Workshop on Knowledge Discovery in Scientific Applications
12 studeni 2009, Zagreb

Mjerenje i karakterizacija podataka iz stvarnog svijeta

(098-0982560-2566)

Branka Medved Rogina

Institut "Ruđer Bošković"
Zavod za elektroniku
Laboratorij za istraživanje slučajnih signala i procesa (LISSP)

- dr. sc. Branka Medved Rogina[4], voditelj projekta
- dr. sc. Amir Dubravić[1], CIR
- dr. sc. Ivan Marić[2], LIS
- dr. sc. Vladimir Medved[3], KIF
- dr. sc. Ivan Michieli[1]
- dr. sc. Strahil Ristov
- Peter Škoda, dipl. inž. el., znanstveni novak
- dr. sc. Božidar Vojnović, u mirovini

(1) Metode znanstvene vizualizacije
(098-0982562-2567, Karolj Skala)
(2) Postupci računalne inteligencije u mjernim sustavima
(098-0982560-2565, Ivan Marić)
(3) Automatizirano mjerenje pokreta i ekspertna procjena u studiju lokomocije
(034-0362979-2334, Vladimir Medved)
(4) Eksperimentalne tehnike kvantne komunikacije i kvantne informacije
(098-0352851-2873, Mario Stipčević)

Laboratorij za istraživanje slučajnih signala i procesa (LISSP)

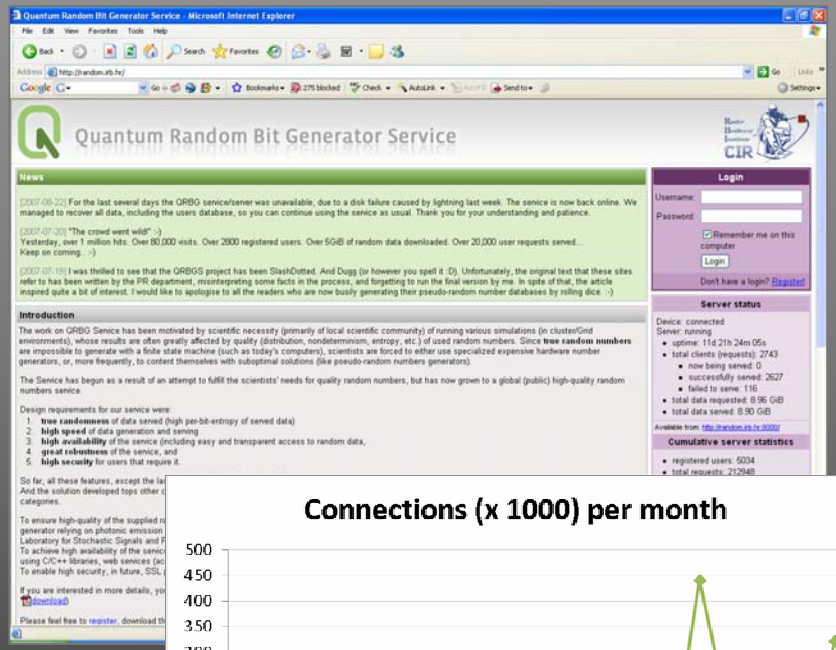
Znanstvena istraživanja metoda mjerenja i obrade signala i podataka iz različitih prirodnih i tehničkih izvora

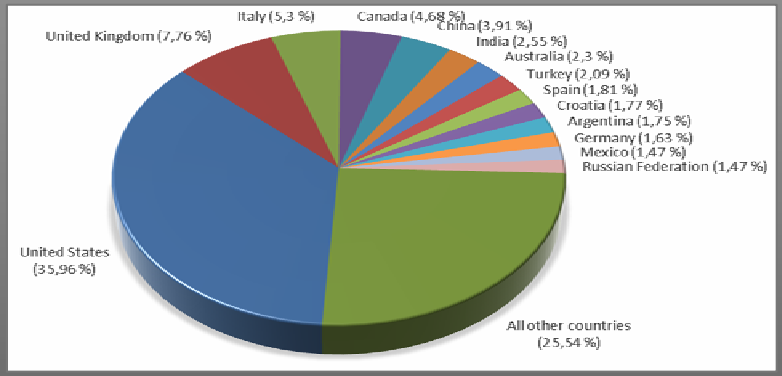
Prioritetna područja istraživanja:

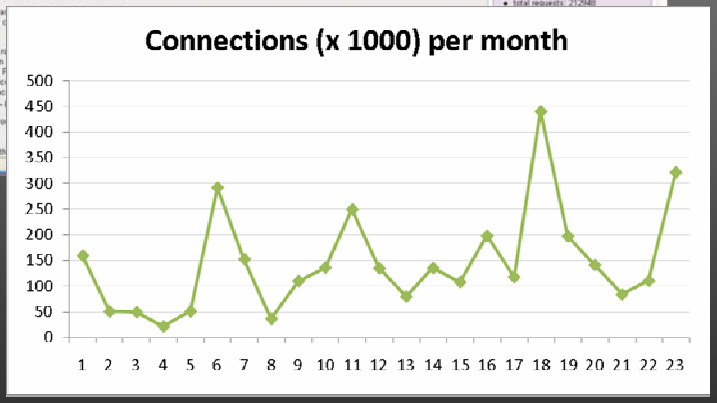
- visokorazlučiva vremenska mjerenja i ultrabrze hardverske tehnologije (programirljivi logički sklopovi visoke složenosti);
- obrada i analiza šumnih vremenskih serija iz složenih nelinearnih sustava;
- biomedicina (obrada i analiza mjernih podataka iz bioloških sustava npr. lokomotorni sustav čovjeka);
- bioinformatika (indeksiranje bioloških sekvenci DNA i proteina);
- istraživanje algoritama i podatkovnih struktura (kompresija podataka, string algoritmi).

