

Machine Vision in Croatia

EMVA CONFERENCE / DUBROVNIK, JUNE 2018.

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BEAUTIES OF CROATIA





Photo source: http://www.istriasun.com

Photo source: https://www.adriagate.com



1244 islands

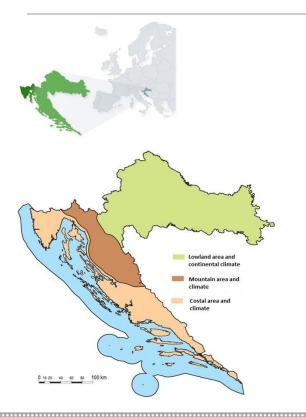
Protected natural beauties

Very well indented coast

- Located along sea side, in continental part and in mountain area
- Ancient cities and fortresses
 - Walls of Ston, Walls of Dubrovnik
- 10 UNESCO heritage sites
 - Natural, historical, cultural and architectural heritage



REPUBLIC OF CROATIA



- Located in the heart of Europe
 - On the crossroad between:
 - Central Europe and Mediterranean
 - Eastern and Western Europe
- Member of EU since 2013.
- Capital: Zagreb
- Borders with Italy, Slovenia, Hungary, Bosnia and Herzegovina, Montenegro and Serbia
 - 2370 km of land boundaries
 - 6278 km of sea coast (including islands)
- Surface
 - Land: 56594 km², Sea: 31067 km²
 - 4.28 millions of inhabitants (Croats 90.42%)

Data Source: Croatian Bureau of Statistics



IMPORTANT FACTS ABOUT CROATIA

- Homeland of tie
 - Worn by 600 millions around the world, every day
- Famous inventors
 - Nikola Tesla, Faust Vrančić, Slavoljub E. Penkala
- Sport legends
 - Goran Ivanišević, Kostelić family, Dražen Petrović, Toni Kukoč, Davor Šuker, ...
- Nobel Prize winners
 - Lavoslav Ružička, Vladimir Prelog



Photo source: http://www.croatia.org

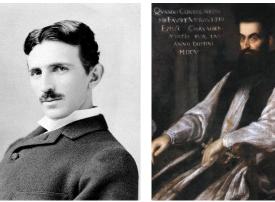


Photo source: https://hr.wikipedia.org

Photo source: http://www.enciklopedija.hr

Photo source: Google



12.06.2018

INSTITUTIONS AND EDUCATION – PILLARS OF DEVELOPMENT

- Ruđer Bošković Institute
 - Leading scientific institute in the natural and biomedical sciences
- Public universities
 - University of Zagreb
 - University of Split
 - Josip Juraj Strossmayer University of Osijek
 - Juraj Dobrila University of Pula
 - University of Rijeka
 - University North
 - University of Zadar
 - University of Dubrovnik
- Private universities
 - Dubrovnik International University
 - University VERN
 - Croatian Catholic University

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and Computing in Zagreb

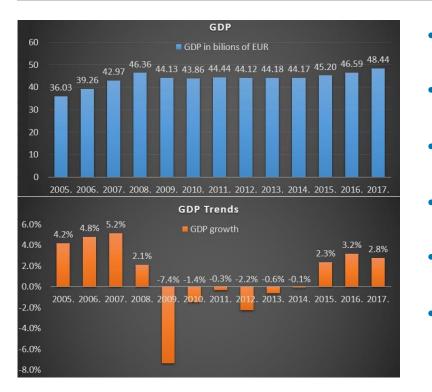
FER – Faculty of Electrical Engineering

Interesting faculties for Machine Vision

- FOI Faculty of Organization and Informatics in Varaždin
- FSB Faculty of Mechanical Engineering and Naval Architecture in Zagreb
- PMF Faculty of Natural Science and Mathematics in Zagreb



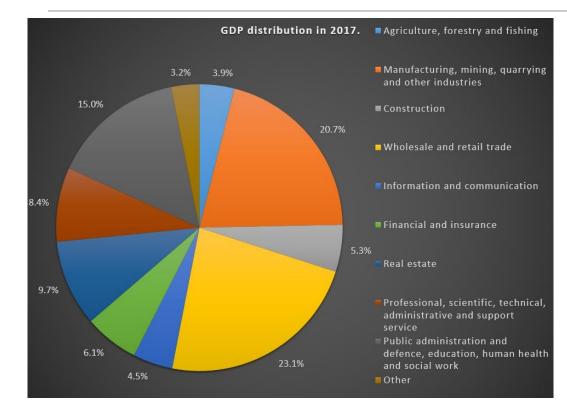
CROATIAN ECONOMY – PATH TO STABILITY



- Economic growth started in 1995., after finishing the war
- GDP
 - 24 billions € in 2000. → 48 billions € in 2017
- 2008. 2015. effects of global economy crisis
 - in 2015. return to positive growth
- Results of 2008. were barely outmatched in 2016.
- Small but continuous growth over last 3 years
 - Period of stability
- GDP per capita in 2017.: 11300 €
 - Data Source: Croatian Bureau of Statistics



