



## ARTIQ

### ARTIQ - AI Centres of Excellence Application for a Host Institution

**Institution** National Centre for Research and Development,  
National Science Centre

**Project Joint National Project:** ARTIQ – AI Centres of Excellence

**Deadline for the submission of applications** 8th of April-11th of May 2021

## I. HOST INSTITUTION DATA

### Identification data of the Host Institution

<b>Name (full)</b>	<i>Adam Mickiewicz University Poznań</i>
<b>Name (short)</b>	<i>AMU</i>
<b>Name of the main organisational unit</b> (where applicable)	-
<b>Address of the registered office</b>	
Street	WIENIAWSKIEGO
Building No.	1
Office No.	
Postal code	61-712
City/district	POZNAŃ
Post office	POZNAŃ
Municipality	POZNAŃ
County	POLAND
Province	WIELKOPOLSKIE
<b>Correspondence address (if different than the address of the registered office)</b>	

Street	
Building No.	
Office No.	
Postal code	
City/district	
Post office	
Municipality	
County	
Province	
EPUAP [Electronic Platform for Public Administration Services] mailbox	<i>/UAM/skrytka</i>
<b>Legal form</b>	<b>UNIVERSITY</b>
<b>The person appointed for contact with NCBR and with the potential Leader/Project Manager</b>	
First name	<b>KRZYSZTOF</b>
Last name	<b>DYCKOWSKI</b>
Position	<b>DEAN</b>
Phone number	<b>+ 48 61 829 53 08</b>
E-mail address	<b>krzysztof.dyczkowski@amu.edu.pl</b>
<b>The person authorised to represent the applicant</b>	
First name	<b>PRZEMYSŁAW</b>
Last name	<b>WOJTASZEK</b>
Function/Position	<b>VICE-RECTOR</b>

## II. CAPACITY OF THE HOST INSTITUTION TO PERFORM THE PROJECT

1. Description of major research achievements in the scope of implementation of R&D projects, as well as the commercialisation of deliverables of such projects regarding artificial intelligence for the last 5 years prior to or in the year of the application along with a list of the most important publications and patents of the applicant (max. 1 A4 page).

1. **Application of the deep learning method in automatic auction categorisation.** The project, developed in collaboration with Allegro, aimed to build a model to support automatic categorisation of auctions based on photographs. The model is contingent on deep neural networks and similarity measures. The work led to the creation of a prototype system enabling users to search for similar auctions and automatically assign them to categories based solely on photographs (2017-2018) (AMU Faculty of Mathematics and Computer Science, FMCS)
2. **Application of fuzzy methods for measurement systems analysis (MSA).** The study was conducted in cooperation with the Department of Management and Production Engineering at the Faculty of Machine Building and Management, Poznań University of Technology. The research aimed to design a smart system to support the development of quality engineering methods and tools, with particular emphasis on statistical process control analysis (SPC) and measurement systems analysis (MSA). The tests were conducted on site in Aesculap Chifa (B. Braun) Nowy Tomyśl, specialising in the manufacture of medical equipment. The company has subsequently implemented the study outcomes (2012-2017) (FMCS)
3. **Studies on natural language processing.** The project is being carried out in collaboration with **Samsung Electronics**. The results are applied in the company's products. The project involved research and development in the following areas related to natural language processing: Automatic text translation, Application of finite-state methods in text processing, Natural language analysis on SmartTV devices, Natural language understanding in learning systems, Continuous speech recognition on mobile devices, Natural language understanding on mobile devices, Application of self-learning systems in natural language processing systems (2015-2021) (FMCS)
4. **Sales forecasting methods.** The study concerns methods for effective forecasting of in-store product sales and stock levels using time series analysis and deep learning methods. The system under development is highly scalable and is expected to replace an earlier tool. The work is performed in cooperation with LIDL. The system is planned to be implemented in the company's branches in other countries (2017-2018) (FMCS)
5. The **StethoMe** project aimed at the **creation and commercialising an electronic stethoscope with an AI module, used to detect abnormal sounds in the respiratory system. The combination of the StethoMe stethoscope and AI** algorithms helps to perform an auscultatory examination, record the sounds and analyse them accurately. Any abnormalities are automatically detected. Both the electronic stethoscope and the algorithms are certified medical devices. Both products were launched on the Polish market (B2C) at the end of 2020 and they are now offered for sale in other European markets. In addition to B2C sales, cooperation with a number of medical centres is also currently underway. For years, StethoMe company has attached considerable importance to collaboration in research and development in medical practice by cooperating with experts in the field of pulmonology and lung diseases. The equipment is used by allergy and pulmonology wards as well as facilities involved in the fight against the Covid-19 pandemic. **StethoMe** has received many prestigious awards for the project, including the **Economic Award of the President of the Republic of Poland in the special category of Research & Development**. StethoMe won the competition for the **Polish Product of the Year**, held by the **Polish Agency for Enterprise Development and the National Centre for Research and Development**. In this competition the company moreover received a **special award for an ICT product** (Faculty of Physics)

2. A list of 5 research and development projects within national and international competitions in the area of artificial intelligence and implemented within the last 5 years prior to or in the year of the application (title, manager, source of financing, amount of financing) (max. 1 A4 page).

