Executive Summary

I have **11 years of professional experience**, including **9.5 years as an external partner** at a research center. Throughout my career, I have contributed to projects across various sectors, including **agriculture**, **healthcare**, **smart homes**, and **transportation**, where I have developed specialized expertise.

I hold a Bachelor's Degree in Automation Engineering (BEng) and a Master's Degree (MSc) in Advanced Microelectronic Systems Engineering. My core expertise lies in V2V (**Vehicle-to-Vehicle**) and V2I (**Vehicle-to-Infrastructure**) communications and the design of **Autonomous Vehicle Systems**. I have extensive experience in embedded systems design and development, including firmware development for AVR, NXP, MOTOROLA, TI, and ATMEL microcontrollers. My proficiency extends to Linux-based development, leveraging C, object-oriented C++, and Linux shell scripting on platforms such as Raspberry Pi, Arduino, and i.MX 7Dual Sabre. I am also highly skilled in schematic and PCB design using Altium, PCB fabrication techniques, PLC programming (Siemens systems), and designing embedded system graphical user interfaces (GUIs).

During my tenure at CERTH, I played a **leading technical role** in the European Horizon Research Project **SAFE STRIP**, where I contributed to the architecture and operation of Roadside Units (RSUs) and improved ITS-G5, LTE, and BLE communication protocols to enhance road safety. Additionally, I led critical national research initiatives such as **ODOS 2020**, where I designed sensor networks for real-time driver notifications, and **SELAS**, which focused on using next-generation photovoltaic panels for highway energy optimization, including nighttime energy supply. A career highlight was contributing to **SAFE STRIP**, which resulted in a **national patent**, and demonstrating the practical impact of my work.

As the **founder of AUTONAVIS R&D**, I have dedicated the past four years to independently developing innovative solutions, separate from my collaboration with the research center. My primary focus has been the GoCAV platform, a fully reconstructed autonomous go-kart equipped with **LiDAR**, **multiple sensors** including **Camera**, **AI technologies**, and **RTK GPS integration**. This platform is **a benchmark for autonomous vehicle research and development**, bridging the gap between simulation and real-world testing while **minimizing accident risks**.

The GoCAV project has undergone three implementation phases, including efficiency optimizations, CAN network integration, and microcontroller firmware interfacing. The system's final evaluation in test field conditions demonstrated highly satisfactory results, proving its value as a research and innovation tool. Future applications include **integrating** these autonomous systems **into conventional vehicles** to enhance road safety, expanding **mobility solutions** for **people with disabilities**, and developing **autonomous emergency response systems**. All architecture and implementation details have been officially documented and notarized.

AUTONAVIS R&D has built a **strong network of partners** specializing in **embedded systems, autonomous vehicles, and V2X communication protocols**. Moreover, I have experience **writing proposals for European R&D projects**, which could be valuable in future collaborative efforts.

With a strong background in embedded systems, autonomous vehicles, communication protocols, and energy solutions, I bring valuable expertise to any team driving innovation in connected and safe transportation technologies.

For more details and photos of completed projects, refer to my **CV** or visit:

- **Business Website:** https://autonavis.com/
- **GoCAV in Action:** https://autonavis.com/gocav/
- **LinkedIn:** http://lnkd.in/b-CxryD

CURRICULUM VITAE

CHRISTOS SOUGLES

PERSONAL INFORMATION

DATE OF BIRTH:	25/08/1982
PLACE OF BIRTH:	THESSALONIKI, GREECE
MARITAL STATUS:	MARRIED
ADDRESS:	SAMPSOUNTOS 20, THERMI, 57001, THESSALONIKI GREECE
CONTACT NUMBERS:	00302310419369, 00306972233164
E-MAILS:	chris.sougles@gmail.com, c.sougles@autonavis.com
LinkedIn:	http://lnkd.in/b-CxryD

WORK EXPERIENCE

- **January 2023 – December 2024**

  Worked as a Senior Embedded Systems Engineer (Research Associate) at the "Centre for Research & Technology Hellas – Information Technologies Institute" in the Horizon research program FLEXIndustries.

  The FLEXIndustries project focuses on developing and implementing energy efficiency measures and process flexibility methods across seven industrial sectors. It aims to ensure the seamless integration of these solutions with electrical and thermal networks. The project seeks to establish a flexibility assessment methodology for industrial environments and improve connectivity between IT and technology sectors within the energy domain. FLEXIndustries will deliver a secure platform for dynamic energy and process management, supporting process flexibility while promoting clustering methods to enhance the local renewable energy capacity and increase industrial flexibility. Additionally, the project will demonstrate and validate its solutions in seven real-world industrial environments and design sustainable business models to enable the energy transition in energy-intensive industries. FLEXIndustries aims to improve energy efficiency and enhance flexibility in industries, contributing to more sustainable and efficient energy use.

  Especially, I have been involved in:
  - *Technical management of WP5*
  - *Decision Support System (DSS) design for each of the seven pilot trials*

- **October 2022 – December 2024**

  Worked as a Senior Embedded Systems Engineer (Research Associate) at the "Centre for Research & Technology Hellas – Information Technologies Institute" in the Greek research program AE3vAO.

  The AE3vAO project focuses on creating a digital platform for the efficient management and optimal utilization of food waste. Globally, one-third of produced food is lost or discarded, leading to wasteful resource usage and negative economic and environmental impacts. The project aims to decompose organic matter and improve biowaste management through innovative technologies like intelligent recycling bins.

  The project aims to develop an intelligent platform to monitor anaerobic digestion bins' filling

levels and operational status in real-time while engaging users in rational waste management. The platform will utilize machine learning and deep learning techniques for data analysis and inference. A multi-user recognition system will also be developed using Bluetooth or NFC tags, promoting personalized usage and tracking recycling performance.

The platform's architecture is based on a Raspberry Pi microcomputer connected to sensors monitoring the bins. Data is stored in a database and accessible via the internet or a mobile app. The project will be validated at key city locations to assess its effectiveness, aiming to promote circular economy practices, reduce costs, and foster ecological awareness.

Especially, I have been involved in:

- *Technical management of the bin monitoring system*
- *Overall project management*

➢ **February 2022 – October 2022**

Worked as a Senior Embedded Systems Engineer (Research Associate) at the "Centre for Research & Technology Hellas – Information Technologies Institute" in the Greek research program ΣΕΛΑΣ.

The ΣΕΛΑΣ project aims to study and leverage new photovoltaic system technologies in existing highway infrastructure (e.g., guardrails, toll booth structures, parking areas) to cover part of their energy needs. Its innovative photovoltaic systems generate electricity 24/7, utilizing ambient light from other sources (e.g., car headlights, highway lighting) during nighttime. (See attached related photographic material – SELAS GREEK PROJECT)

Especially, I have been involved in:

- *Programming, constructing, and installing the pilot system on-site.*
- *System connection to the platform via a 4G/LTE network.*
- *The writing of the project deliverables*

➢ **October 2021 - October 2022**

Worked as a Senior Embedded Systems Engineer (Research Associate) at the "Centre for Research & Technology Hellas – Information Technologies Institute" in the Greek research program Renaissance.

The Renaissance project is an Innovation Action (IA) that provides a community-based, scalable, and replicable approach for implementing new business models and technologies that support clean energy production and shared energy distribution within local communities.

➢ **May 2021 – October 2021**

Worked as a Senior Embedded Systems Engineer (Research Associate) at the "Centre for Research & Technology Hellas – Information Technologies Institute" and participated in the Horizon research program IoTAC.

