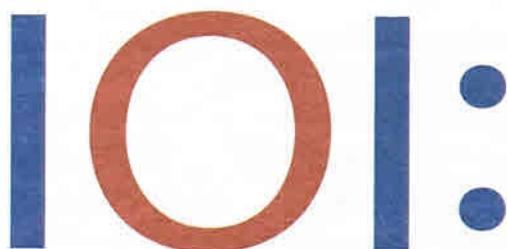
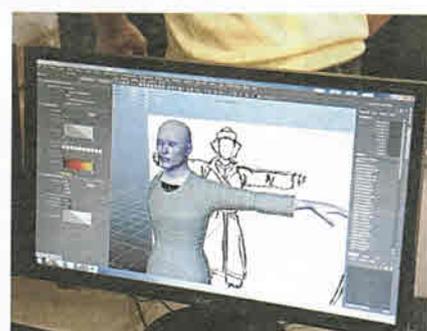
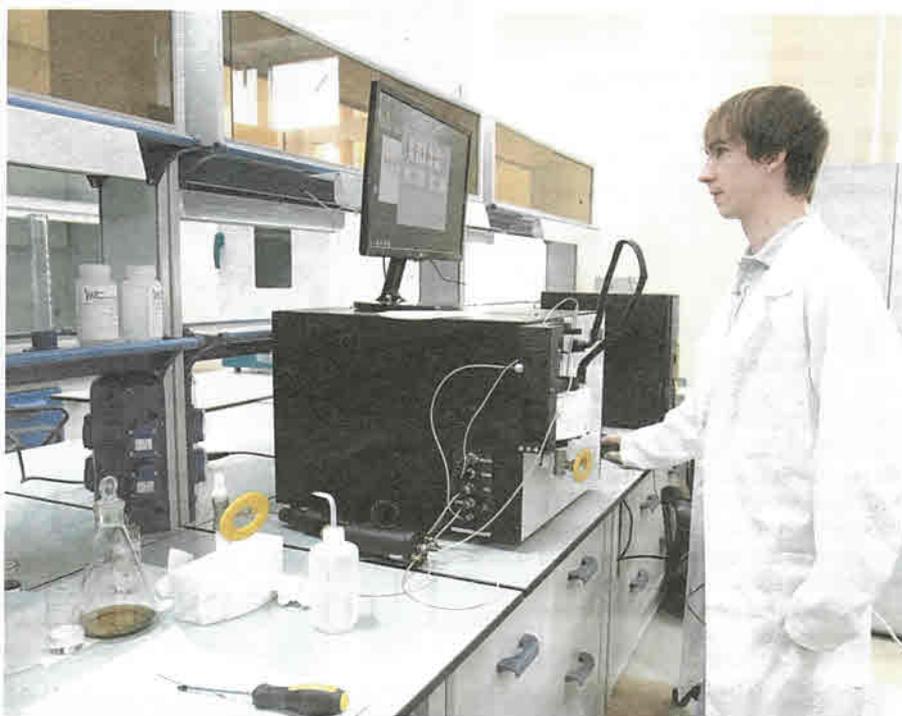


KAZAN UNIVERSITY

IOI 2016 Special Edition Kazan Federal University Newspaper
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Innovation
Originality
Imagination

THIS CENTURY IS WITHOUT DOUBT THE AGE OF INFORMATION TECHNOLOGY. MODERN-DAY RESEARCH WOULD SIMPLY NOT BE POSSIBLE WITHOUT IT, AND SO WE AT KAZAN FEDERAL UNIVERSITY DEVOTE AN ENORMOUS AMOUNT OF TIME AND ENERGY TO ITS DEVELOPMENT. IT GOES WITHOUT SAYING THAT THIS IS JUST A FRACTION OF WHAT OUR UNIVERSITY HAS TO OFFER.

Welcome messages



**Dmitry Livanov,
Minister of
Education and
Science RF:**

Dear contestants at the International Olympiad in Informatics!

On behalf of the government of the Russian Federation I welcome you, wishing you a fruitful competition and future successes in IT. I hope that one day one of your names may be said in the same breath as Steve Jobs or Bill Gates!

**Rustam Minnikhanov,
President of
the Republic of
Tatarstan:**



The Republic of Tatarstan has every right to be proud to have the honour to host the XXVIII International Olympiad in Informatics. For the bottom of my heart I wish every contestant is able to express themselves, uncover their gifts and talents, and make new friends. I wish you success, creative solutions and new achievements!



