enchele

Company Portfolio

Kosovo, Tringë Smajli, Prishtina 10000

Contents

Introduction

Our Mission

To accelerate innovation by bringing the most unique solutions to the clients.

Our Vision

Creating unique solutions that enable companies to transform industries.

Enchele develops solutions for residential, commercial, and industrial use. Depending on the requirements, we give the best solution to our customers.

We provide:

- Hardware to Software development
- IoT Cloud Solution
- Home Automation and Control
- Energy Management and Power Analytics
- Industrial Automation and Control
- IoT Sensor Modules

Our partnerships:

Our offices are located in Prishtina, Kosovo, and Iskra Kranj, Slovenia.

Our partnership with ISKRA Corporation includes a lot of benefits for us:

- Direct Access to Electronics Laboratory (for emissions, conductivity, surge, and other certification-related tests)
- Iskra R&D knowledge
- Hardware production and manufacturing

Capabilities

3D modeling and CAD

Full product design with material properties (SolidWorks)
Design validation
Mechanical CAD design
Animation, Rendering

Electrical Engineering

Circuit Design
PCB routing and design (Altium, EasyEDA, KiCAD)
PCB testing
Cable Design and Documentation

Cloud Services

Amazon Web Services
Microsoft Azure
Google Cloud
IoT Development
Linux

Embedded Systems Programming

IoT System Design
Design Firmware with C/C++
Security Review
ESP32, ARM Cortex M0-7, RISC-V, Stm32, etc.
ESP-IDF, Arduino, etc
Communication Technologies: Bluetooth(BLE), WiFi, Modbus, Ethernet
Protocols: MQTT, HTTP/S, WebSockets

Web Development

Front End (Angular, HTML, CSS, Tailwind, JavaScript, jQuery, React, Svelte)
Backend (ASP.NET, Node.js, C#)
Frameworks (.Net Framework & .NET Core, Electron, WPF, Java Swing)

Mobile App Development

C#, Python, C/C++, Java
Android & iOS native development (React Native, Xamarin.Forms, Xamarin.Native, .NET Maui, Flutter)
Databases MS SQL, Cosmos DB, PostgreSQL, MongoDB, MySQL
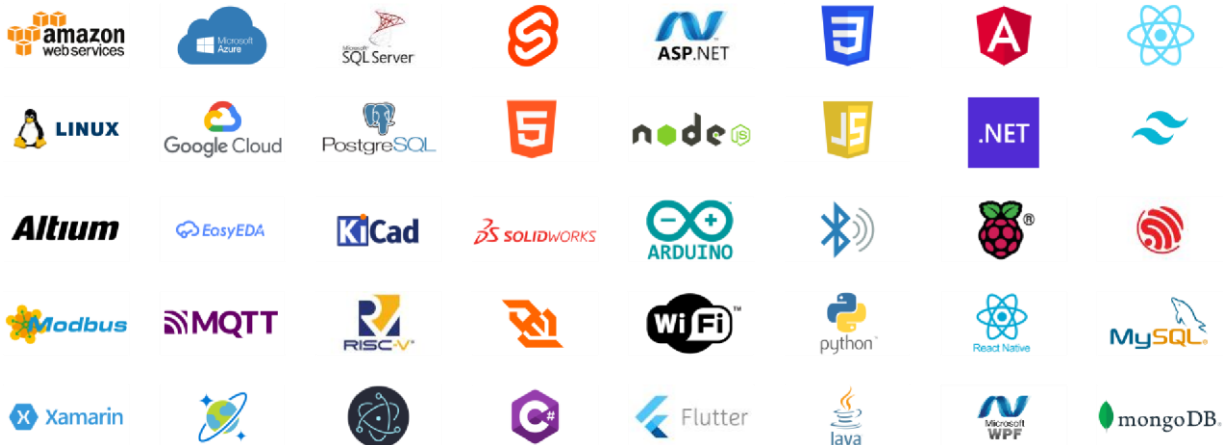
Projects

Enchele Products

Smart/Dual Module

The Smart Wall/DIN Rail Module is an energy switching device that handles currents up to 16A. Designed in small size and filled with functionalities, able to fit in most standard electrical boxes, switches, and DIN Rail mounts.

Features:
- Easy Remote Control
- Wifi and BLE Connectivity (with BLE mesh support for multiple devices)
- Wide range of AC Power Supply
- Power Metering, etc.

We developed this product from the ground up including
- Mold Plastic Design
- AC to DC power supply design(Pre-tested for certification requirements)
- Microcontroller (Firmware)
- Energy Measuring Chipset calibration
- IoT Cloud Architecture
- Enchele Home APP (iOS and Android)

Smart Module Visualization

The Dual Module uses similar hardware/software except that it has 2-channels for switching loads(5A each channel). Intended usage includes lighting and other low-power applications.
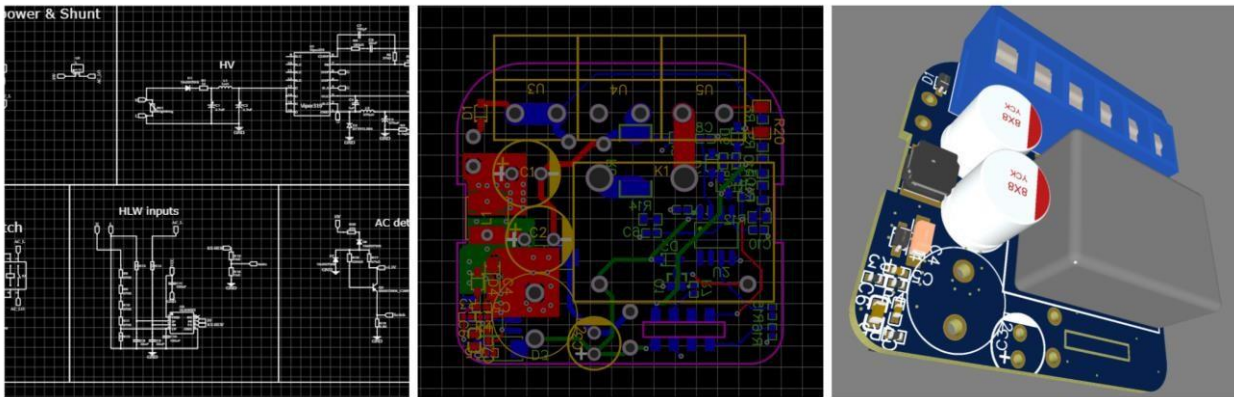
Schematic and PCB design of Smart Module