ECONOMY STRUCTURE – MISS BALANCE



Qsmartek

visior

- Tourism strongest component
 - Approx. 20% of GDP
 - Croatia is leader in nautical tourism
- Strong industries
 - Food industry
 - Chemical and Oil
 - Machines and Equipment
 - ICT
 - Auto industry
 - Energetics
 - Pharmacy
 - Textile industry

Data Source: Croatian Bureau of Statistics



PRESERVED NATURAL RESOURCES – DEPOSIT FOR THE FUTURE

- Moderate utilization of resources resulted in rich reserves
- Agricultural land
 - 1.5 million ha is utilized, 2.7 million ha is available
 - Large fields of Slavonia
- Forests
 - 2.7 million ha (47% of total land area)
- Fresh water
 - 27330 m³ per inhabitant, leader in EU
- Oil, gas
 - Pannonian, Dinarides and Adriatic basins
- Renewable energy sources
 - Island of Hvar has 65% of sunshine yearly
 - Regions near seaside have wind potential of over 300 W/m²
- Stone from island of Brač
 - Many famous buildings are made of it

Data Source: Croatian Bureau of Statistics, Eurostat



SMARTEK

Qsmartek



- 2001 Foundation of Smartek d.o.o.
- Started in one room of family house
- Focused on Machine Vision and building quality products
- Worked with many distributors in China and Europe
- Resources were strained, focus was no longer engineering
- Strategically changed in 2011 to focus on one distributor FRAMOS
- Partnership allowed for successful execution of strategy
- Merged with FRAMOS in 2013

WHO IS FRAMOS?

Qsmartek

vision



- Founded in 1981
- Family owned
- Employees 150+
- 50M revenue
- Fulfilment, buffer-stock or consignment stock possible
- Quality Certification DIN EN 9001
- The only global imaging partner from sensor to system
- Development of our own technologies
- Team of 40 engineers
- Reliable Partner Network

FRAMOS

WHO WE ARE NOW

- 15 years of experience in Machine Vision
- 25 employees
- Total 950m² containing:
 - Development / Production
- ISO9001 certified
- Passionate about what we do
- Core values and culture remain the same
- Same company, new possibilities







MAKING MACHINES TO SEE AND THINK!

- Specialists in flexible camera and strobe controller solutions
- State of the art standard portfolio, ready to be customized
 - From form factor over IOs to special algorithms
- "twentynine" industrial camera platform with latest CMOS image sensors
 - Small 29x29mm footprint, enhanced processing capabilities, GigE Vision & USB3 Vision
- High Performance LED Strobe Controllers
 - Unbeaten power, efficiency and stability, full control for a wide range of applications
- Fully tailor made solutions for deep integration

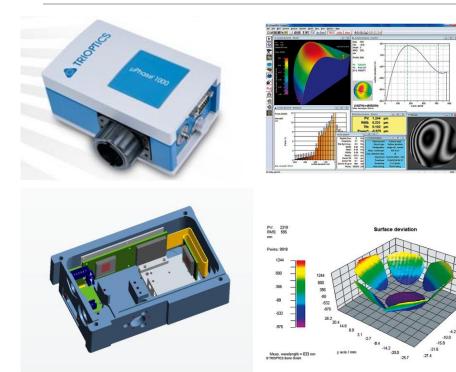








INTERFEROMETRY SYSTEM



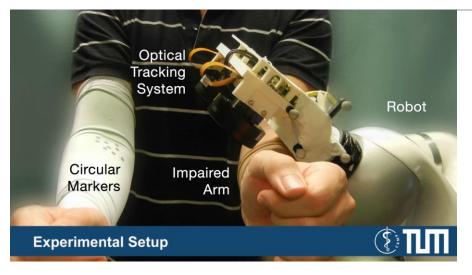
- Dual camera system developed for TRIOPTICS Berlin GmbH
- Precise measurement of surface deviation and wave front aberration
- Controlling DC motor and piezo actuator
- Processing data from two global shutter image sensors, incremental encoder and external signals

