

**ENERGEETIKATEADUSKONNA ELEKTRIAJAMITE JA JÕUELEKTROONIKA
INSTITUUDI
TEADUS- JA ARENDUSTEGEVUSE AASTAARUANNE 2010**

1. Instituudi struktuur

Elektriamite ja jõuelektronika instituut, Department of Electrical Drives and Power Electronics, Tõnu Lehtla

- Elektriamite ja elektrivarustuse õppetool, Chair of Electrical Drivers and Electrical Supply
- Robotitehnika õppetool, Chair of Robotics, Tõnu Lehtla

2. Instituudi T&A iseloomustus (täidab str.üksus)

2.1 Õppetoolide või muude alamstruktuuriüksuste T&A kirjeldus ja tähtsamad tulemused
(sh õppetoolide või muude alamstruktuuriüksuste kuni 5 olulisemat publikatsiooni, tähtsamad T&A finantseerimise allikad ning soovi korral T&A-ga seotud tunnustused, ülevaade teaduskorralduslikust tegevusest ülevaade teadlasmobiilsusest ning hinnang teadustulemustele)
eesmärgid:

Elektriamite ja jõuelektronika instituudi 2010. aasta olulisemad saavutused olid järgmised:

1. 2010. aastal vanemteaduri Dmitri Vinnikovi poolt esitatud sihtfinantseerimise teema SF0140016s11 avamise taotlus 2011-2016 „**Aktiivsete elektrijaotusvõrkude muundurite topoloogiad ja juhtimismeetodid**” osutus edukaks ning seda rahastati 2011. aastal 85540 €. Rahastati ka sihtfinantseerimisega kaasnevat väikese-infra taotlust: SF0140016s11AP11 „Väikesemahulise teaduse infrastruktuuri kaasajastamine teadusteema SF0140016s11 raames”
2. 2010. aastal prof. Tõnu Lehtla esitatud rahvusvahelise programmi ERA NET Smart Grid projekti taotlus „**Power Quality and Safety Requirements for People and Electrical Equipment in Smart Grid Customer Domain**” (Elektri tarkvõrgu kliendivalduse elektrikvaliteedi ja inimeste ning elektriseadmete ohutusnõuded) osutus edukaks ning seda rahastatakse kui Eesti Teadusfondi granti aastatel 2010-2013 kokku summas 149700 €. Rahvusvahelise projekti koordinaatoriks on Tallinna Tehnikaülikool ning projekti juhiks elektriamite ja jõuelektronika instituudi professor Tõnu Lehtla. Projekti partneriteks on Riia Tehnikaülikool ja Grazi Tehnikaülikool Austriast.
3. Baasfinantseerimise teema BF613 (aastatel 2009-2010) aitas kaasa mitme doktoritöö valmimisele ning valdkonna tugevdamisele uute doktorikraadiga teaduritega. 2010. aastal kaitses oma doktoritööd Tanel Jalakas. „Research and development of high-power high-voltage DC/DC converters.
4. 2010. aastal saadi 2 uut ETF granti. Edukateks taotlejateks olid: Indrek Roasto, ja Dmitri Vinnikov.
5. 2010. aastal saavutati 1. koht konkursil "Rakenduslik teadustöö 2010" (teadustöö "Alalispinge muundur taastuvenergeetika rakendustele"), Tallinna Linnavalitsus koostöös Tallinna Tehnikaülikooliga,
6. 2010. aastal omistati Tallinna Tehnikaülikooli 2009. aasta parim noorteadlase tiitel vanemteadur Dmitri Vinnikovile.

Kokkuvõttes võib 2010. aastat lugeda elektriainete ja jõuelektronika instituudi teadlasperede edukaks.