Sensors

The Enchele Sensors package includes security system sensors to detect movements, water leaks, fire, CO levels, window or door openings, and temperature/humidity measurements. All the hardware (PCB and schematics) and software are developed by us.

Technical features:

- Ultra Low Power Microcontroller
- Active readings with deep sleep mode
- Battery management system(BMS)
- Wifi/BLE connectivity
- Sensor development (water, smoke, motion, etc)

BLE Mesh Network Communication
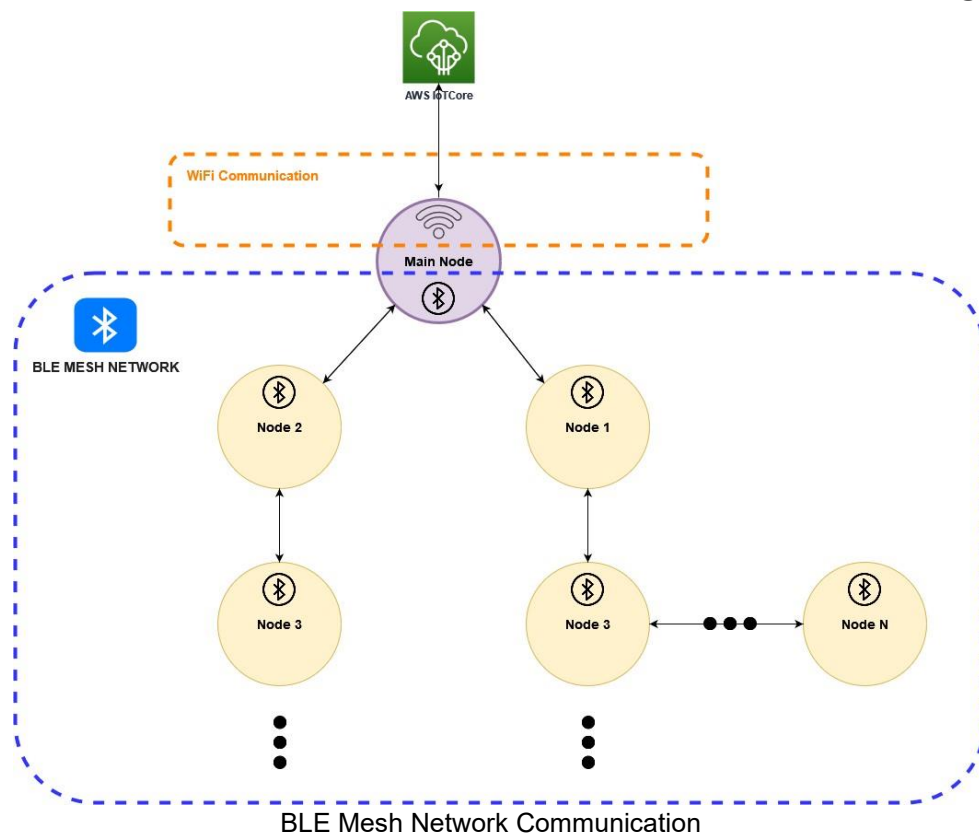
Enchele Product Package

ISKRA Cabinet Control (ICC) Project

This product was developed and produced by Iskra in Slovenia. Enchele Team provided the IoT infrastructure and communication.

In this project, our mission was to connect the SG gateway to our existing cloud solution that we built for our products and to create a cross-platform mobile App. With the aim to create a package and a mixture of Enchele and Iskra products intended for the industrial and household sector, offering:

- Energy Managing and Monitoring
- Remote Control
- Scheduling
- Automation

ICC hardware and App

Automatic assigning and updating system of SSL Certificates

BLE server architecture for WiFi provisioning

Process of adding switches and energy meters on the SG

MQTT command

EM002931

SW002913

SW002915

SW002918

Device Name
Boiler

Serial Number
SW002913

ADD

Notify if success or failure.

1 During the process of adding a new device, user inputs the serial number of the new device. The user can name the new added device any name he wants

Serial Number	Device Type	Device Name	Mod Bus Address
SW002918	Switch	Lights	35
•	•	•	•
•	•	•	•
•	•	•	•
SW002913	Switch	Boiler	44

2 The data for new device will come to the data base via the mobile app.

3 The system will register the new added device and give it a unique mod bus address, also always checking if it was previously used

4 With these two information the system will generate the MQTT command to assign mod bus address **44** to the new added device with serial number **SW002913**

MQTT command

Enchele API

Automatic mod bus address assigning system

JSON messages to configure new devices

Every device will have it's QR code. The QR code will contain the serial number of a device.

IR   IR   ModBus   ModBus

Energy Meter WM1-6/WM3-6   SG-W1 Gateway   Latching Switch_1   Latching Switch_2   Latching Switch_3

33   **33**   **33**   **33**

Supose we configured the SG Gateway and it is connected to the internet. We also wired the new devices with the SG Gateway. We scan the QR code of the device get the serial number. So if the number of the device is **SW000054** then we will have to send two JSON commands to set a new Mod Bus address

The QR codes of the other devices will be used to set the Mod Bus addresses of every device. Since at the beginning every device will have the same Mod Bus address, we have to change them and to give every device a unique address. This will be possible to do via the serial number by sending MQTT commands to the SG gateway then the SG will set up new addresses for every device.