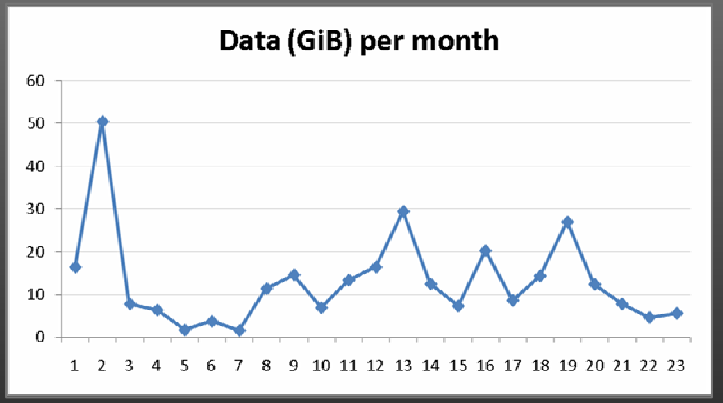
"QRBGS – Quantum Random Number Generator Service"

ZEL/ZEF/CIR - suradnja na projektu 2007/2009





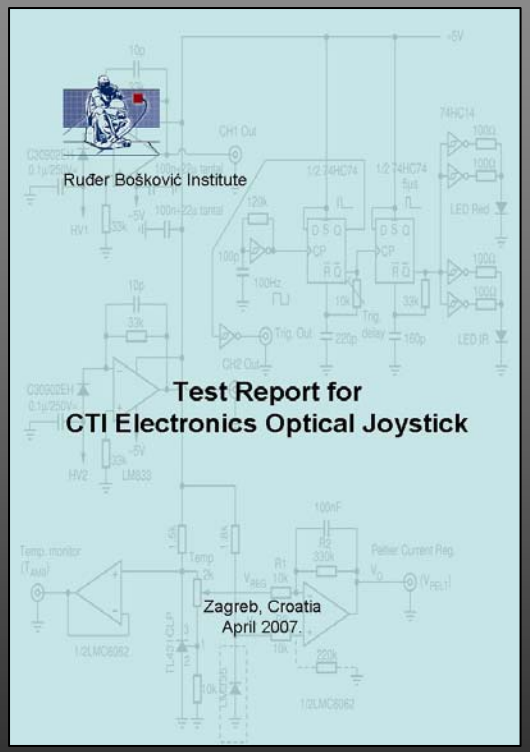


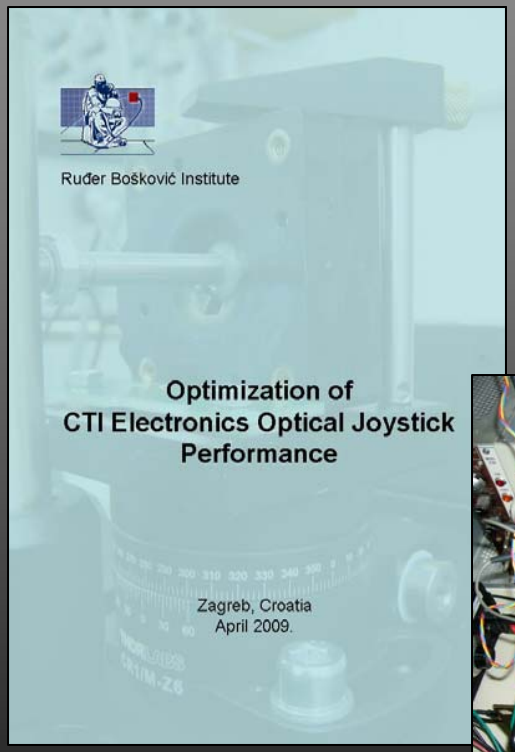


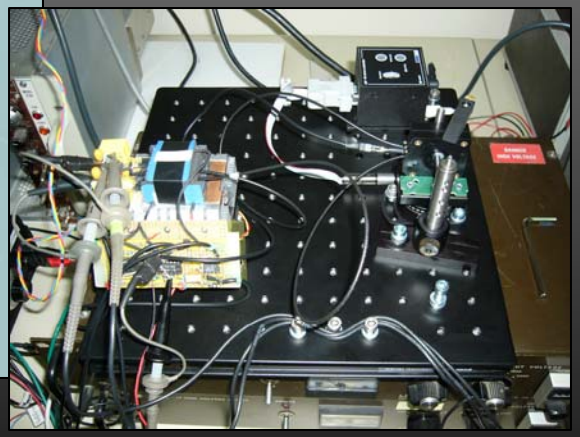
Prve dvije godine rada (2007-06-15 do 2009-06-15):
10,050+ registriranih korisnika (150+ zemalja, tisuće institucija)
3.4 milijuna posluženih zahtjeva
1.3 TiB isporučenih brojeva (5 – 50 GiB mjesečno)

"Sustav za automatizirano, pozicijski razlučeno mjerenje vrlo niske razine svjetla"

IRB (ZEL/ZEF) - CTI Electronics (USA) suradnja na projektu 2007/2009







"Nove tehnologije u proizvodnji i prijenosu digitalnog videosignala"

Specijalistički seminar za djelatnike HRT - FER, Zavod za radiokomunikacije
veljača 2009.