2.2 Instituudi teadus- ja arendustegevuse teemade ja projektide arvandmed

Haridus- ja Teadusministeerium:

- sihtfinantseeritavad teemad: **1**

Aktiivsete elektrijaotusvõrkude muundurite topoloogiad ja juhtimismeetodid

SF0140016s11	SF	01.01.11 - 31.12.16
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- baasfinantseerimise toetusfondist rahastatud projektid (sh TTÜ tippkeskused) **4**

Intelligentse transformaatori kontseptsiooni väljatöötamine ning eksperimentaalne uuring laboratoorse katseseadme abil	BF137	HTM baasfinantseerimine	01.01.10 - 31.12.10
Elektrienergia tarbimis- ja koormusmuutrite analüüs energiatarbimise juhtimismeetodite ja -mudelite sünteesiks	BF124	HTM baasfinantseerimine	01.11.09 - 30.06.10
Lokaalsete mikro-elektrivõrkude pingekvaliteedi ja elektromagnetilise ühilduvuse diagnostikasüsteemi katseseade	BF123	HTM baasfinantseerimine	01.11.09 - 28.05.10
Nutikate elektrivõrkude (Smart grid) uus tehnoloogia ja võimalikud rakendused Eesti elektrisüsteemis	B613A	HTM baasfinantseerimine	01.01.09 - 31.12.10

- riiklikud programmid teiste ministeeriumide poolt rahastatavad riiklikud programmid uurija-professori rahastamine.

SA Eesti Teadusfond:

- grandid **3**

Kõrgepingeliste IGBT transistoride lülitusomaduste uurimine	ETF7425	ETF	01.01.08 - 31.12.10
Võimsad kõrgsagedusliku vahelüliliga alalispingemuundurid	ETF7572	ETF	01.01.08 - 31.12.11
Võimsate IGBT muundurite innovatiivsete juhtimis- ja diagnoostikasüsteemide uurimine	ETF8020	ETF	01.01.09 - 31.12.12

- ühisgrandid välisriigiga
- järel doktorite grandid (SA ETF ja Mobilitas) **1**

- tippteadlase grandid (Mobilitas)

Ettevõtluse Arendamise Sihtasutus:

- eeluuringud
- arendustoetused

SA Archimedesega sõlmitud lepingud:

- Infrastruktuur (nn „mini-infra“, „asutuse infra“) **2(3)**

Väikesemahulise teaduse infrastruktuuri kaasajastamine teadusteema SF0140016s11 raames	SF0140016s11AP11	AP	01.01.11 - 31.12.12
Arukad energiasüsteemid	TAP6-6	TAP	01.01.10 - 31.12.11

Energia ja geotehnika doktorikool II	DAR8130	SA Archimedes toetus	01.12.08 - 31.08.14
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- Eesti tippkeskused
- muud T&A lepingud

SA Keskkonnainvesteeringute Keskusega sõlmitud lepingud siseriiklikud lepingud **1**

Kütuseelementide baasil autonoomse toiteallika alalispingemuundur	Lep9122	siseriiklik leping	01.11.09 - 28.02.11
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EL Raamprogrammi projektid välisriiklikud lepingud **3**

Integration of Renewable Energy Sources and Improvement of Energy Conversion Efficiency in Microgrids	VA431	välisleping	01.01.10 - 31.12.12
Eesti-Poola Akadeemiate vaheline projekt „Taastuvenergiaallikate integreerimine ja energia muundamise efektiivsuse suurendamine mikro võrkudes“ (https://www.etis.ee/portaal/projektiAndmed.aspx?TextBoxName=vinnikov&PersonVID=44277&lang=et&FromUrl0=isikud.aspx&FromUrl1=isikuProjektid.aspx)		välisleping	2010-2012
Elektri tarkvõrgu kliendivalduse elektrikvaliteedi ja inimeste ning elektriseadmete ohutusnõuded	GERA1	ERA- Net Smart Grids	01.11.10 - 31.10.13

2.3 Instituudi töötajate poolt avaldatud sihtfinantseeritava teadusteema taotlemisel arvestatavad eelretsenseeritavad teaduspublikatsioonid (ETIS klassifikaatori alusel 1.1, 1.2, 1.3, 2.1, 2.2, 3.1, 3.2, 3.3, 4.1 ja 5.1)

1.1

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1.2

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3.1

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3.2

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Müür, M.; Pettai, E. (2010). Analysis of Methods and Tools for Industrial Automation Engineering. In: 8th International Symposium "Topical Problems in the Field of Electrical and Power Engineering", Doctoral School of Energy and Geotechnology II: 8th International Symposium "Topical Problems in the Field of Electrical and Power Engineering * Doctoral School of Energy and Geotechnology II", Pärnu, Estonia, 11.01.-16.01.2010. (Toim.) Lahtmets, R.. Tallinn: Tallinn University of Technology, 2010, 88 - 92.