The QR code scanning of the SG Gateway will be used to get the serial number of the device that will be used as a root topic to receive and send data from it and during the WiFi provisioning via bluetooth.

JSON to assign new Mod Bus Address

```
{
  "data": {
    "cmd": "modbus_write_single",
    "serial_number": "SW000054",
    "reg": 40202,
    "value": 35
  }
}
```

JSON to save data

```
{
  "data": {
    "cmd": "modbus_write_single",
    "serial_number": "SW000054",
    "reg": 40012,
    "value": 1
  }
}
```

Now that device will have Mod Bus address **35** and now we can send to it switch on and off commands or any other command that is available for that device

```
{
  "data": {
    "cmd": "bicom",
    "addr": 35, (now with new address)
    "val": "on" (or "off")
  }
}
```

So all the messages will have to go SG gateway that's why we need to assign addresses and put them in JSON messages so that SG knows to which device switch or energy meter to send the command to.

Adding new Modbus devices using QR code

Iskra Energy Management System - Pilot Project

Iskra Energy Management Software is designed to manage electricity consumption, collect data from Iskra products and generate analysis reports. The software shows all kinds of data collected from the devices such as Measuring Centers, Measuring transducers, and Iskra Cabinet Control. These data are mainly for electricity and energy consumption, analyzing any abnormal load into specific devices or areas and other events, alarms, schedules, and measurements.

Energy Management Software Interface
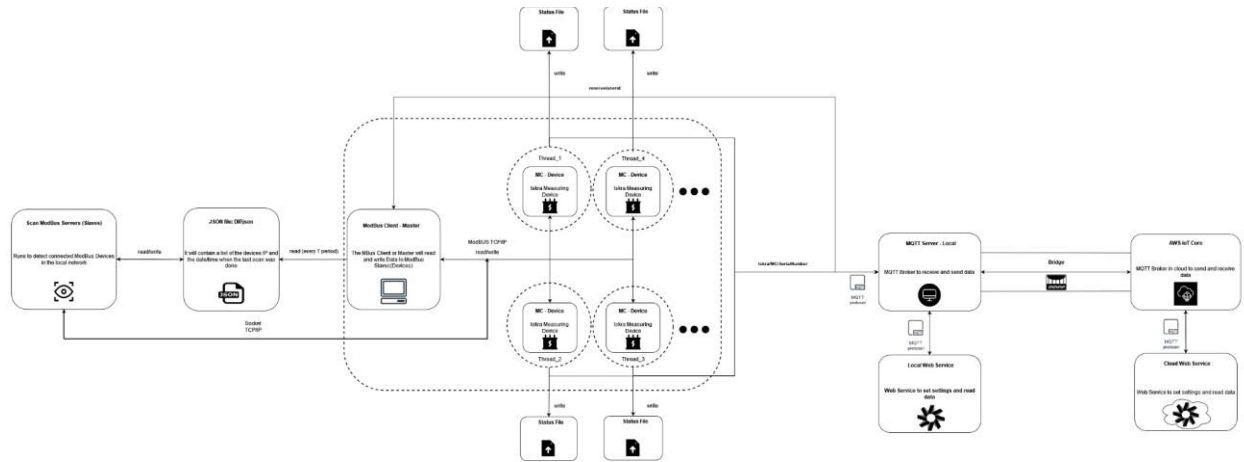
Architectural overview and the workflow process of measuring centers
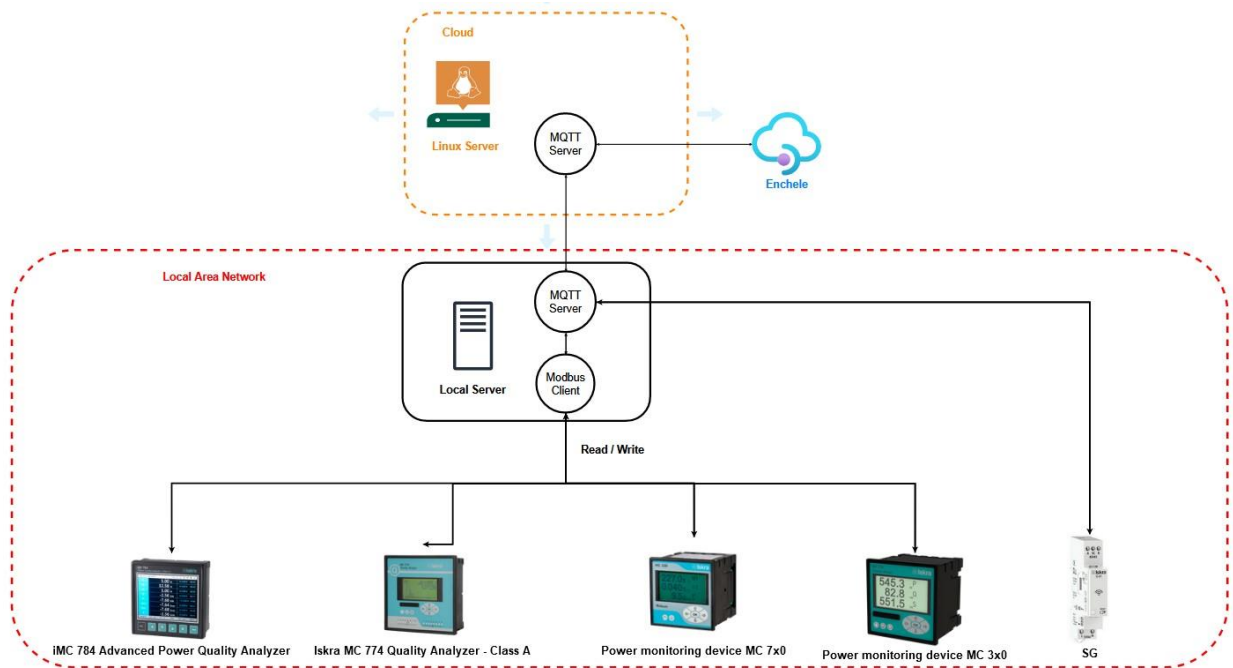
How the MCs and the gateway connect to the cloud