**Nikolai Nikiforov,
Minister of
Telecom and Mass
Communications
RF:**

The 28 th IOI will be contested by the best of the best: those who have triumphed in the many elimination rounds to make it here. Let this battle of wits be an important event in each of your lives, and your abilities, skills and strength of will carry you across the line.

**Ishat Gafurov,
Rector of Kazan
Federal University:**



I am delighted to welcome you to Kazan Federal University. We hope that some of the contestants at this Olympiad will one day join the ranks of KFU students, and eventually earn a worthy place among the scientists, researchers and teachers of our university.



Why will Kazan Federal University host IOI 2016?

NOT BY CHANCE HAVE KAZAN AND KFU BEEN CHOSEN AS HOSTS FOR RUSSIA'S FIRST INTERNATIONAL OLYMPIAD IN INFORMATICS.

«Kazan is one of the largest scientific and cultural centres in the Russian Federation», notes Dmitry Livanov, Minister of Education and Science of the Russian Federation, in his welcome speech on the IOI website. «The International Olympiad in Informatics will take place at Kazan (Volga-Region) Federal University, an institution which combines rich academic traditions with the newest educational technologies, with IT playing a priority role.»

Rector of Kazan Federal University Ishat Gafurov has always placed great importance on the development of information technologies. Additionally, for a

long time the university has enjoyed the support of a succession of influential faces from relevant ministries, including Minister of Telecom and Mass Communications of the Russian Federation Nikolai Nikiforov, who became Chair of the Supervisory Board in 2015, providing support to computer sciences at the university and helping to realise a range of large-scale IT projects initiated by its scientists. It is worth noting that the university's cooperation with Nikolai Nikiforov, himself a graduate of KFU, goes back even further. It is in a large part down to his initiative that a range of industry-specific innovative departments and laboratories have opened at Kazan University. Addition-

ally it was under his patronage that the KFU Higher School of Information Technologies and Information Systems (ITIS) was opened and continues to operate to this day.

**Ishat Gafurov,
Rector of KFU:**

The fact that Russian representatives, in particular those from Kazan Federal University, have on many occasions won medals at informatics olympiads at the highest level has played a large role in the Organisational Committee's decision to hold the International Olympiad in Informatics in Kazan.

Figures of the week

20 industrial laboratories created by IT companies and the Higher School for Information Technology and Information Systems

2 doctoral councils for dissertation defence at the Institute of Computational Mathematics and Information Technologies

50 grant places awarded by the Ministry of Information and Communication RT allocated to ITIS in 2015

In Tatarstan, IT specialists are trained almost from the cradle

KAZAN FEDERAL UNIVERSITY HAS DEVELOPED RUSSIA'S FIRST EDUCATIONAL ONLINE PLATFORM TO CONTINUE IMPROVING THE NATION'S IT SKILLS AND TRAIN SKILLED WORKERS IN THE INDUSTRY. THE PROJECT WAS LAUNCHED IN JULY.

It incorporates courses for professionals (developers, analysts, system administrators and so on) and IT fluency courses for the rest of the population, split into seven age groups ranging from 4 years old (IT-Start) to 60+ (IT-Silver).

"Identifying potential talent for the IT industry should start as young as possible," says director of the Institute of Continuing Education at KFU Liliya Nurgatina. "We propose creating information technology centres at partner schools for 4-6 year-olds and IT clubs for the parents, as well as clubs for young children along the lines of 'co-working centres' where they can meet, share ideas and learn. In our eyes, online courses alone are not enough – children need to be engaged with active, fun teaching styles."

For the older ones, lessons are given in the form of special programmes (IT biology, IT chemistry, IT economics and so on) which the children choose according what they want to

do in the future. A pilot scheme for this age group is planned for the Lobachevski IT-Lyceum at KFU.

It is interesting to note that KFU students, especially those who go on to become IT teachers, become "proponents" of IT fluency while at middle school. To help encourage this idea to bear fruit, the Centre for Student Initiatives for Increasing IT Fluency in the Population will come into being at KFU from September.

The online platform is designed for a for an enormous student body (up to 100,000 people), with programmes ranging from 8 hours to 3 years, and a flexible discount system envisaged.

Online registration for the professional courses is already up and running, and tuition will begin in September. Registration for the children's courses will be available in early autumn.

Target audiences were taken into account when developing all of the online courses,

and so everyone will quickly manage to find a common language with computers, be they a housewife or a pensioner.