The IoTAC project aims to provide an innovative, secure, and privacy-friendly architecture for the Internet of Things (IoT) that facilitates the development and operation of more attack-resilient services through (a) monitoring and assessing security throughout the broader lifecycle and development of software, (b) creating an advanced access control mechanism based on an innovative interaction model using integrated cards and private key technology, (c) detailed logging of system execution processes, and (d) providing relevant mechanisms to certify the security of produced applications and systems, based on international security standards, best practices, and the project's research findings.

The results will be demonstrated by implementing four use cases in IoT environments where fully functional applications will be developed in a laboratory setting. Finally, one of the project's priorities is the establishment of certification mechanisms in the field of IoT system security.

- **April 2020 – April 2021:**

  Worked as a Senior Embedded Systems Engineer (Research Associate) at the "Centre for Research & Technology Hellas – Information Technologies Institute" and participated in the Greek research project ODOS 2020 (https://odos2020.iti.gr/).

  ODOS 2020 aims to introduce an innovative technological solution that, through the use of the "Internet of Things" (IoT) and infrastructure-to-vehicle communication technologies, implements collaborative applications in the field of Intelligent Transportation Systems without significant or costly interventions on the roadway, significantly contributing to increased road safety and the safe maintenance of infrastructure. The integrated technological solution will be aimed at all types of vehicles (passenger cars, trucks, motorcycles) and will require minimal to no equipment from the vehicles. (See attached related photographic material – ΟΔΟΣ 2020 GREEK PROJECT)

  Especially, I have been involved in:
  - *The design of the system architecture*
  - *The design and construction of the power supply unit (autonomous system – use of batteries and photovoltaic) for the RSU (Road Side Unit)*
  - *The writing of the project deliverables*

- **May 2020 – April 2021**

  Worked as a Senior Embedded Systems Engineer (Research Associate) at the "Centre for Research & Technology Hellas – Information Technologies Institute" and participated in the European research project EXA2PRO.

  The goal of the EXA2PRO project is to implement a programming environment that will aid in the better development of parallel algorithms for solving complex scientific problems on exascale computing systems (1018 operations per second). It is expected to support a range of scientific applications by providing programming tools to improve the quality of numerical codes, assist in the more efficient and rational management of the heterogeneous structure of modern computing systems at the hardware level, and provide tools for optimizing memory management.

- **July 2017 – August 2020:**

  Worked as Senior Embedded Systems Engineer (Research Associate) at “Centre for Research & Technology Hellas – Information Technologies Institute”. I have participated in the SAFE STRIP European Research Program (http://safestrip.eu/).

  SAFE STRIP aims to introduce a disruptive technology that will achieve to embed C-ITS applications in existing road infrastructure, including novel I2V (Infrastructure-to-Vehicle) and V2I (Vehicle-to-Infrastructure), as well as VMS (Variable Message Sign) / VSL (Variable Speed Limit) functions into low-cost, integrated strips markers on the road. (See attached related photographic material – SAFESTRIP HORIZON PROJECT)

  Specifically, I have been involved in:
  - *The design of the system architecture*
  - *The operation of the RSU (Road Side Unit)*
  - *The implementation of communication protocols ITS-G5, LTE, BLE*

- *The PCB design of the RSU (Road Side Unit)*
- *The operation and installation of the RSU on the road during pilot tests*
- *The writing of the project deliverables*

➢ **June 2015 – June 2017:**

Worked as Embedded Systems Engineer (Research Associate) at "Centre for Research & Technology Hellas – Information Technologies Institute". I have participated mainly in a European Research Program (My Air Coach) and other Research Programs by supporting Embedded Systems Development.

Especially, I have been involved in:

- *Writing Firmware (Embedded C Programming) for TI Microcontroller MSP430 (My Air Coach Project)*
- *Designing SAFE STRIP Project Specifications (Project Proposal)*
- *Electronic Circuit Designing – Schematic & PCB – (WATT+VOLT "1-phase" & "3-phases" Energy Meters)*
- *Object Oriented C++ Programming*
- *Database Designing*
- *System Integration*

➢ **January 2015 - August 2015:**

Worked as an Embedded Systems Engineer (self-employed). The project aims to build my libraries for peripheral devices using Atmel microcontroller 89C51AC2.

The project objectives are the following:

- *The building of a circuit which is composed of:*
  - *Atmel microcontroller 89C51AC2*
  - *Graphical LCD (240 x 128)*
  - *Keypad (4 x 4)*
  - *4 external 8Kb RAMs*
  - *RS-232 DE9 connector*
- *The firmware development to enable the following functionalities:*
  - *Data display in the Graphical LCD (240 x 128) (graphics and text)*
  - *Data input in the Graphical LCD by using the keypad*
  - *Data recording in the 4 external 8Kb RAMs (data coming by the microcontroller serial port or by future sensors connection to the microcontroller inputs pins)*

The circuit has been designed in a way that makes future expansion possible. Especially the following inputs & outputs are available:

- *8 digital inputs*
- *8 digital outputs*
- *8 analog pins either used as inputs or outputs (port P1 special functions)*
- *External Interrupt 0 & 1 Inputs (Port P3 special functions)*
- *Timer 0 & 1 Counter Inputs (Port P3 special functions)*

(See attached related photographic material – ATMEL MICROCONTROLLER 89C51AC2 & PERIPHERAL DEVICES)

- **November 2012 - October 2013:**
  Worked as Technical Manager (Supervisor of the Installation and Maintenance of the automated bike sharing – parking system) at “Brainbox Informatics” company. Especially I was responsible for:

  - Managing the purchase of tools and spare parts required for installation and maintenance
  - Overseeing the installation process of the automated bike-sharing and parking system
  - Conducting technical training sessions and supervising system installers across various cities.
  - System maintenance:
    - Providing remote technical assistance to local technicians
    - Maintaining comprehensive technical records of the system’s performance in each city
    - Resolving major technical issues on-site
  - Proposing and submitting system improvement suggestions to the Dutch supplier

  Different system versions have been installed in the following Greek cities.
  - *Automated Bike Sharing system in the municipalities of*
    - *Ioannina - 10 bikes / 2 stations*
    - *Didymoteicho - 100 bikes / 7 stations*
    - *Komotini - 100 bikes / 6 stations*
    - *Kavala - 50 bikes / 4 stations*
    - *Karditsa - 70 bikes / 6 stations*
    - *Keratsini - Drapetsona - 70 bikes / 6 stations*
    - *Nafpaktos - 60 bikes / 4 stations*
  - *Automated Bike Sharing system "Thessbike" 6 bikes / 1 station in Thessaloniki*

  Automated Bike Parking system OTE – COSMOTE 80 automated bike parking locks in high-traffic spots in Athens (Golden Hall, The Mall Athens, Floisvos Marina, Plazza Mall, etc).
  (See attached related photographic material – *AUTOMATED BIKE SHARING & PARKING SYSTEM*).

- **February 2010 – November 2010:**
  Joined the army. I served at the Technical Corps.

- **September 2007 - August 2008:**
  Worked as an Embedded Systems Engineer. I implemented a remote temperature monitoring system for industrial refrigerators (Telemetry System) during the project.

  The primary objective of this project was to develop a remote monitoring system for the temperature of industrial refrigerators using the RS485 network, a Wavecom GSM modem, and Atmel T89C51AC2 microcontrollers.

  During the implementation, I designed and built the control device for the GSM modem, which served as the master device, and monitoring devices for the refrigerators, which acted as slave devices supporting up to nine units. Additionally, I developed the firmware for all devices, ensuring their functionality. The master and slave devices were equipped with backup power supplies using rechargeable batteries, ensuring reliable operation even during power interruptions.