Uporaba optičkih komunikacijskih veza u televizijskom sustavu

prof.dr.sc. *Branka Medved Rogina*
Institut Ruđer Bošković
Zavod ze elektroniku
medved@irb.hr

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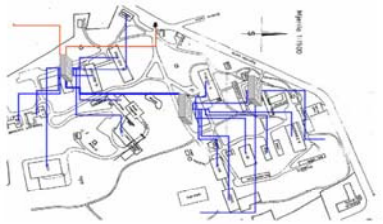
Optički kabel – primjer izvedbe (IRB)

hibridni optički kabel ELKA
- 20 MM + 4 SM - 700 m
- 8 MM + 4 SM - 4000 m

LINK	DULJINA (m)	LINK	DULJINA (m)
K-V	330.8	K-II	68.4
K-III	110.4	K-VI	155.1
K-IV	111.4	K-VII	204.4
CK	140.5	K-Xa	230.5
CK-II	227.2	K-Xc	289.6
NAL	215.8	PO-II	210.9
UZ	191.4	KOCIM	130.7
B-I	143.6	R-II	277.3
B-II	192.2	R-I	112
VO	261.6		

1. nemetalni nosivi elemenat
2. PE plašt
3. svjetlovoda nit
4. cjevčica
5. vodonepropusna masa za punjenje cjevčice
6. vodonepropusna masa za punjenje jezgre kabela
7. traka
8. ispuna
9. aramična vlakna
10. PE plašt
11. PA plašt

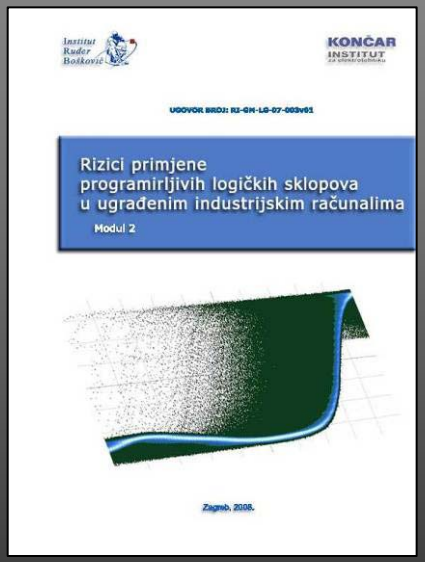


1/74

"Rizici primjene programirljivih logičkih sklopova u ugrađenim industrijskim računalima"

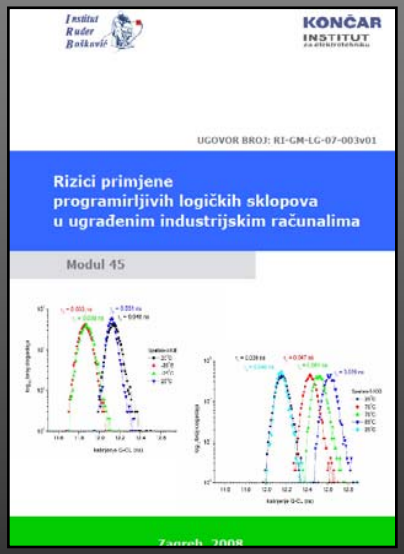
IRB (ZEL/CIR) - IET suradnja na projektu: UGOVOR RI-GM-LG-07-003v01 2007/2009

analiza metastabilnosti



mjerne metode i postupci

izvedba mjernog okruženja



ispitivanje pouzdanosti

"Zajednička radionica IRB i Končar" – zajednički programi znanstvenih i razvojnih istraživanja od posebnog interesa za RH

… mogućnosti nastavka suradnje IRB (ZEL/CIR) - IET? listopad 2009.

Institut Ruđer Bošković

Prva zajednička radionica I...

login | vetmail

IRB: Bijenička 54, HR-10000 Zagreb. tel: +385 (0)1 4561-111, fax: 4680-084, PR: 4571-269, mail: info@irb.hr

... Prva zajednička radionica IRB-a i Končara (više)

pretraživanje | imenik | kontakt | pomoć | print | posjećeno | mapa weba

Gore (Prva zajednička radionica IRB-a i Končara)

Zagreb, 22.10.2009. - Danas je u prostorijama Končar - Elektroindustrije d.d. u Zagrebu, na inicijativu ravnateljice IRB-a dr. sc. Danice Ramljak i predsjednika Uprave Končar - Elektroindustrije Darinka Bage, po prvi put održana zajednička radionica Instituta 'Ruđer Bošković' i Končara s ciljem definiranja zajedničkih programa znanstvenih i razvojnih istraživanja u područjima od posebnog interesa za Republiku Hrvatsku.