"One of the factors accelerating the creation of our online platform is the need to afford talented children, in particular those living in rural communities, a virtual arena in which to prepare for olympiads in informatics," says Liliya Nurgatina. "In August, Russia's first ever International Olympiad in Informatics will be held at KFU. I don't think Kazan and Kazan Federal University were chosen by chance. The growth strategy of our republic is linked to the high-technology industries, which cannot exist without IT specialists, and Kazan Federal University is one of the country's leading sources of them. The KFU IT-Lyceum which opened a few years ago has allowed highly qualified individuals to develop while still at school. In founding our educational online platform we are continuing what was begun."

Larisa Busil

ONLINE PLATFORM STRUCTURE



IT fluency courses

- 
IT-START
 Programmes for children ages 4-6
- 
IT-JUNIOR
 Programmes for children ages 7-10
- 
IT-JUMP
 Programmes for schoolchildren ages 11-17
- 
IT-INTERMEDIATE
 Programmes for learners aged 17-35
- 
IT-Advance
 Programmes for learners aged 35-45
- 
IT-X
 Programmes for Generation X (aged 45-60)
- 
IT-SILVER
 Programmes for over-60s

Courses for IT professionals

- 
Analysts
- 
Developers
- 
Mobile developers
- 
Testers
- 
Web
- 
System administrators
- 
Software architects

THE LABORATORY OF MACHINE COGNITION AT THE HIGHER SCHOOL FOR INFORMATION TECHNOLOGIES AND INFORMATION SYSTEMS (ITIS) IS CONTINUING ITS WORK ON ARTIFICIAL INTELLIGENCE.

KFU scientists teach a machine to feel disgust and fear

Even with scientists all over the world trying to crack the secret to an artificial intellect, people are yet to fully agree on what an 'intellect' even is. On the one hand it could be anything capable of processing complex information. On the other hand you could make the case for it being something more akin to the minds of humans and animals. If so, before any attempt to construct a machine intellect we must first of all understand the workings of one in nature, an approach referred to as "biological inspiration".

The Laboratory of Machine Cognition draws its inspiration from biological systems. Researchers there believe that emotions are one of the base mechanisms on which mammalian consciousness is based, and without consciousness it is hard to speak of an 'intellect'. This point of view necessitates a multidisciplinary approach: the laboratory actively engages with neurobiologists and clinical neurologists, as well as psychologists, philosophers, cognitive scientists, sociologists, urban economists and many other specialists from all over the world.

Researchers base their ideas on Hugo Lövhelm's "Cube of emotion", which describes the influence of three neurotransmitters – noradrenaline, serotonin and dopamine – on basic emotional states. In this system the role of these neurotransmitters is considered in the reallocation of computing power between the processes of storing information and taking decisions.

The laboratory is currently working on recreating the brain of a



rat, and has already succeeded in mimicking dopamine and serotonin subsystems and recreating fear and disgust responses. We spoke with laboratory head Maxim Talanov about his team's work.

» What are the main difficulties in your research?

- There are a lot of complications. We are unable to portray the human brain with current computer capabilities. Not enough is known about how the human brain works. So far as part of the Human Brain Project we have succeeded in modelling the far smaller mammalian

brain of a mouse. Realistically for a supercomputer capable of modelling a human brain we are looking at about 2030.

» If robots start to experience emotions, is it not simply a matter of time before we encounter certain ethical problems in how we interact with them?

- This is a serious question and in fifty or so years will be a very pertinent one. Will we extend our humanity to entities created differently to us? If yes, then we should interact with them on the same basis as we would with other people. If no, we will have

to contend with a new type of chauvinism.

» In your view, why should we try to create an artificial intellect?

- Firstly it will help us understand the nature of our own intellect. Secondly it would provide us with a voice or opponent who sees the world in a different way. It will offer us a different point of view. On that topic I'm really sorry we're yet to make contact with aliens, as they would surely also display a different kind of intelligence. Additionally, "conscious" machines would help us perform work which is dangerous or physically demanding for people, but requires intelligent activity. Almost within reach is an exceptionally useful invention – a robot nurse.

» What plans does your laboratory have for the future?

- We want to build a connected system along all three axes – noradrenaline, dopamine and serotonin – to recreate the eight basic emotions in a computer system and see it dynamically alter its psycho-emotional state. We also want to develop a system of psycho-emotional evaluation to allow it to experience fear, disgust or joy to various stimulants. We should be able to recreate the emotional range of a rat in two to three years.

What we are doing is very topical. So far no-one has managed to recreate emotional states in a computer system. We know the approaches to make systems experience psycho-emotional states and alter their behavioural strategy accordingly.