Energometer

Energometer is a project launched by SpaceSyntaks with technical support from the Enchele team. After the installation of the Enchele Smart Modules on three apartments, real-time data on energy usage is provided in the Enchele Home App to end-users. Our Smart Modules powered by Iskra, can switch ON/OFF devices and also measure energy consumption. The Energometer project will serve as an educational social performance tool that will encourage and inform citizens on how to conduct personalized analyses of their behavior in regard to their electricity consumption by using the available open data.
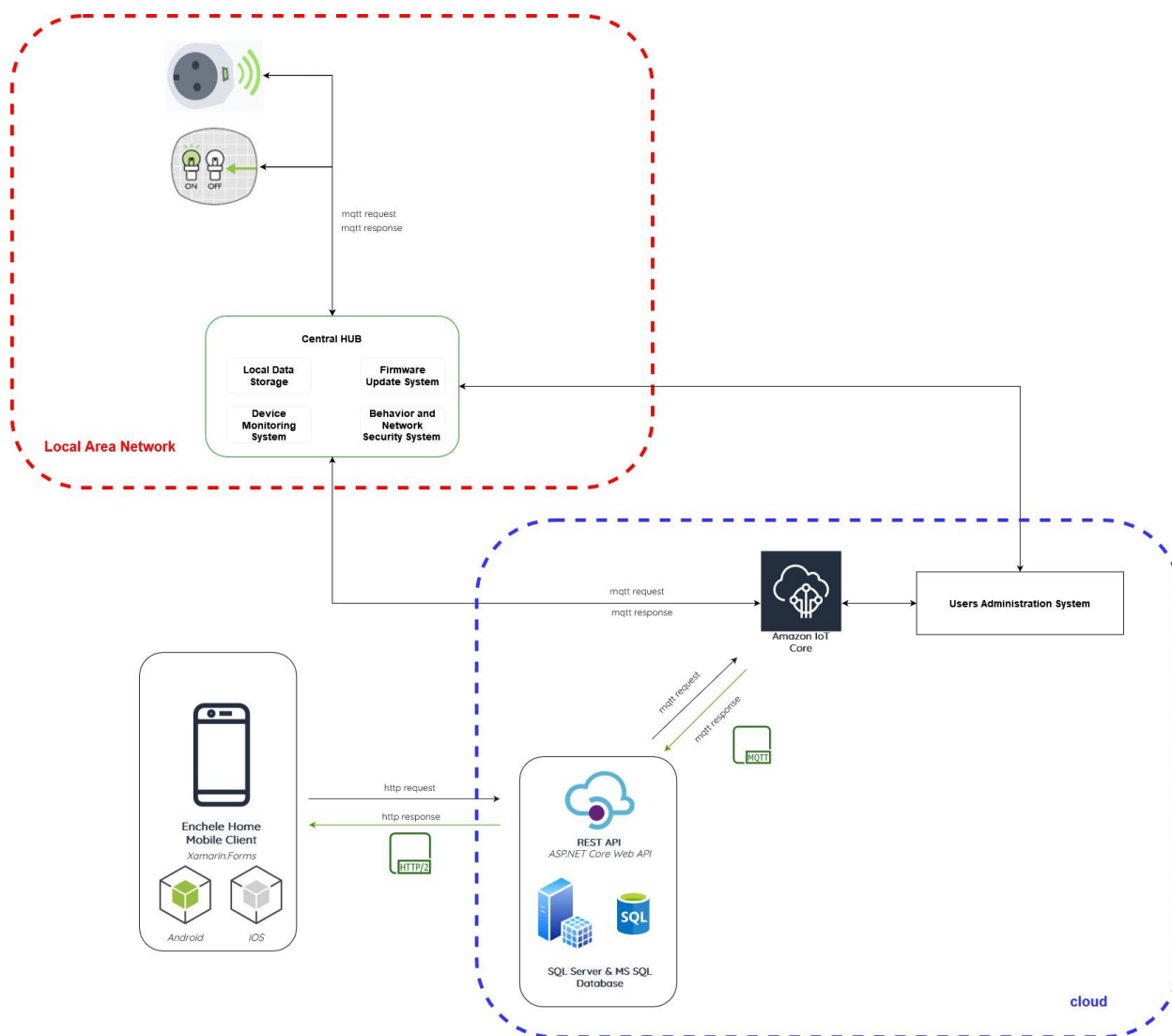
Architecture overview of the Energometer project

Air Quality Monitoring System

The air quality monitoring system was implemented by Enchele in the facility of Innovation Center Kosovo. Some of the Indoor air quality monitoring parameters are:

- Carbon dioxide (CO2)

- Carbon monoxide(CO)

- Temperature

- Relative humidity

- Sulfur Dioxide (SO2)

- Nitrogen oxides (NOx)

- Particulate Matter (PM 2.5 and PM 10)

- Air Velocity

- Volatile organic compounds (VOCs).