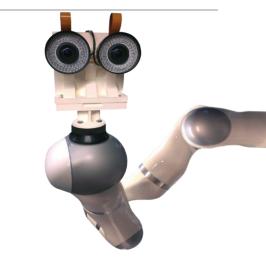
USB3.0 interface

Photo source: http://www.trioptics-berlin.com



COOPERATIVE ROBOTICS



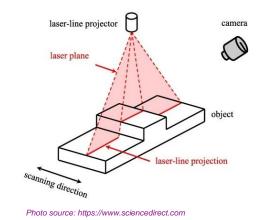


- After stroke: 80% hemiparesis
- Re-education of movements by training
- Patient participation very important
- Previus systems: Up and down, Joystick

Photo source: Framos

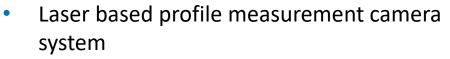


PROFILE MEASUREMENT SYSTEM

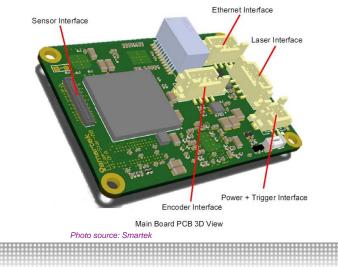


- Controlling laser projector
- Processing data from Sony global shutter image sensor, incremental encoder and external signals
- Gigabit Ethernet interface

Qsmartek

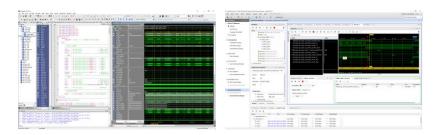


 Measuring profile dimensions of extruded, roll-formed and other continuous profiles



SLVS-EC RX IP CORE – NEXT GENERATION

- High resolution, high framerate sensors
- Benefits:
 - Easier design of image sensor board
 - Reduced number of lanes
 - No skew adjustment between lanes
 - Longer transmission distance
 - Lower pin count for same bandwidth
 - Error detection (CRC) and correction (ECC)
- Deliverables:
 - SLVS-EC RX IP Core
 - Evaluation Kit with Sony IMX421



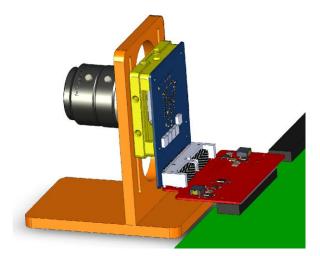
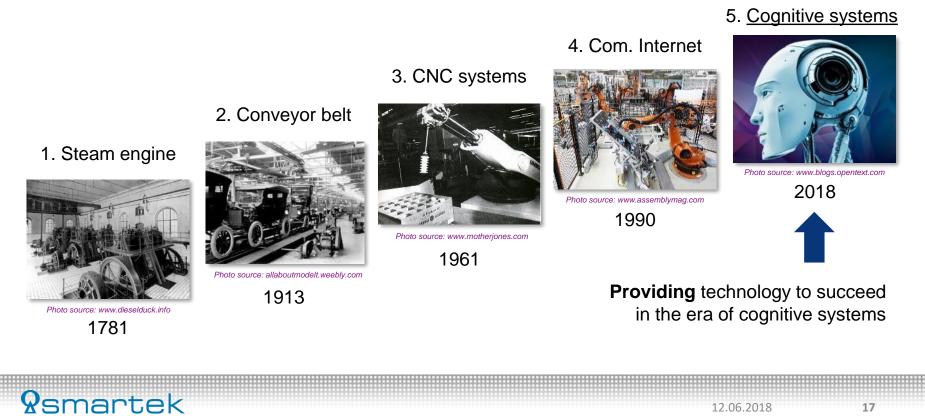


Photo source: Smartek



FUTURE FOR MACHINE VISION



vision

CROATIA'S FUTURE IN MACHINE VISION

- Smartek shaping the embedded vision hub in Croatia
- Sustainable, responsible development and growth
- Focusing on R&D, customization, smart solutions and know how
- Avoiding extreme mass production
 - Preserving nature for time to come
 - Keeping excellence
- Heritage as basis for develop the future
 - Foundations sited in institutions, universities and experience of large companies formerly leading in the field of electronic
- Improvement of education to become leading edge
- Strong passion to seek solution for challenging problems and being ahead
 - High quality engineers, respected worldwide
- Full synergy to raise optimism of society is about to happen



Thank you!

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