery. This project's focus is on feature extraction and algorithm development. Thanks to our versatile motion sensor, there was no need for initial hardware development and we could directly deal with the core questions of the customer.

Customer

Modular Walking (MOWA) is a Swiss based expert in Medical Gait Analysis. Axiamo as a specialist in motion analysis is a perfect partner for this custom development and can use its technology platform to efficiently answer the customer's technological questions and deliver a product ready to be sold.

Keywords

Algorithm development, Gait Analysis, Wearable Motion Sensor, Real Time Analysis, Data Visualization

Success Story

Hospital Bed Activity Monitoring

Product description

CTI-Project between Compliant Concept, Switzerland Innovation Park Biel/Bienne and BFH, using Axiamo Technology.

This system developed by Axiamo is to be mounted to hospital beds and connected to a bed sensor measuring force distribution on the mattress. This allows to avoid bedridden patients. Hospital personnel are detected using wearable BLE beacons and have the possibility to setup patient dependent parameters like no-movement time until alarm and configure different alarm sources like bed exit detection.

The custom hardware developed in this project bases on an embedded Linux system with a touchscreen display. The device has connectors for the bed sensor, alarm output and power supply. Since the device features an integrated battery, patient displacements without any data interruptions are possible.

Customer

Compliant Concept is a spin-off of the internationally renowned technical university ETH Zurich and Empa, Switzerland. Their goal is to make the care of hospital patients and nursing home residents safer, more efficient and more comfortable. With the Hospital 4.0 system developed in cooperation with Axiamo, patient movements can be monitored in a modern and networked way eliminating many unneeded patient checks thus saving time and increase their productivity.

Keywords

Embedded Linux, Touchscreen interface, Raspberry Pi, Hospital, BTLE positioning, Real Time signal processing

Proposal

Axiamo as an experienced engineering company can be inquired for whole system implementation or single aspects of product development. Projects which can be realized basing on our own technology framework profit from rapid development phases and well tested components resulting in very competitive conditions regarding features and engineering expenditures.

Scope

Axiamo provides expertise in full stack application engineering covering:

System Concept	Data Analysis
Hardware Development	Algorithm Development
Firmware Development	Application Design
Low Power Optimizations	Advisory Tasks

Technology

We use modern technologies to be able to fulfill the high product standard concerning design and usability requested nowadays. Our cross platform software applications are designed using the Qt framework and our GUIs run on QML.

Our development process involves continuous integration tools with automated builds. We use Linux as our primary development platform due to its versatility and functionality.

Toolset

Company Network

Bern University of Applied Sciences

spin off FH Bern University of Applied Sciences

- Infrastructural Support
- Specific Technical Know How
- Rapid Prototyping
- Prototypes Production Line

Swiss Federal Institute of Sport Magglingen

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Federal Office of Sport FOSPO
Swiss Federal Institute of Sport Magglingen SFISM

- Sports Science
- Scientific Validation
- Access to real life testing environment

Switerland Innovation Park Biel/Bienne

SWITZERLAND INNOVATION PARK BIEL/BIENNE

- Production Know How
- Injection Molding
- Rapid Prototyping
- Company Business Address

Be Advanced Accelerator

HighFlyer be-advanced

- Business Coaching

Full Stack Engineering

Proven Technology

Axiamo's modular application framework allows to combine different proven technologies from hardware to end user application. With many years of experience and numerous completed engineering projects, our team gained high productivity in product development.

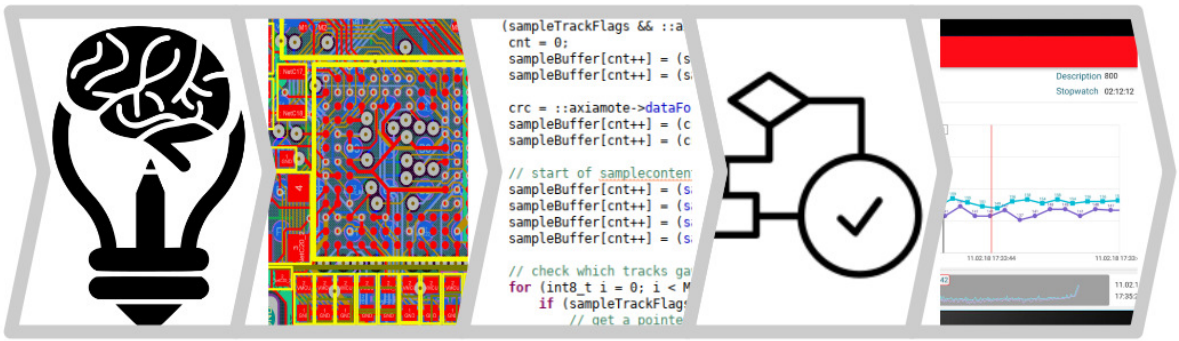
Main Focus

Axiamo mainly focuses on wearable sensor data acquisition, processing and visualization technology. For most sensing applications, we use our miniature embedded 32bit processor board providing numerous sensors and interfaces. Target hardware with displays and user interface are mostly implemented on embedded Linux boards or Tablet hardware.

Since our application software stack is not bound to any target platform, all our software components are reusable and enable a quick and very cost effective customer solution implementation.