Project: Image Processing E-Drill Software Application

E-Drill software application to measure the offset between the center of the detected circle around the cutting edge and of the detected circle around the fastener's head. This was part of the restoration process of the commercial and US air force planes.
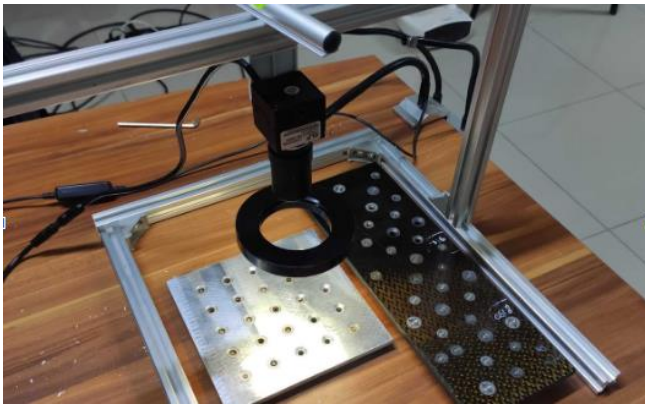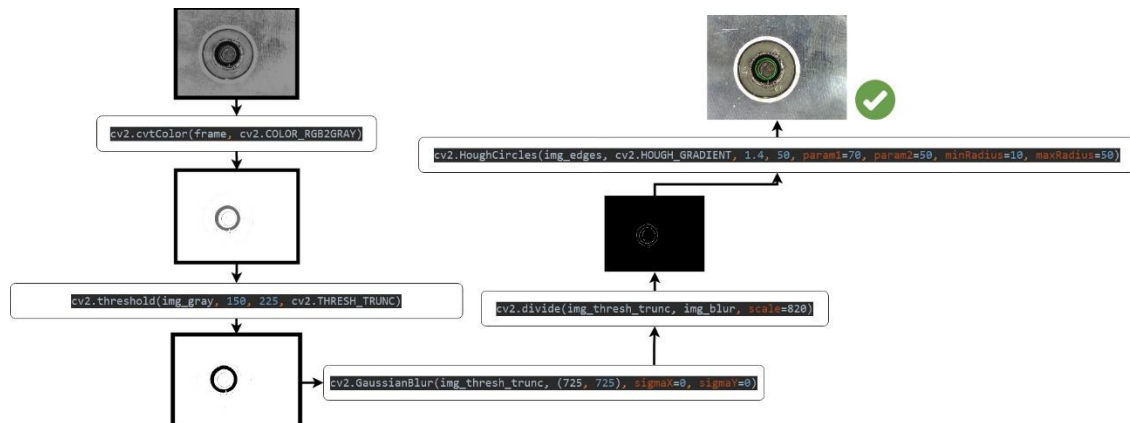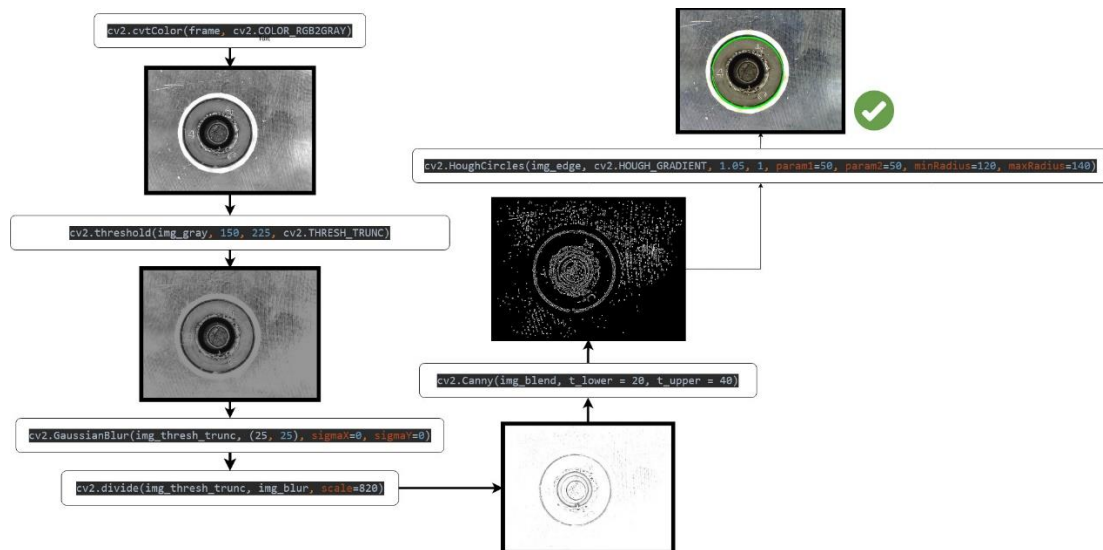

Camera setup testing
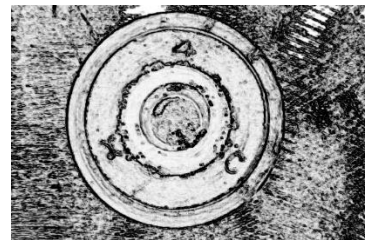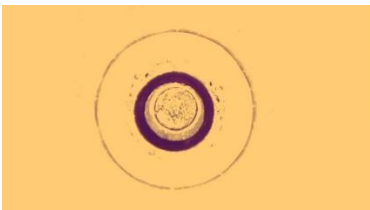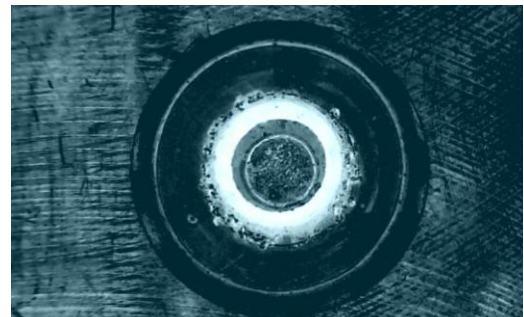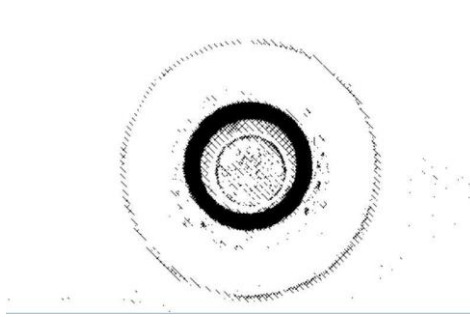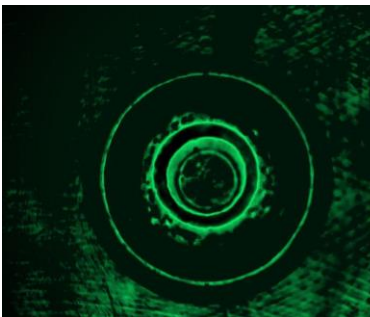
Different filters designs for easier circle detection