  Communication between the master and slave devices was established via the wired RS485 network. Since the RS485 network lacks a data link layer, I designed and implemented a custom data link layer to facilitate seamless communication. Interaction between the user and the GSM

modem, controlled by the master device, was enabled through bidirectional text messages (SMS). The system could notify users about critical events, such as alarm activations or power failures affecting one or more refrigerators. Furthermore, users could query the operating status of specific refrigerators at any time by sending an SMS to the system, which recognized a unique format for such requests.

The master and slave devices were designed to allow the configuration of their operating parameters, including the number of users. This configuration could be performed by both the installation engineer and the user through a built-in keypad on each device. This flexibility ensured the system could be tailored to meet the specific requirements of different installations.
(See attached related photographic material – TELEMETRY SYSTEM)

- **April 2006 - September 2006:**
  Worked as an Automation Engineer at the company "Digintel". Especially I successfully implemented the following projects:
  - Elevator Floor Indicator Lights Controller - Programmed a microcontroller (ATtiny13 - AVR) to control the floor indicator lights of an elevator system.
  - The implementation of a remote watering system supervisor:

    The project's primary objective was to design, construct, and program a remote supervision device utilizing an ATmega32 microcontroller for a watering system. The watering system consists of a wheel with a coiled hose and a tractor that drives the wheel. To initiate watering, the user unrolls the hose using the tractor, which then slowly recoils the hose after use. The supervision device was designed to adapt to the wheel and provide the user with critical information, including the remaining length of the hose until it is fully recoiled, the estimated time until the watering process is completed, and the instantaneous velocity of the watering operation.

    During the project, I designed and constructed the printed circuit for the supervision device and developed its firmware. The firmware facilitated communication between the user and the GSM modem integrated into the device. The interaction was enabled through a missed call initiated by the user, to which the supervision device responded with an SMS containing the requested information. The system was designed to accommodate one user at a time, with the user's mobile number set during the device configuration procedure.

    The configuration procedure involved setting several parameters using an embedded keyboard, allowing the installation engineer and the user to tailor the system to their needs.

  - *The design (Vision) and the building of the electrological panel of a machine that stretches painting canvas. Moreover, I did the programming of the P.L.C. (Programmable Logic Controller), which is the fundamental element of the whole system.*

  (See attached related photographic material - CANVAS STRETCHING MACHINE FOR PAINTING FRAMES)

EDUCATION

- **Graduated in October of 2009:** University of Bristol, UK, MSc in Advanced Microelectronic Systems Engineering (scholar)

  DISSERTATION
  "Controller Area Network – Performance and Traffic Management"

  The primary objective of this project was to evaluate the performance of two types of CAN networks: Event-Triggered CAN (ETCAN) and Time-Triggered CAN (TTCAN). We implemented various data transmission scenarios under different bus loads in a CAN network to achieve this. The network setup consisted of two LPC2378 microcontrollers and a CAN analyzer, which generated traffic and measured message transmission times.

  Upon completing the project, we observed that the response time for an asynchronous external event in ETCAN is influenced by message priorities and the sequence in which the messages are transmitted on the bus. In contrast, the performance of TTCAN remains unaffected mainly by bus load, relying instead on the structure of the matrix cycle.

  A noteworthy finding emerged from the analysis of transmission times between the two microcontrollers: the accuracy of measuring transmission times directly on the microcontrollers is not only comparable to the results from the CAN analyzer but, in some cases, can even surpass it. This result highlights a significant advantage, especially considering the high cost of the CAN analyzer.
  (See attached related photographic material – BRISTOL DISSERTATION)

- **Graduated in June of 2007:** Alexandreio Technological Educational Institute of Thessaloniki, Greece, Degree in Automation (Highest Grade Point Average)

  THESIS
  "Telemetry through 8051 and GSM / GPRS Modem"

  The primary objective of this project was to design, build, and program a remote-control device using the Atmel T89C51AC2 microcontroller. The device could control eight digital outputs, providing the system user with real-time updates on the status of eight digital inputs and notifying them in the event of a system alarm.

  As part of the project implementation, I designed and constructed the circuit board for the remote-control device. Additionally, I developed the device's firmware, enabling communication between the user and a GSM modem via bidirectional text messages (SMS). The device recognized a unique SMS format for interaction. Only one system user could be configured at a time, with their mobile number defined during the device's setup process.

  This system, developed as part of my thesis, was showcased at the 21st International Technology, Telecommunications, and Digital Technology Exhibition in Thessaloniki in October 2007.
  (See attached related photographic material – AUTOMATION THESIS)

SOFTWARE - HARDWARE KNOWLEDGE & SKILLS

- **Software (Programs):**
  - ***Excellent Knowledge:*** Visio, Altium, Corel, Proteus (Professional 7), Cadence, Wireshark, Windows, MS Office
  - ***Good Knowledge:*** Linux
  - ***Basic Knowledge:*** AutoCAD

- **Software (Programming):**

  Assembly, Embedded C, Object-Oriented C++, Linux Shell Scripting, Verilog, VHDL

- **Hardware (Microcontrollers):**
  - **Programmed in C:**
    - ***AVR:*** ATtiny13, ATmega 8, ATmega 16, ATmega 32, ATmega328P
    - ***NXP (PHILIPS):*** LPC2378
    - ***MOTOROLA:*** 68HC12
    - ***TEXAS INSTRUMENT:*** MSP430F5438A
  - **Programmed in C & Assembly:**
    - ***ATMEL:*** AT89C51RD2, AT89C51AC2, AT89C51CC03

- **Hardware (Development Boards)**
  - Raspberry Pi 5
  - Arduino Nano και Mega V3.0
  - i.MX 7Dual SABRE (MCIMX7SABRE) - NXP Semiconductors

- **Hardware (FPGA):**
  - **Programmed in VHDL (*Basic Knowledge*):**
    - ***MicroBlaze Development Board:*** Kit Spartan-3E 1600E

- **Communication Protocols:**
  - ITS-G5, LTE, BLE, CAN, RS-485, GSM

- **Designing Embedded Systems User Interface**

- **PCB Construction:**
  - UV Exposure and Etching Devices

- **Hardware Tools**
  - CAN-Bus Analyzer

LANGUAGES

ENGLISH:

- **IELTS** (July 2008)
- ***Reading:*** 7.5 ***/ Listening:*** 6.5 ***/ Writing:*** 6.5 ***/ Speaking:*** 6
- **Citizen of Bristol (United Kingdom):** September 2008 – September 2009
- **Participation in 6 European Projects:** June 2015 - Present

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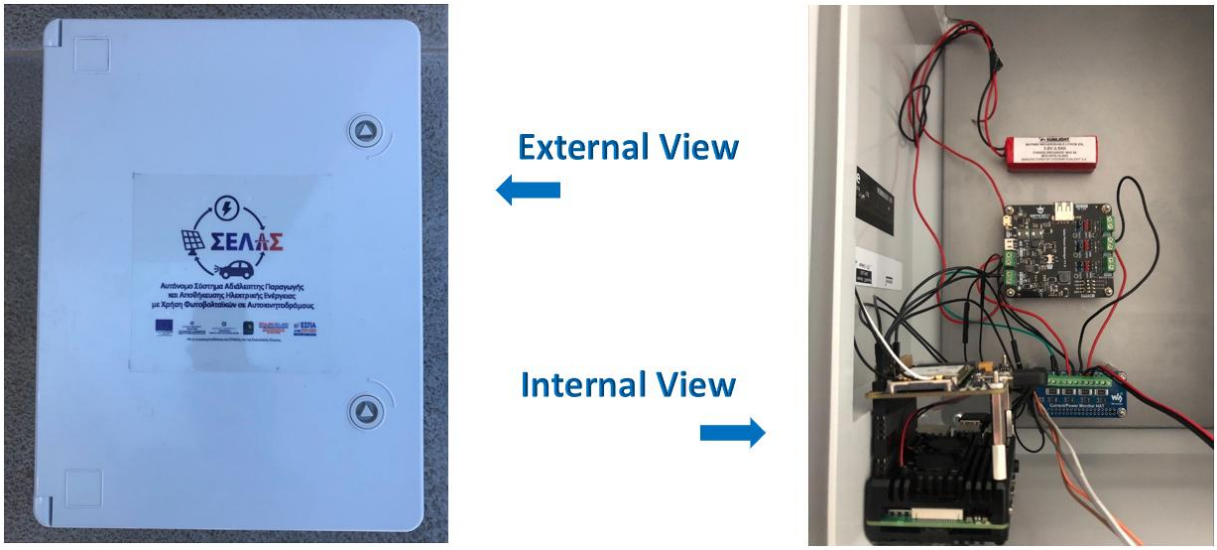
ΣΕΛΑΣ
GREEK PROJECT