From Idea To Product

Concept | Engineering | Product



Modularity

Platform	Connectivity	Algorithms	Application	Features
Low Power 32bit Microcontroller	BT2.3 data link	Real Time Target CPU	Desktop	Cloud Data Synchronization
Embedded Linux Modules	BTLE periph. / central	Application Integrated	Android	Responsive UX Design
Custom	Ultra Wide Band	MATLAB code	iOS	Time / Per Use Licensing
	USB		Embedded Linux	
	Wi-Fi		Web	

info@axiamo.com

www.axiamo.com

Hardware Engineering

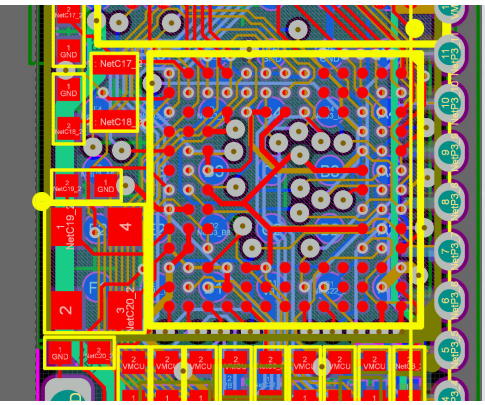
Axiamo has successfully developed a miniature and versatile sensor hardware platform, the Axiamote X1. This hardware design features several on board sensors and application specific modular extensions and has been produced in batches to a total amount of more than 1000 pieces. Industrialized and optimized for mass production, it serves as a cost effective and sustainable hardware base for a large field of applications.

Extensions exist for

- Ultra low power long term measurements
- Ultra Wide Band (UWB) position measurements with centimeter precision and data transmission
- Crank mounted power meter logger for track cycling.

Axiamo provides expertise in hardware design with over 15 years of experience in schematic and PCB design for industrial production.

Applications where a complete miniature system with user input and display is requested, can be served with embedded Linux solutions. Axiamo has designed a complete patient monitoring system for use in hospitals.



Axiamote X1 Platform

Our hardware platform optimized for space efficiency, high speed and low power solutions is the self developed Axiamote X1 sensor electronics. Miniature size with 9 axis motion sensor, air pressure sensor, flash memory, 32bit ARM Cortex M3 CPU, Bluetooth Classic / LE, USB. Extensible through GPIOs with numerous interfaces.

Low Power Applications

Basing on our Axiamote X1, battery critical scenarios can be covered. For our PADIS solution, the sensors are worn up to one week with a single battery charge. With bigger battery, single charge run times of weeks or months are feasible.

Ultra Wide Band Capable

The UWB extension enables the Axiamote X1 to be used as a position measurement system with centimeter precision. It has been successfully demonstrated for measuring whole teams soccer player's position with a rate of 20 positions per player per second.

Custom Hardware

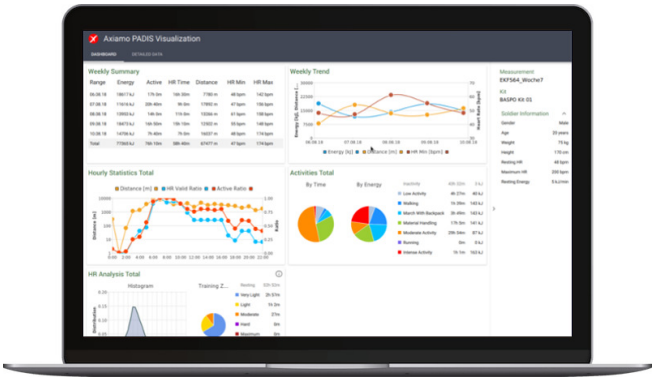
If possible, we base new designs on our proven hardware platforms. However if the customer's requirement can not be met using existing Axiamo hardware technology, we offer custom hardware development as well.

Application Programming

For the end user, the user interface is one of the most critical aspects of a product. We know every application has to be as simple as possible providing as much features as needed. Modern and intuitive design is not a plus, it is the minimum.

Axiamo uses the modern cross platform design language QML for most of its application front ends. Our solutions are not bound to one platform, our apps run on every desktop PC, Tablet computers, mobile phones – even in the web browser.

Our approach to build a user interface is to first understand the customer's idea on it, then to challenge it with the customer often resulting in a better and more simple approach than the customer initially had in mind.



Our competences in application development cover the following areas:

- Initial mock up design
- Application programming for desktop, tablet and mobile
- Data visualization 2d and 3d
- Cloud integration
- Integrated software updater
- Licensing solutions

Case design

For a finished product, hardware and software development is not sufficient. For the end user, the product design is a more important aspect in the complete picture. We have several partners for case design with expertise in:

- Injection mold tooling design (ABS / silicones)
- 3d printed casings

Engineering Team

Michael Gasser
Chief Executive Officer

Hardware design
Firmware development
Signal processing and algorithm development

Benjamin Habegger
Chief Techology Officer

Algorithm development
Software architecture
Cross platform software development

Damian Weber
Chief Operating Officer

Hardware designs
Firmware development
Frontend / UX
Supply Chain Management

Contact

Axiamo GmbH
Switzerland Innovation Park
Aarbergstrasse 5
2560 Nidau
Switzerland

info@axiamo.com