Zajednička radionica predstavlja nastavak inicijative pokrenute na radnom sastanku čelnih ljudi Končara i IRB-a održanom u srpnju ove godine. U prvom dijelu današnje radionice sudionici su se fokusirali na zajedničke programe u području iskorištavanja energije sunca, razvoja različitih vrsta senzora, obrade materijala te primjene računalnih i informatičkih tehnologija, dok je drugi dio radionice bio posvećen prezentacijama različitih istraživanja u području kvantne informatike, nanotehnologije te proizvodnji biovodika.

nizacija, dr. sc. Milka Jakšića pred IRB-
suradnika izvršili selekciju programa

od vodećih gospodarskih tvrtki u RH,
tehnologija, neophodno potrebnih za
kog rada u Hrvatskoj prema temama

omaster)

Makeover for
Industry System Design Science

KONČAR INSTITUT za elektrotehniku

Napredne primjene pomoću programirljivog hardvera

Institut Ruđer Bošković
Zavod za elektroniku &
Centar za informatiku i računarstvo

Branka Medved Rogina &
Karolj Skala

KONČAR INSTITUT za elektrotehniku
Zavod za energetsku elektroniku i upravljanje
Siniša Marijan

Zagreb, 22.10.2009.

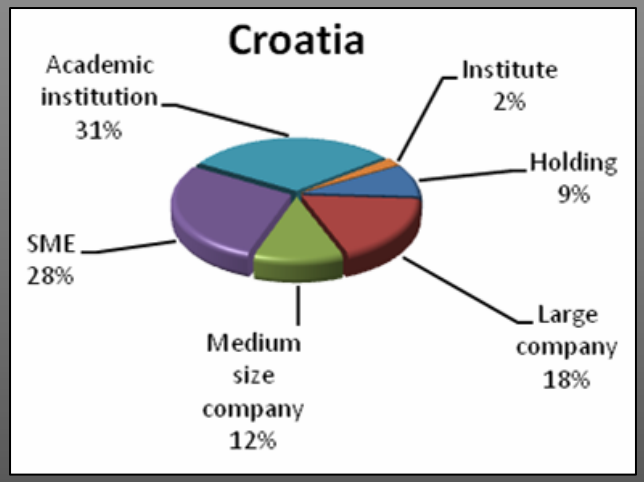
Division of Electronics and Center for Informatics and Computing

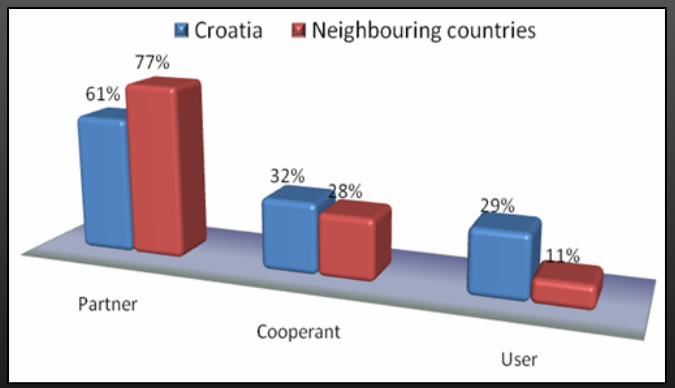
Power Electronics and Control Department

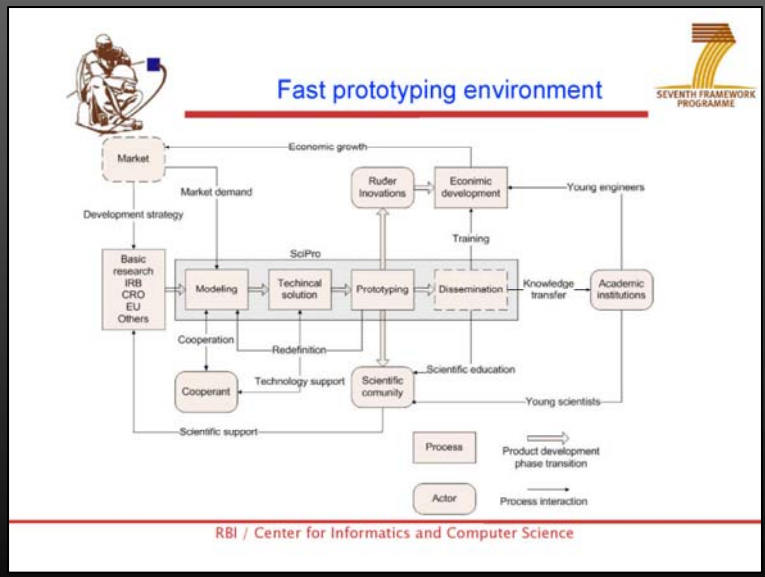
razvoj procesora na bazi FPGA
optoelektronički senzori

FP7-REGPOT-2010-5:
Research Potential in the Western Balkan Countries

... projektni prijedlog listopad 2009.







"Reconfigurable embedded systems based assistive applications for elderly people"

Znanstvenoistraživački projekt u okviru zajedničke hrvatsko-mađarske suradnje u području znanosti i tehnologije (od 2009. do 2011. godine)

AAL
AMBIENT ASSISTED LIVING

CROATIAN-HUNGARIAN INTERGOVERNMENTAL S & T COOPERATION PROGRAMME FOR 2009-2010
PROJECT PROPOSAL

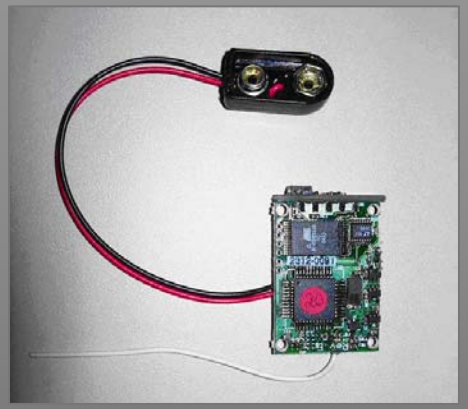
TITLE OF THE PROPOSED PROJECT IN ENGLISH	**Reconfigurable embedded systems based assistive applications for elderly people**
TITLE OF THE PROPOSED PROJECT IN CROATIAN	**Primjene podrške starijim osobama temeljene na reprogramirljivim ugradbenim računalnim sustavima**
SHORT TITLE OF THE PROJECT PROPOSAL	**EmbAssi**