Under Construction Control Panel for DSSC Photovoltaics

Control Panel of DSSC Photovoltaics – Laboratory Tests

DSSC PV - Night Operation of the System

Conventional PV System Installation

DSSC PV System Installation

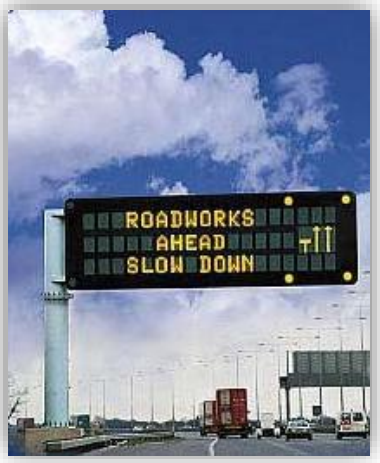
ΟΔΟΣ 2020
GREEK PROJECT

RSU Power Supply Control Panel

SAFE STRIP
HORIZON PROJECT

EXISTING TECHNOLOGY

Information Provided to Vehicles by Road Infrastructure



SAFE STRIP Proposal

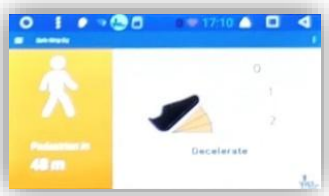
Installation

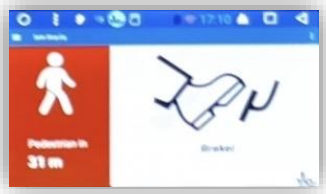
- Reduces the size and cost of the infrastructure
- Reduces installation time
- The system can be installed on the existing road infrastructure

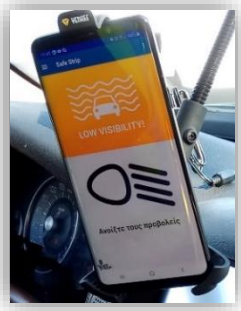
System Operation

- Information is provided by sensors located on the roadway

- Personalized messages (on the vehicle's screen or mobile device) based on the vehicle's position on the roadway



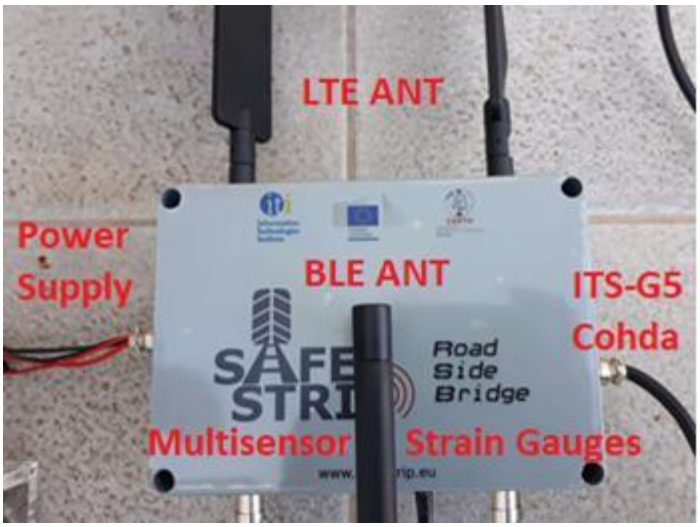




Scenarios Implemented

- Notification about the presence of a pedestrian on the roadway
- Notification about current road surface conditions
- Notification about road surface wear
- Notification about a vehicle moving in the opposite direction of traffic
- Notification about a stationary vehicle on the road due to a breakdown
- Notification about low visibility conditions
- Notification about ongoing roadworks
- Collision avoidance at intersections
- Notification about the presence of an unguarded railway crossing
- Transmission of information to autonomous vehicles
- Notification about approaching an area with virtual tolls
- Parking space management