Adamowicz, M.; Strzelecki, R.; Vinnikov, D. (2010). Cascaded Quasi-Z-Source Inverters for Renewable Energy Generation Systems. In: Proceedings of 5th International Conference and Exhibition on Ecological Vehicles and Renewable Energies: 5th International Conference and Exhibition on Ecological Vehicles and Renewable Energies, March 25-28, 2010, Grimaldi Forum, Monaco. (Toim.) Copyright © 2010 MC2D & MITI. Monaco., 2010, 1 - 8.

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Beldjajev, V.; Lehtla, T.; Mölder, H.. (2010). Influence of Variable Energy Flow to Power Characteristics. . In: 9th International Symposium Pärnu 2010 "Topical Problems In The Field Of Electrical And Power Engineering" and "Doctoral School of Energy and Geotechnology II", Pärnu, Estonia, June 14 - 19, 2010: Doctoral school on energy and geotechnology II. Tallinn University of Technology, 2010, xx - xx.

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Andrei Blinov, Tanel Jalakas, Dmitri Vinnikov, Kuno Janson (2010). Transient Analysis of High-Voltage Half-Bridge Inverter during Freewheeling States. In: 9th International Symposium "Topical Problems in the Field of Electrical and Power Engineering", Doctoral School of Energy and Geotechnology. Pärnu, Estonia: (Toim.) R. Lahtmets. Tallinn, Estonia:, 2010, 8 - 11.

2.4 Instituudis kaitstud doktoriväitekirjade loetelu

Tanel Jalakas, Elektriajamite ja jõuelektroonika instituut

Teema: *Research and Development of High-Power High-Voltage DC/DC Converters*

(Võimsate kõrgepingeliste alalispingemuundurite uurimine ja välmimine)

Juhendaja: prof Tõnu Lehtla

Kaasjuhendaja: Dmitri Vinnikov

Kaitses: 14.06.2010

Omistatud kraad: filosoofiadoktor (energia- ja geotehnika)

2.5 Instituudis järel doktorina T&A-s osalenud isikute loetelu

MJD42 ,MOBILITAS Postdoctoral Research Grant 2009, Zakis Janis, „Research and Development of Bi-Directional Power Converters for Energy Storage Applications“

2.6 Instituudis loodud tööstusomandi loetelu

Instituudi töötajad on kolme leiutise autorid. TTÜ nimel esitati kaks Eesti kasuliku mudeli registreerimise taotlust ja TTÜle anti välja üks kasuliku mudeli tunnistus.

Esitatud taotlused:

1. U201000149

Tandem-alalispingemuundur

Taotlus esitatud: 30.11.2010

Omanik: TTÜ

Autorid: Dmitri Vinnikov, Hardi Hõimoja, Indrek Roasto, Tanel Jalakas, Hannes Agabus, Kristi Tammet.

2. U201000150

Pinget tõstev galvaaniliselt isoleeritud alalispingemuundur

Taotlus esitatud: 30.11.2010

Omanik: TTÜ

Autorid: Dmitri Vinnikov, Tanel Jalakas, Indrek Roasto, Janis Zakis, Hannes Agabus, Kristi Tammet

Väljaantud tunnistus:

1. EE00930U1

Pingetoiteline kvaasi-impedantsallikaga vaheldi

Tunnistus välja antud: 15.04.2010

Omanik: TTÜ

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3. Instituudi infrastruktuuri uuendamise loetelu

Toiteplokk GEN 600-5.5,2 630,00 eur