Cutting edge circle detection

Fastener head circle detection

Values Output, centers and radiuses

Marble Cutter - Manual to Fully Automatic (Retrofit)

Retrofit process

The machine is used to cut marble stones. The problem was that the machine was manually controlled by the operator. This resulted in a lot of errors during the cutting process, some caused by the inaccuracy of the machine and some by the mistakes of the operator. So to avoid this and to make the operator's life easier, we automated this machine by adding to it a new servo motor with a configurable PID controller, an encoder, and a microcontroller to automate the entire process, and an HMI for the operator to interact with the machine.

Electrical Safety and Audit

We have a lot of experience in Electrical Safety audit by examining the security of electrical installations at industrial units or organizations. Electrical Safety Audit was performed by enquiry, inspection, testing, and verification.

We created a lot of effective reports and presented them with analyzed facts and evidence to ensure that we are reducing the risk and helping our clients to ensure compliance with applicable Safety Standards and Regulations.

We were focused on:
- RCD tests
- Testing and Evaluation of Grounding Systems
- Lightning protection
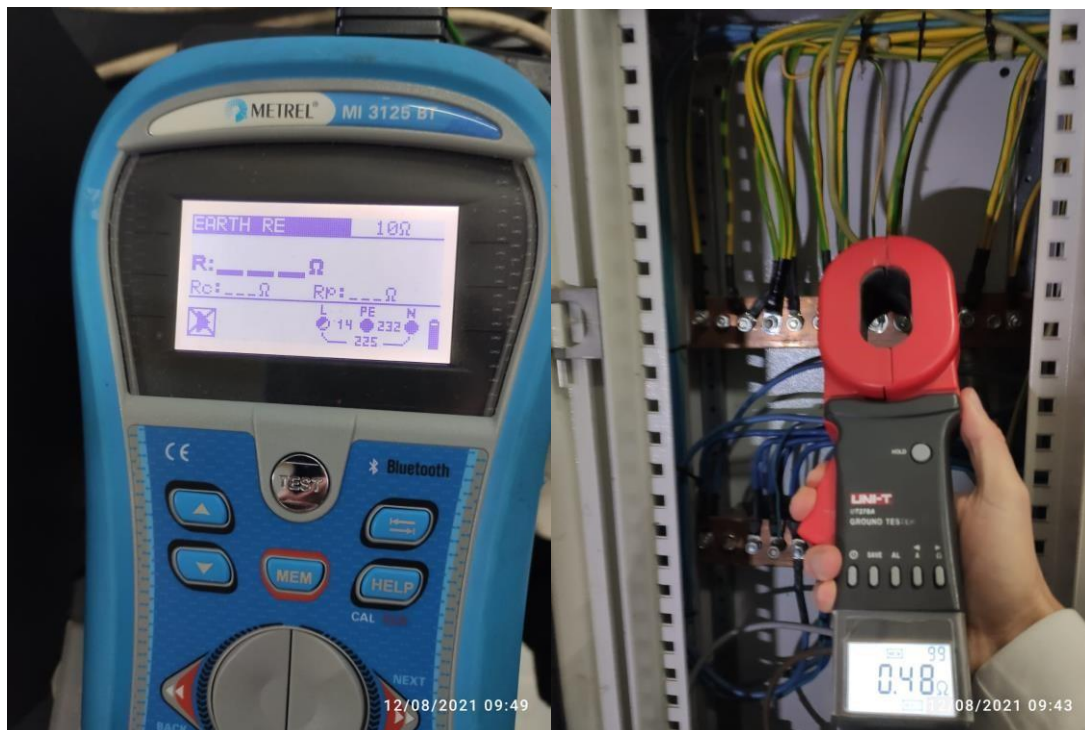
Performing RCD tests and Grounding Wire Resistance check