		CROATIAN PROJECT COORDINATOR	HUNGARIAN PROJECT COORDINATOR
LAST NAME		Medved Rogina	Hanák
FIRST NAME		Branka	Péter
DEGREE		Prof. dr. sc.	dr. univ.
TITLE		Senior Research Associate, Head of the Laboratory for Stochastic Signals and Processes Research	Senior Research Associate, Director of the Biomedical Engineering Knowledge Centre
INSTITUTION's	NAME	Institute Ruđer Bošković Division of Electronics Laboratory for Stochastic Signals and Processes Research	Budapest University of Technology and Economics, Biomedical Engineering Knowledge Centre & Dept. for Control Engineering and Information Technology
	ADD-RESS	Bijenička 54 10000 Zagreb Croatia	Magyar tudósok körútja 2. 1117 Budapest Hungary
	TEL	+385-1-4561024	+36 1 463-2022
	FAX	+385-1-4680090	+36 1 463-2204
	E-mail	medved@irb.hr	hanak@iit.bme.hu

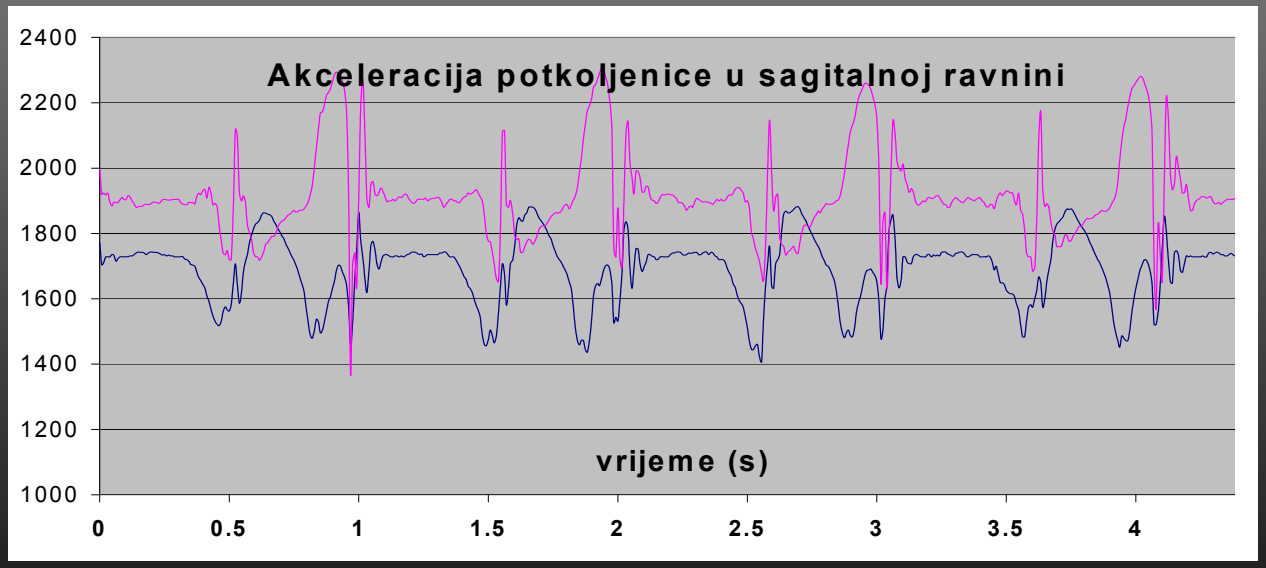
PROJECT STARTING DATE January 1, 2009 DURATION 2 years