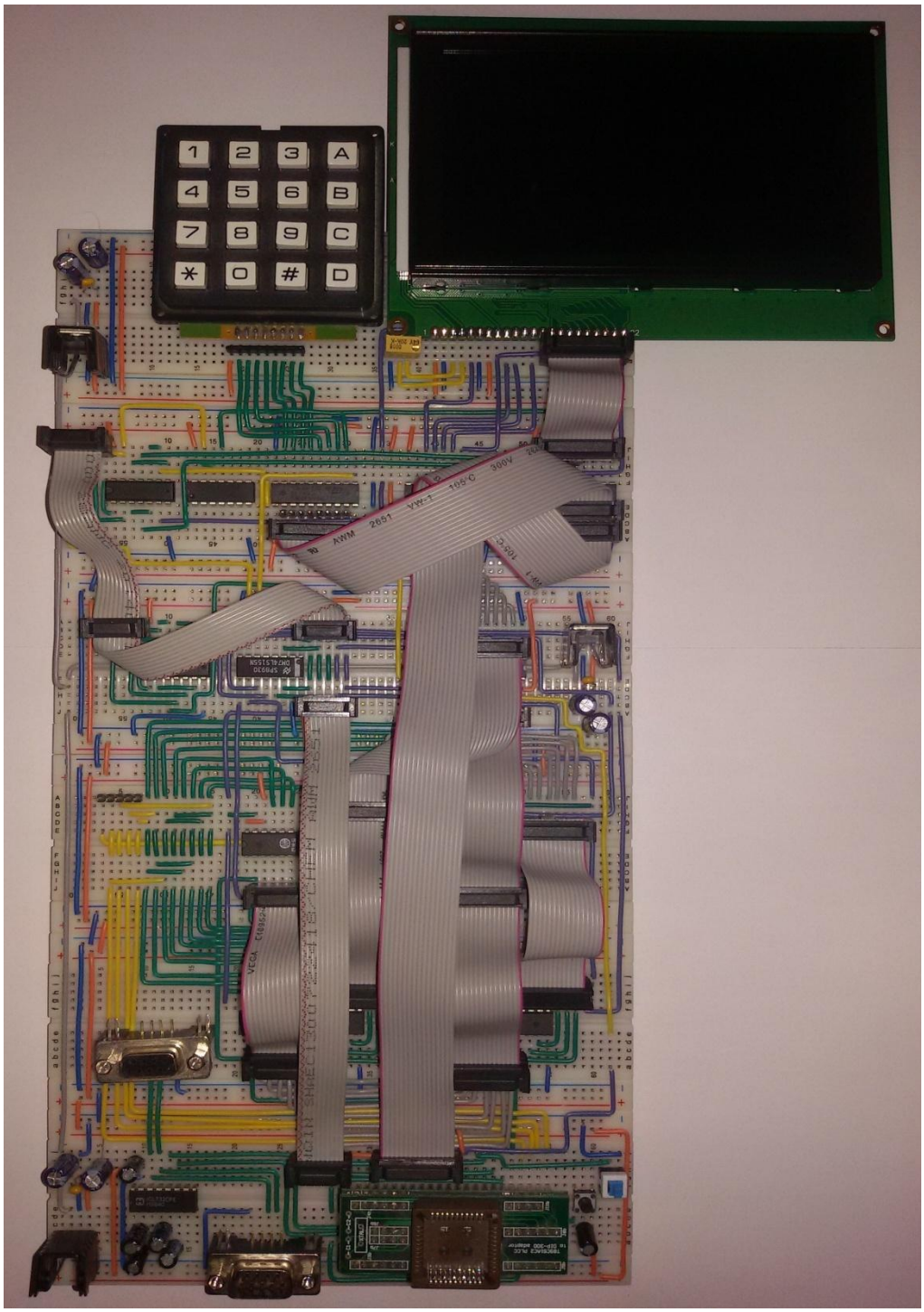
RSB Components



RSB Central Control Unit

RSB Operational Test

ATMEL MICROCONTROLLER 89C51AC2 & Peripheral Devices



Development Board

AUTOMATED BIKE SHARING & PARKING SYSTEM

Automated Bicycle Rental System of Ioannina

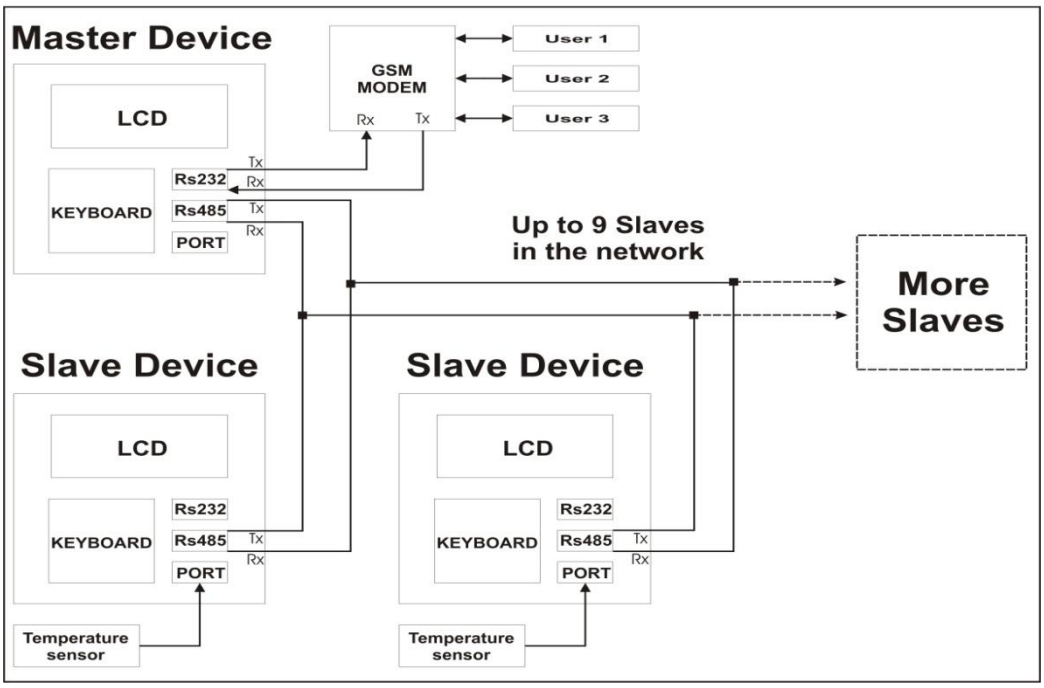
Automated Bicycle Rental System of Didymoteicho

Automated Bicycle Rental System of Karditsa

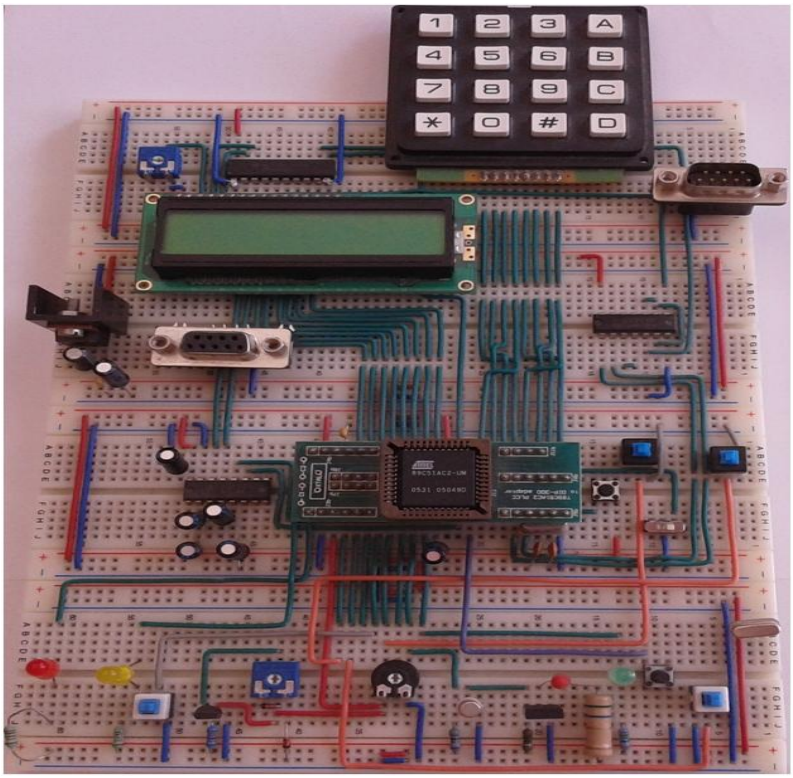
Automated Bicycle Rental System of Karditsa