Paper Bag Machine - Reverse Engineering

Paper Bag Making Machine is a machine that is mastered to produce the most refined paper bag with high-performance speed. It was designed to get the bags ready at minimum making cost. Rugged structure ensured better quality and life of the machine. The length of the bag was controlled by gears. Gear change determines the size of the paper bag. The entire machinery is controlled by a single inverter motor. We re-designed the parts of the entire machine (over 1500 mechanical parts in total).
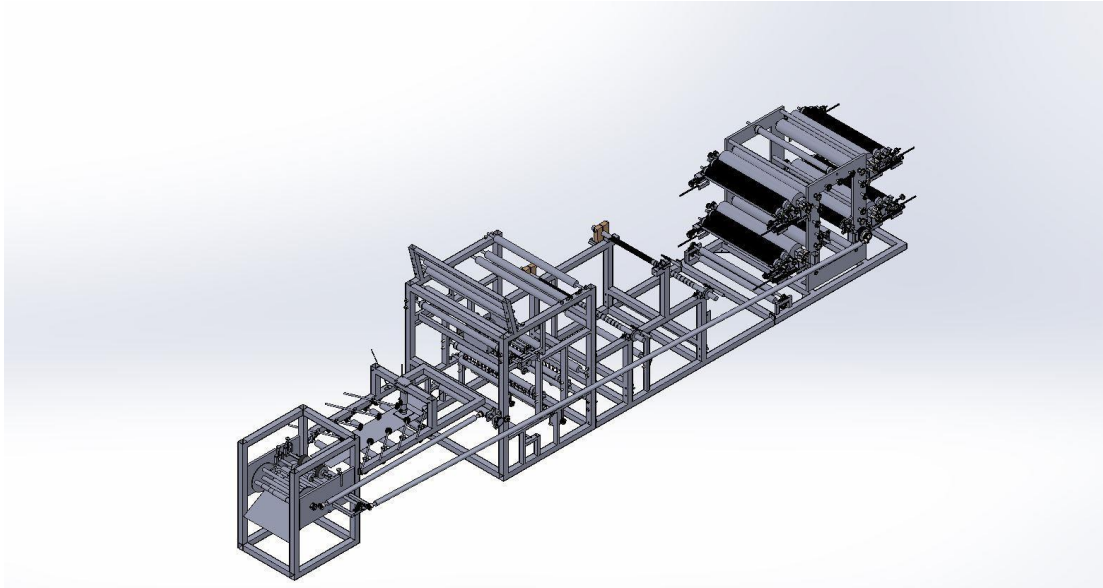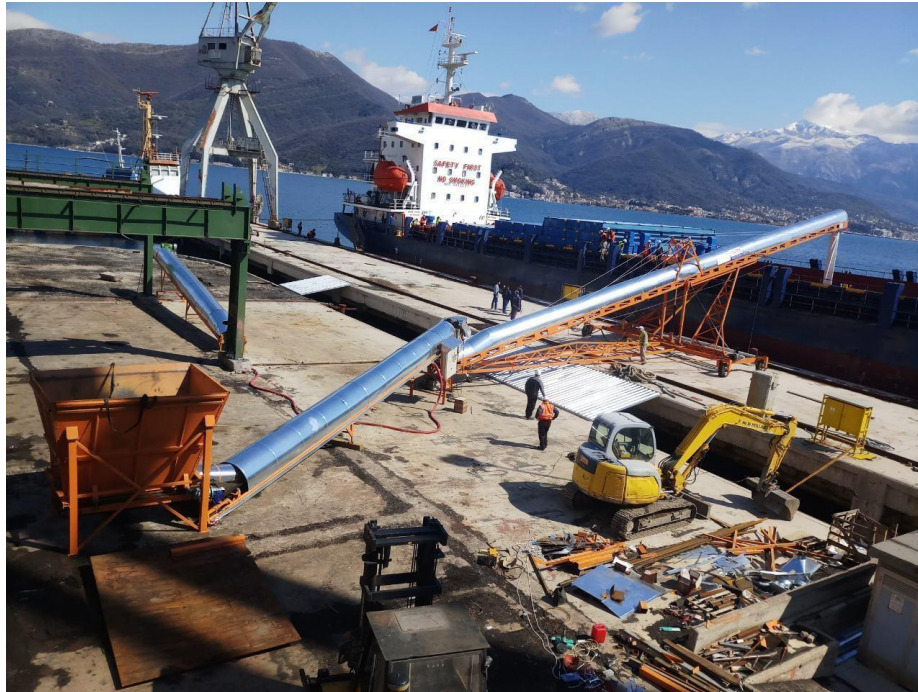
Assembly file of Machine

3D modeling and documentation of the Industrial Transportation Belt

3D modeling using SolidWorks software, dimensioning, and 2D documentation including exploded views with bill of materials and assembly instructions of building parts for material transportation belts.


Transportation belt in Kotor, Montenegro

About Us

5+ Years of experience in IoT Solutions

A dream team of talent and know-how

Our engineering team consists of the Top Tech Talent in the industry to guarantee exceptional results. All of our bilingual engineers have vast experience working with the latest technologies on the most challenging and innovative projects in the market.

We are a diverse team of Research Engineers with combined experience in software/hardware engineering and research. Our engineers have backgrounds in mechatronics, computer science, electronics, energy, and management.
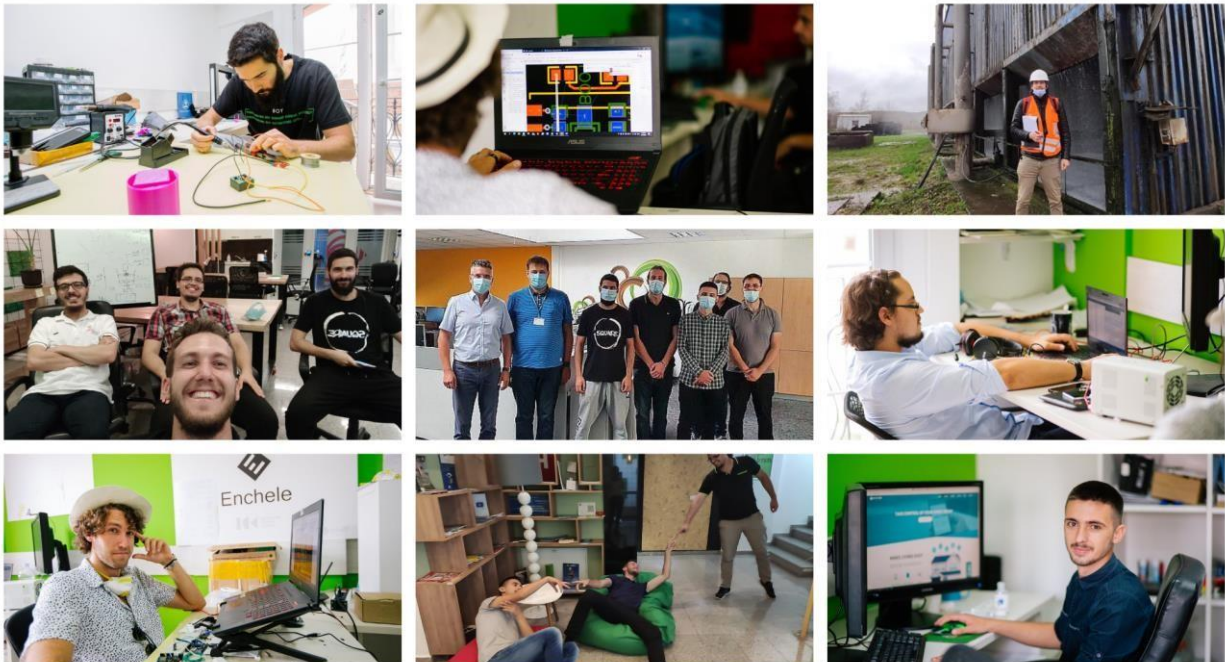
Team Presentation