Mjerenja i analize vremenskih serija kod karakterizacije bioloških sustava

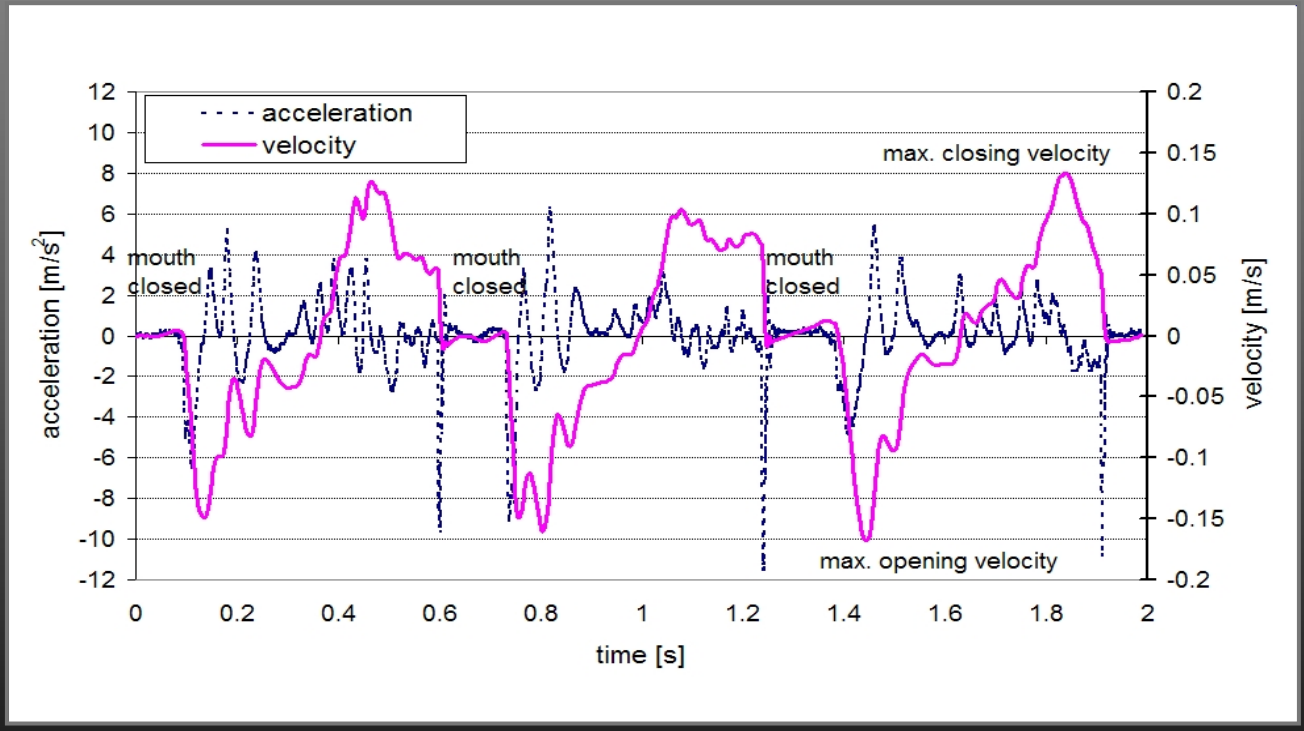
akcelerometrijska 3D osjetila +
stereo-fotogrametrijska metoda +
analiza u multimedijskom formatu +
nelinearne numeričke metode



Kinematički parametri hoda (suradnja s Kineziološkim fakultetom)



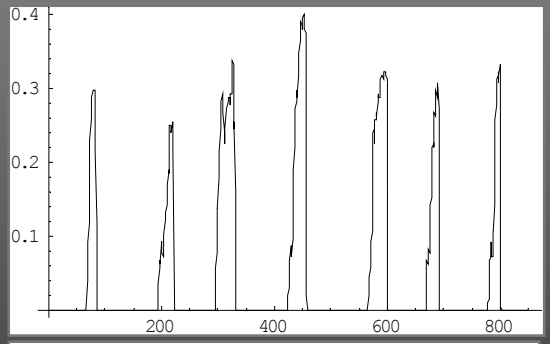
Kinematika kretanja čeljusti (suradnja sa Stomatološkim fakultetom)



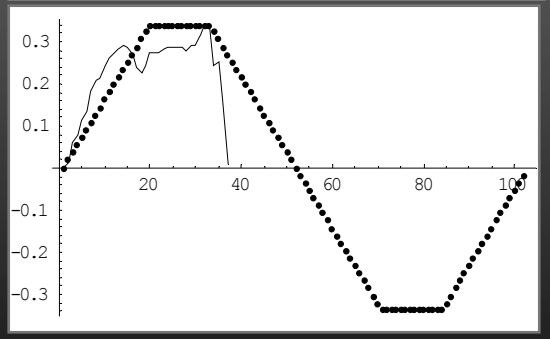
Dinamometrički analitički sustav za primjenu u fizijatriji, ortopediji, neurologiji i kineziologiji (suradnja s poliklinikom "Drago Ćop" u Zagrebu)

- Elektronički senzor stiska
  anatomska prilagodba šake

- Prikupljanje vremenske serije stiska šake
  analogno digitalna pretvorba signala



- Višestruki algoritmi obrade prikupljenih podataka
  akceleracija i brzina stiska



Pretprijava tehnologijsko-istraživačko razvojnog projekta MZOŠ

Istraživanja u području biomehanike (Laboratorij za biomehaniku, Kineziološki fakultet)

A short overview of biomechanical research in Croatia

In the following three separate texts are provided, from three different research centers in Croatia, concerning part of the research activities related to biomechanics

Faculty of Kinesiology, University of Zagreb, Croatia
Vladimir Medved, Mario Kasović
vladimir.medved@kif.hr, mario.kasovic@kif.hr

Figure 1. A preparation for the measurement of table tennis str

Good networking of the Laboratory within the Zagreb region enables a number of different research projects, theses, and goal-directed experiments to be realized. We either collaborate or have begun the collaboration with a couple of research and higher education institutions like the Zagreb Ruđer Bošković Institute, an eminent Croatian research institution (Associate Professor Branka Medved-Rogina; signal processing), Faculty of Sports, University of Ljubljana, Slovenia (Professor Miran Kondrič; table tennis research), and Institute of Sport Sciences, University of Vienna, Austria (Professor Arnold Baca; study of complex movements). Our efforts during the last period are directed particularly to the standardization of new medical diagnostic methods, gait analysis in the first place, to be applied in health care, for which there is a real need in the 1-million populated Zagreb region. We have therefore recently initiated the collaboration with a couple of health institutions and clinics to fulfill this task.