Automated Bicycle Rental System of Thessaloniki

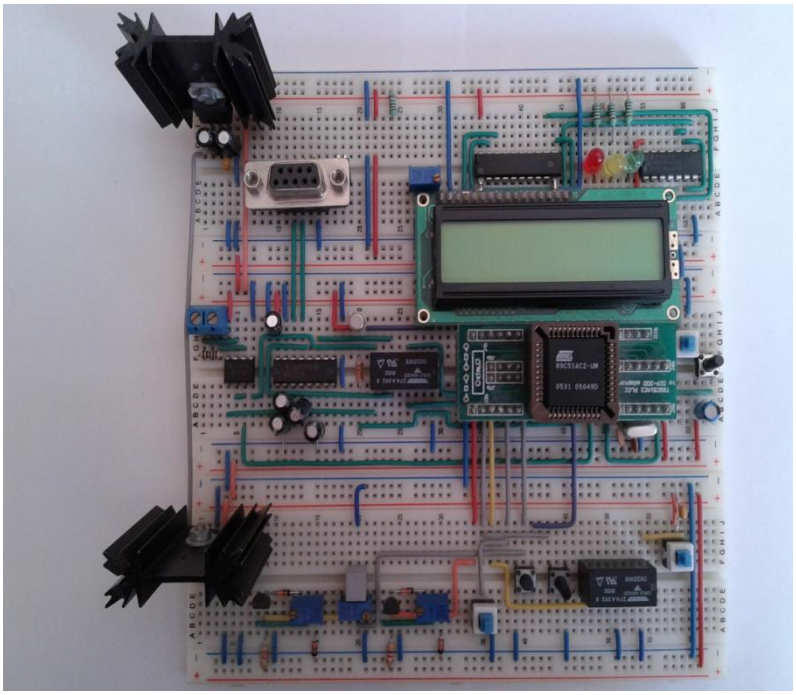
TELEMETRY SYSTEM



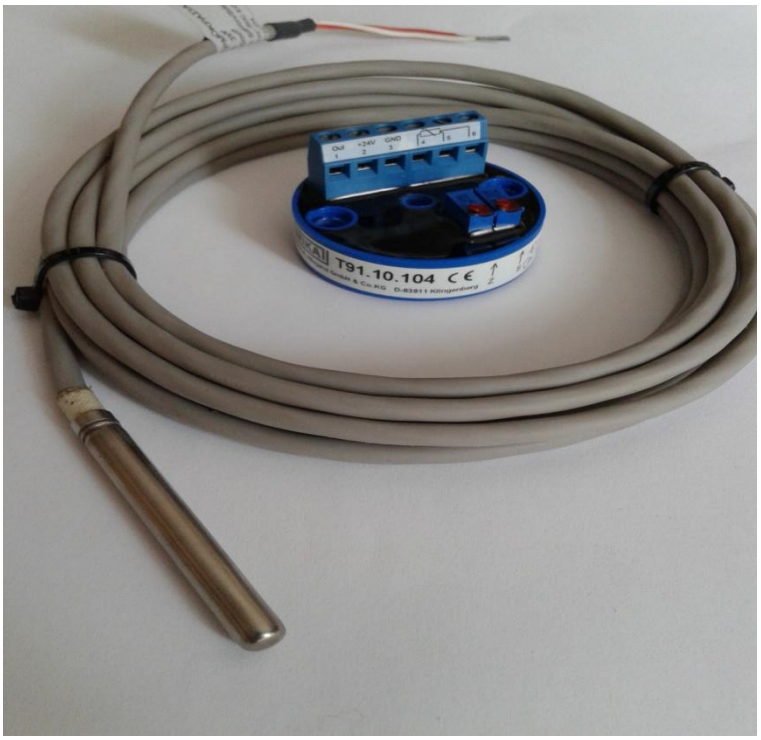
System Architecture



Development Board 1

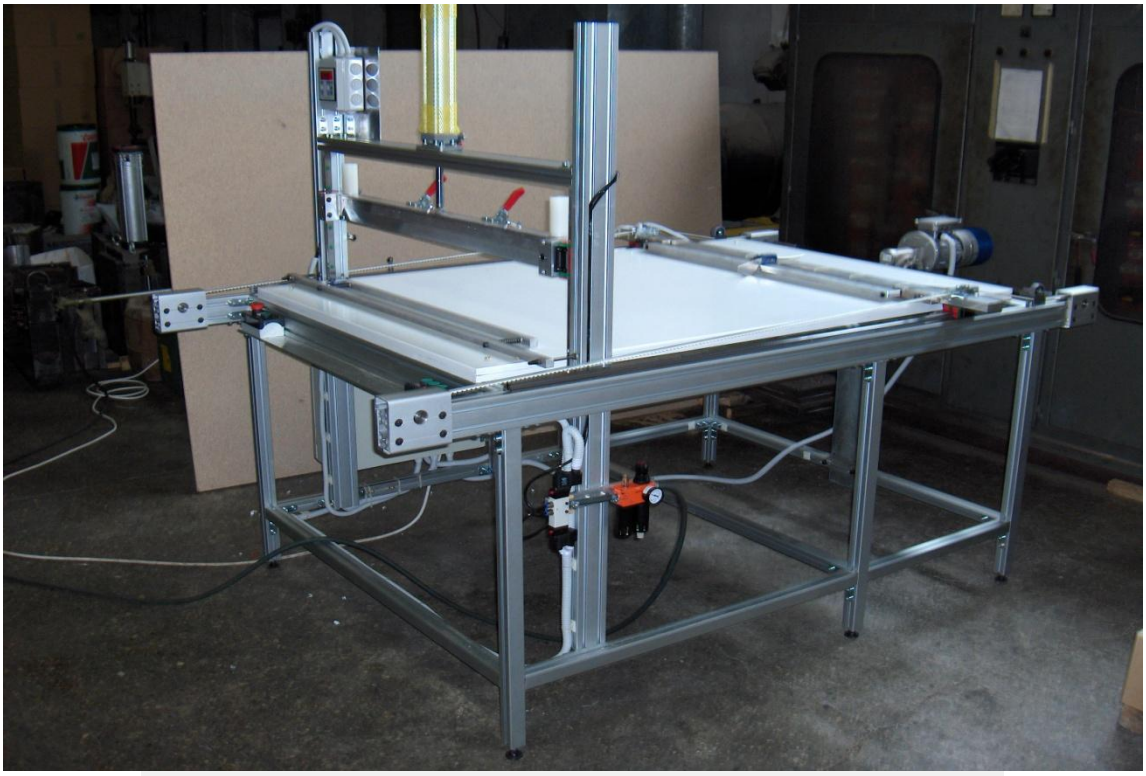


Development Board 2

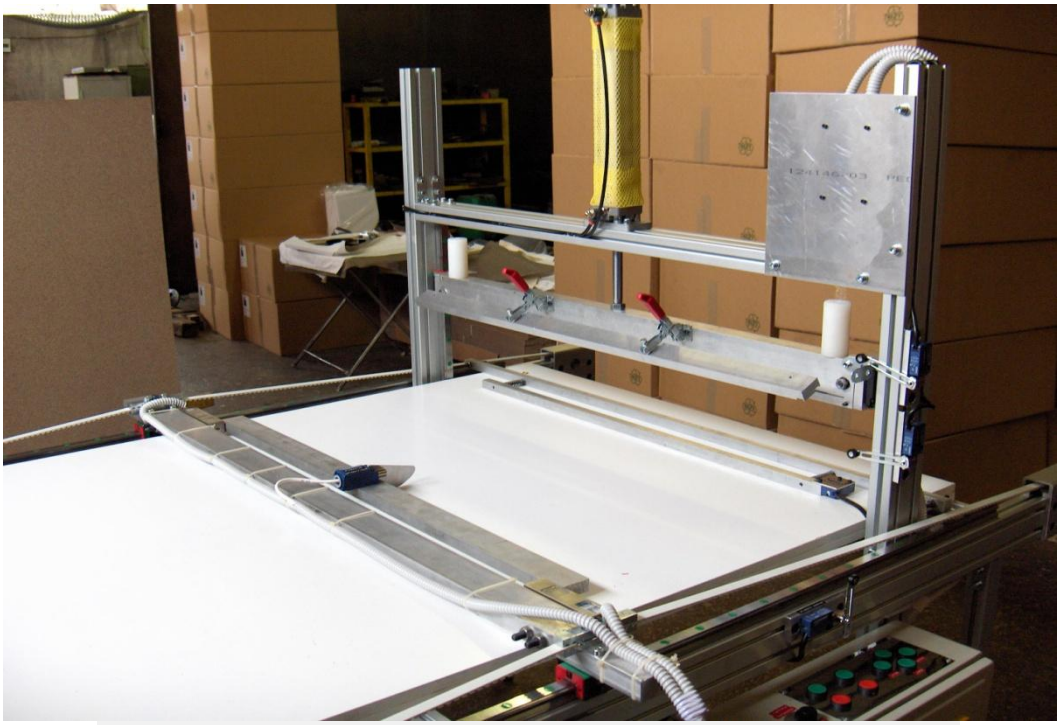