Bajram Ilazi *CEO*	Persistent entrepreneur focused on ambitious goals that aim to solve problems and contribute to humanity. During my MBA studies, I developed a desire to get involved in engineering and started Enchele with my colleagues. My experience since 2017 has been mainly creating and managing engineering companies involved in the energy, automation, and IoT sectors. From my experience with the company, I have developed skills in Business Management, Teamwork, Leadership, Financial Skills, Strategic Planning, Analytical skills, and Presentation skills. As an entrepreneur, I am excited about the future because I believe that the future will be better.
Brilantdon Nura *Systems Integrator Engineer*	I am a dynamic and innovative Hardware-Software Fusion Engineer with a passion for crafting the future of connected systems. With a deep understanding of both hardware and software components, my expertise lies in seamlessly converging the physical and digital realms within the exciting domain of Internet of Things (IoT).
Rinor Mehmeti *Lead Software Engineer*	RSoftware Engineer with more than 6 years of experience in building enterprise software solutions using modern technologies. My area of expertise is designing and building high-scalable software solutions that aim to solve complex problems in areas such as efficient energy and supply chain. My interests are aligned mainly with providing solutions for future-world problems, that's when IoT solutions come into play - as a Software Engineer at Enchele, I have designed and developed applications such as Enchele Home, ICC, and Iskra Energy Management System. I have also been involved in the development of world-class software solutions such as supply-chain products for enterprises such as Starbucks, and Nestle.

|	
Uran Cabra *Embedded Systems Engineer*	With a background in Mechatronic Systems Engineering, I have been working on Embedded Systems, specifically on IoT product development. My responsibilities include firmware development and electronics design and testing. Currently, I am also pursuing a master's in Electrical Engineering with a focus on Autonomous Mobile Robotics.
Redon Berisha *Hardware Engineer*	Over 4 years of experience in developing products from scratch, robotics, and industrial machinery. Skilled in soldering, electronics, and electrical engineering, research(googling) and development, reverse engineering, and PCB designing, with the main goal of developing new products. I do not care about the young generations but my goal is to advance my engineering skills so that my company can ascend to NASA-level engineering.
Neriton Pacarizi Systems Engineer	Systems and engineering enthusiast with a background in Mechatronics Management. Electronics and technology have always been my favorite subject of mine. Experienced in handling electronic and hardware components. Currently working in IoT projects, oriented in systems designing and different programming solutions. Focused towards a common goal and achieving success with my team.

Some projects that we did for fun!
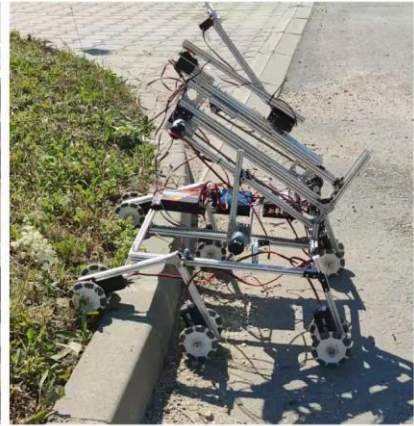
Robots

CNC Machines and Drones
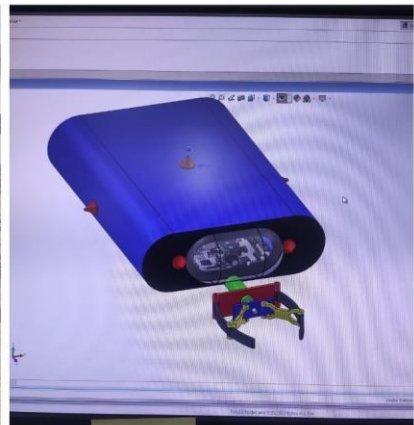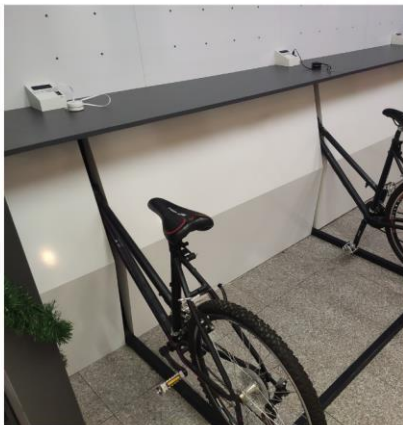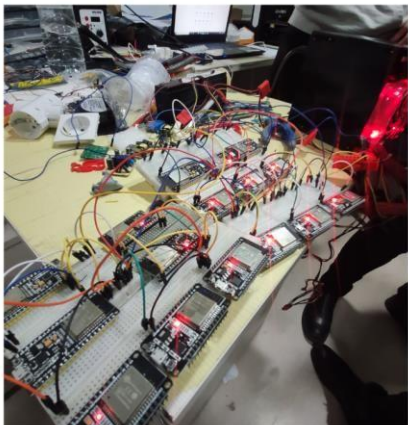
Mesh, Energy Bike and Underwater Strike