Further information: www.kif.hr/predmet/bio/lab_bio.

ISB

International Society of Biomechanics Newsletter

ISSUE Number 105
June 2008

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Clinical Biomechanics 24 (2009) 121

Contents lists available at ScienceDirect

Clinical Biomechanics

journal homepage: www.elsevier.com/locate/clinbiomech

Editorial

Surface EMG application in clinical biomechanics

"The course of a movement is nothing else but a projection to the outside of a pattern of excitation taking place in a corresponding setting in the central nervous system". This citation of Hess (1954, according to Waterland, 1968) has caught my attention since the first day of my studies of the neuro-musculo-skeletal system in kinesiological tasks. Pursuing a bioengineering approach and investigating the function of this system in *in vivo* conditions I have always considered surface EMG (sEMG) as a rather non-invasive window into its action, which, combined with other available measurement quantities, provides a unique, second to none, information. Later on, in my PhD research, I have witnessed a high degree of sensitivity and specificity offered by this signal in studying, specifically, movement skill acquisition and co-ordination in artistic gymnasts; sEMG signals being for this purpose processed in a smoothed, full-wave rectified and low-pass filtered form. It was therefore my great pleasure when being approached by Prof. Zeevi Dvir, Reviews editor for Clinical Biomechanics, with the offer to devise a four-paper series which would describe the current state-of-the-art of sEMG with particular attention to its clinical biomechanics aspects.

I have therefore laid out a four-part series, which in my opinion, should give a fair cut-through of the field. An exhaustive scholarly elaboration, however, cannot be attempted in this manner but must be left to book-length works such as Basmajian and De Luca's (1985) or the more recent Merletti and Parker's (2004).

In succession the issues that are covered consist of the sEMG signal detection and measurement aspects, force to sEMG relationship, clinical application of sEMG in gait analysis and finally muscle fatigue evaluation by sEMG signal processing. I was lucky to find authors who were not only willing to contribute but are truly international authorities on the subject. The Roberto Merletti group has integrated vast USA (Boston University) and Italian experience. Authors Roberto Merletti, Alberto Botter, Amedeo Troiano, Enrico Merlo and Marco Alessandro Minetto have presented the critical technological aspects of modern instrumentation for sEMG signal detection and conditioning. Professor Günter Rau has backed up the German team consisting of Catherine Disselhorst-Klug, Thomas Schmitz-Rode, and himself, which addressed the often unresolved and intriguing issue of sEMG to force relationship, indicating corresponding limits and new approaches. Carlo Frigo and Paolo Crenna, maybe the most well known to the biomechanical community for their vector diagram ground reaction force representation aimed to be applied in medical diagnostics, have presented the latest issues in clinical gait analysis with special emphasis on interpreting available sEMG information. Finally, our University of Zagreb biomedical engineering group, led by Mario Cifrek, and including Saša Ostojić, Stanko Tonković and myself, has elaborated on modern signal processing methods for EMG-based extraction of relevant information needed to evaluate the state of muscular fatigue, both in static and – what is particularly delicate, difficult and important – dynamic conditions.

Through these four articles the reader will, I hope, gain a fair insight into the current state of affairs regarding the most important issues relevant to the applications of sEMG in the field of clinical biomechanics. The style of all papers is suited both to those with either engineering, medical or kinesiological background.

We are in the time of rapid proliferation of instrumented measurement and signal processing methods and devices for use in the clinical atmosphere. I hope, and this hope is certainly also shared by all contributing authors who are to be thanked for their considerable effort, that the readers of this journal will find those four papers informative, and that their niche called 'Surface EMG' will – at least for the moment, as it is always in science – be updated.

References

Basmajian, J.V., De Luca, C., 1985. Muscles Alive – Their Functions Revealed by Electromyography, fifth ed. Williams & Wilkins, Baltimore.

Merletti, R., Parker, P.A. (Eds.), 2004. Electromyography: physiology, Engineering, and Noninvasive Applications. IEEE Press, John Wiley & Sons, Hoboken, New Jersey.

Waterland, J.C., 1968. Integration of movement. In: Wartenweiler, J., Jokl, E., Hebbelnick, M. (Eds.), Biomechanics I: 1st International Seminar, Zuerich, 1967. S. Karger, Basel, pp. 178–187.