Analog Temperature Transmitter and Temperature Sensor

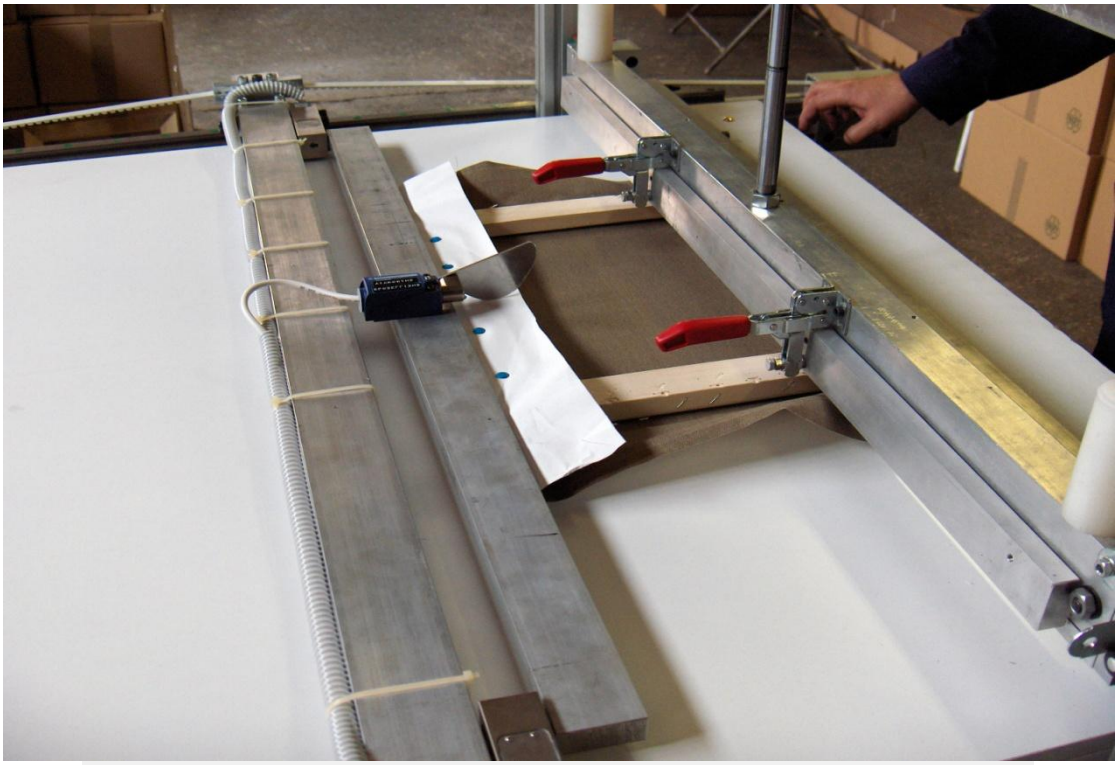
CANVAS STRETCHING MACHINE FOR PAINTING FRAMES



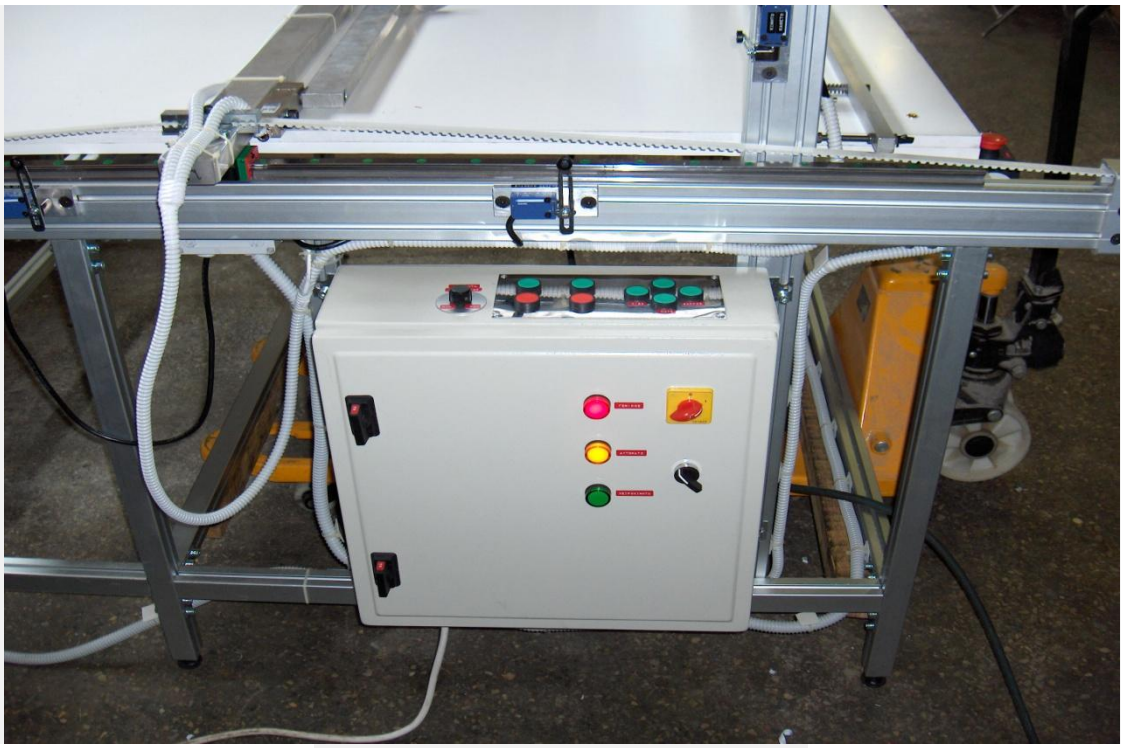
Canvas Stretching Machine for Painting Frames – View 1



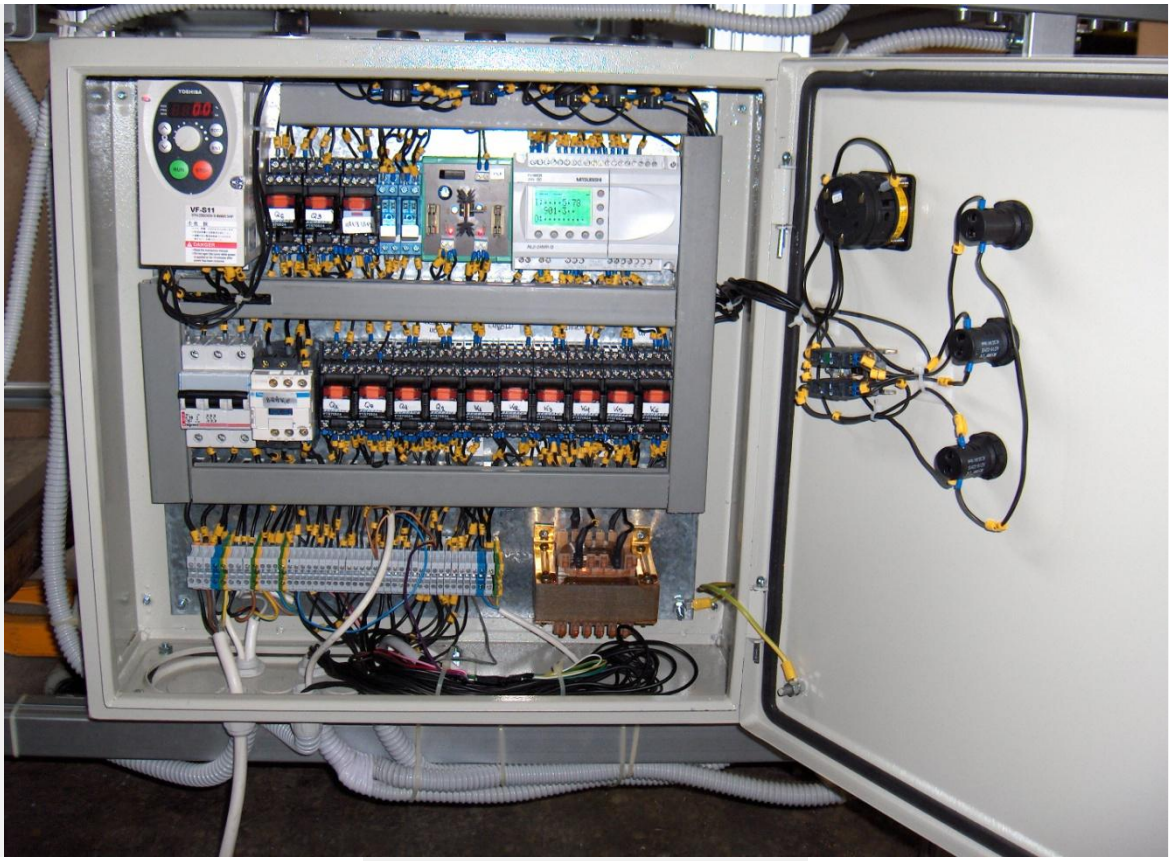
Canvas Stretching Machine for Painting Frames – View 2