Vladimir Medved
Guest Editor
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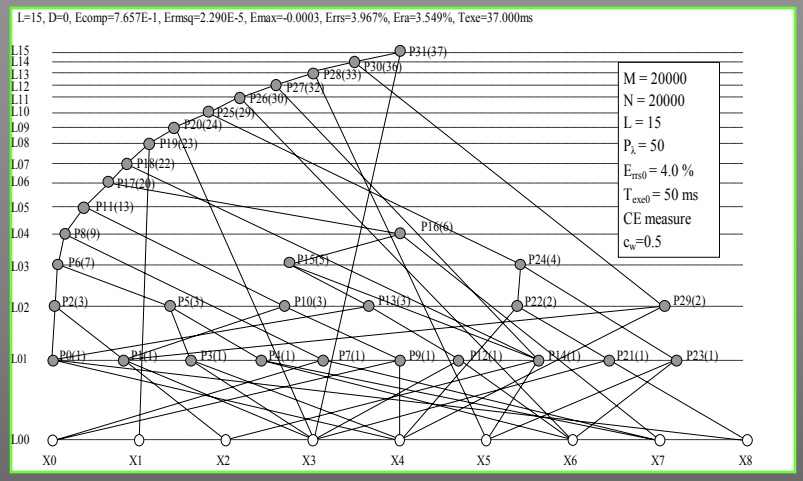
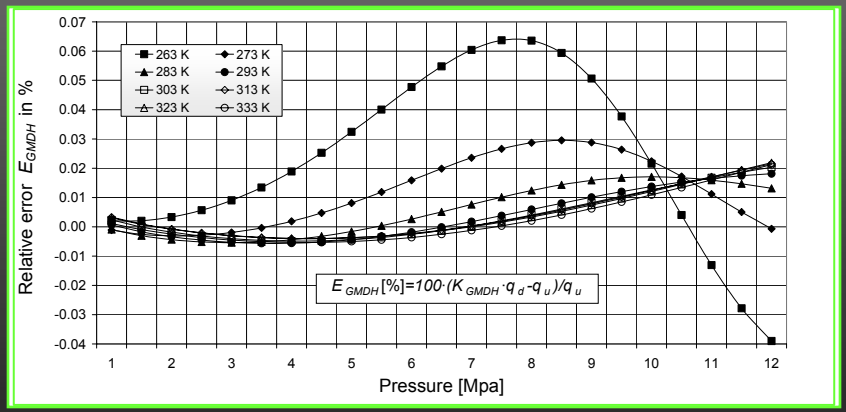
University of Zagreb,
Horvacanski zavoj 15, 10000 Zagreb,
Croatia
Tel.: +385 1 3658670; fax: +385 1 3634 146
E-mail address: vladimir.medved@kif.hr

GMDH (Group Method of Data Handling) algoritam



GMDH polinomsko stablo

Kompenzacija pogrešaka u mjerenju protoka fluida GMDH polinomom



Algoritmi za obradu nizova s primjenama u bioinformatici, računalnoj lingvistici i projektiranju statičkih baza podataka

- U suradnji s Fakultetom elektrotehnike i računarstva u Zagrebu radi se na razvoju korisničkog sustava koji koristi algoritme u svrhu automatskog konstruiranja optimalnih komprimiranih statičkih baza podataka za pohranjivanje rječničkih/tabelarnih struktura. Korisnik bi trebao samo unijeti podatke i zadati parametre omjera između brzine i kvalitete kompresije, a kao rezultat bi se dobila kompaktna samostojeća, dakle i portabilna, struktura u kojoj se svim podatcima može vrlo brzo pristupiti.
- U suradnji s Matematičkim i Biološkim odsjekom Prirodoslovno matematičkog fakulteta u Zagrebu istražuje se mogućnost klasifikacije proteina prema njihovoj trodimenzionalnoj strukturi eksperimentalno dobivenoj kristalografijom. Istražuje se mogućnost da se 3D struktura opiše na takav način da je moguća brza usporedba nepoznatog proteina s velikom količinom podataka pohranjenih u bazi.

Popis objavljenih radova 2007/2009

Poglavlja u knjizi (1)

Stevanović, Radomir; Topić, Goran; Skala, Karolj; Stipčević, Mario; Medved Rogina, Branka: Quantum Random Bit Generator Service for Monte Carlo and Other Stochastic Simulations // Revised Papers of the 6th International Conference Large-Scale Scientific Computing / Lirkov, Ivan; Margenov, Svetozar; Wasniewski, Jerzy (ur.). Berlin; Heidelberg: Springer, 2008. Str. 508-515.

Izvorni znanstveni i pregledni radovi u CC časopisima (3)

Cifrek, Mario; Medved, Vladimir; Tonković, Stanko; Ostojić, Saša: Surface EMG based muscle fatique evaluation in biomechanics // Clinical Biomechanics 24 (2009), 4; 327-340 (pregledni rad, znanstveni).

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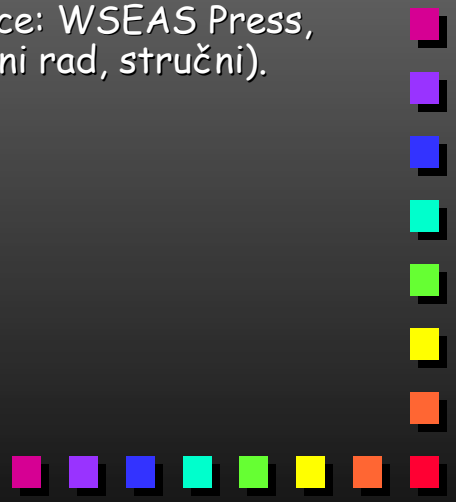

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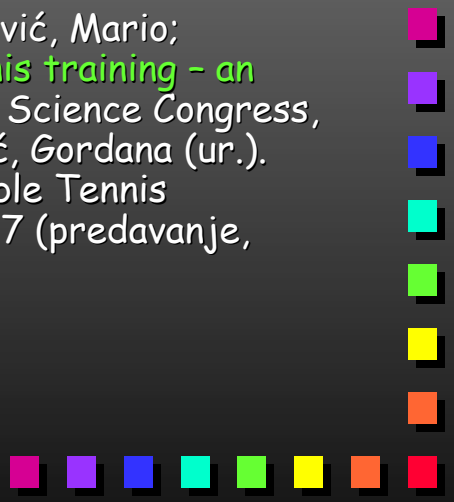

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