Canvas Stretching Machine for Painting Frames – In Operation



External View of Electrical Panel



Electrical Panel Construction

BRISTOL DISSERTATION

IAR LPC2378-SK Development Board

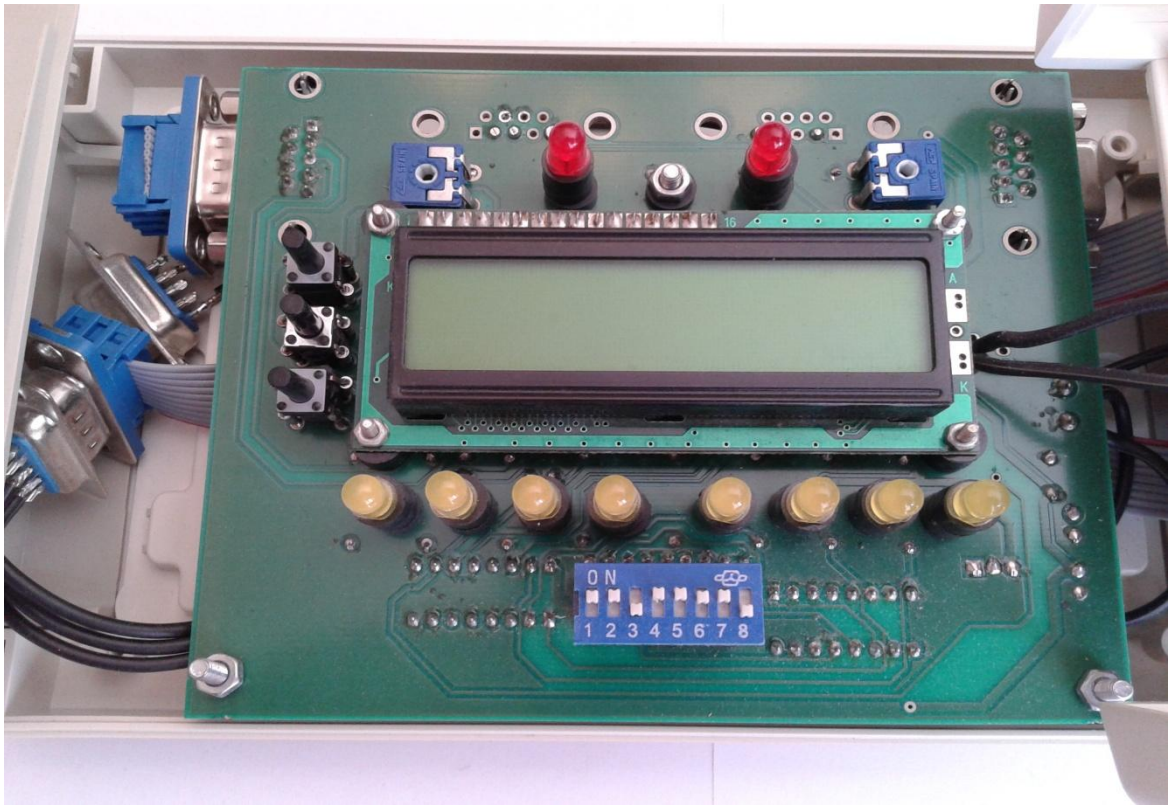
CAN Analyser

AUTOMATION THESIS

Remote Control Device - Front View

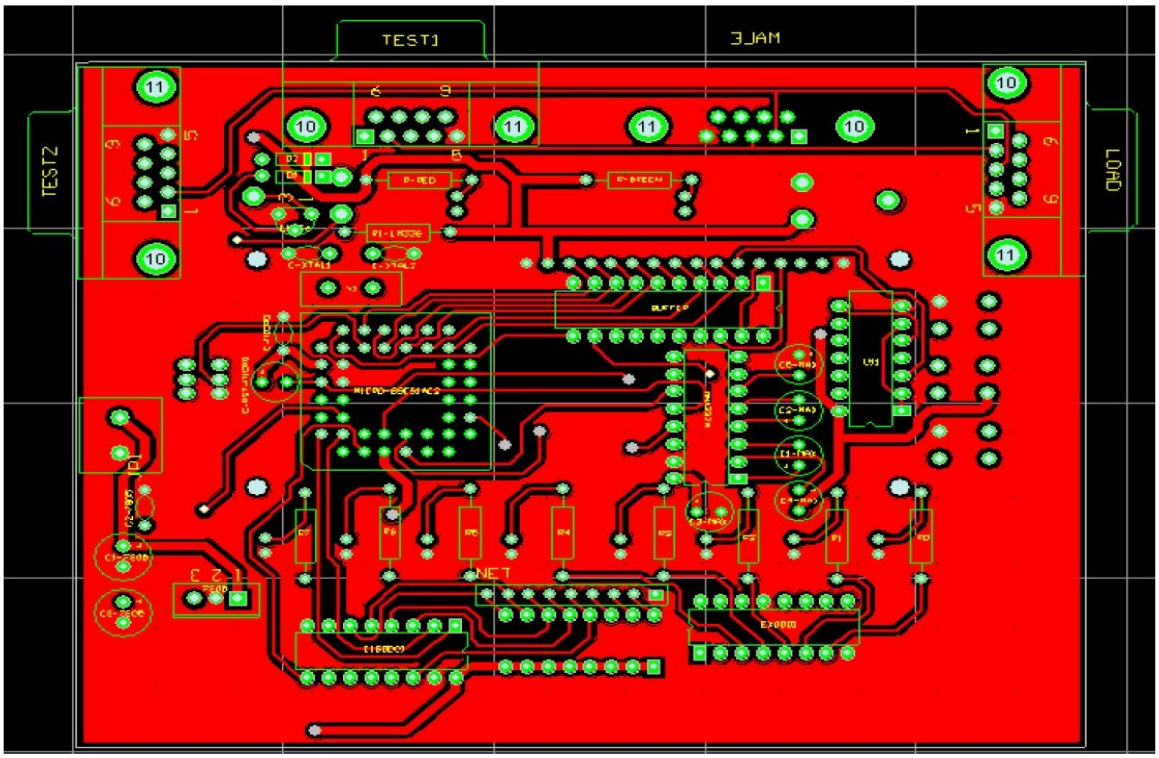
Remote Control Device - Side View

GSM MODEM



Remote Control Device PCB

A. PCB (TOP LAYER)



B. PCB (BOTTOM LAYER)