1. **Application of computational intelligence methods in ovarian cancer diagnosis.** The research objective was to create and implement a smart decision support system for diagnosis and therapy in gynaecological oncology, with special emphasis on ovarian tumours. The project resulted in the creation of a prototype of a smart decision support system for medical diagnosis OvaExpert©. The system uses computational intelligence methods to handle data that may be subjective, imprecise or incomplete. The system has been piloted at the Operative Gynaecology Division, Department of Gynaecology and Obstetrics, Poznań University of Medical Sciences. The work was supported by Microsoft as part of Microsoft Azure Research (grant amount – USD 50,000.00) and a research and development grant of the Ministry of Science and Higher Education (grant amount – PLN 20,000.00) as part of the Innovation Incubator program (2013-2018). Project manager: Prof. UAM dr hab. Krzysztof Dyczkowski
2. **World-unique technology to identify and classify sounds from home auscultation using smart algorithms to support remote diagnosis and monitoring of respiratory diseases.** “Fast Track” Smart Growth Operational Program 2014-2020. The project's aim was to create a system which would enable a non-medically trained person to carry out an auscultatory examination. As a result, the user will obtain information about the recorded physiological and pathological sounds and will be able to send the signals to a doctor and remotely consult the outcome. The technology has been implemented in a product consisting of a measuring device and supporting software. The main purpose of the product is the diagnosis of children and patients with chronic respiratory diseases. Project manager: Prof. UAM dr hab. Jędrzej Kociński. Grant amount 6,457,704.28 PLN (2017-2021)
3. **“Digital Research Infrastructures for the Arts and Humanities DARIAH-PL” project** was part of the Polish Roadmap for Research Infrastructures in 2020. Financed by the European Regional Development Fund, grant amount: close to PLN 100m. Consortium leader: Poznan Supercomputing and Networking Centre. Project manager at AMU: prof. UAM dr hab. Katarzyna Klessa (2021-2023)
4. **Industrial Doctoral Program II – Artificial Intelligence.** Two research topics: Automatic generation of representative speech corpora for the development of acoustic models in ASR speech recognition systems (in collaboration with OLX Sp. z o.o.) and Connecting bilateral market users via machine learning methods employing deep neural network (in collaboration with Samsung Electronics to upgrade the ASR system used in the Bixby project). Project manager: prof. UAM dr hab. Krzysztof Dyczkowski. Grant amount 619,044.64 PLN. Ministry of Science and Higher Education (2019-2024)
5. **Studies on natural language processing.** The project is being carried out in collaboration with **Samsung Electronics**. The results are applied in the company’s products. The project involved research and development in the following areas related to natural language processing: Automatic text translation, Application of finite-state methods in text processing, Natural language analysis on SmartTV devices, Natural language understanding in learning systems, Continuous speech recognition on mobile devices. The studies are financed by Samsung Electronics. Grant amount 9,686,300.00 PLN. Project manager: prof. dr hab. Krzysztof Jassem (2015-2021)

3. Available research equipment, apparatus/infrastructure and intangible assets held in the context of implementation of a project regarding artificial intelligence (max. 1 A4 page).

**AMU IT Centre** manages approx. 60 physical servers and 5 blade server platforms, 38 of which were used to build a virtualisation environment running over 300 virtual servers. The entire server environment is connected to 5 enterprise-class disk arrays via a SAN based on fibrechannel technology. At the end of 2020, the AMU IT Centre exercised direct technical supervision over 290 nodes of the AMU-NET network made up of 1,536 active transmission devices (LAN switches, routers, etc.). The core of the AMU-NET network currently consists of four devices connected to each other by links of 10 Gbps each. Seven buildings (or building compounds) are connected to the network core with 10 Gbps links, the others are connected with 1 Gbps links. All transmission devices making up the AMU-NET network and the elements of the in-building cabling are under direct technical supervision of the IT Centre staff, who man and maintain them on an ongoing basis.

**The AMU Faculty of Mathematics and Computer Science** manages an infrastructure of servers and computational devices composed of the following:

- **cluster of 15 servers** with a total of 102 processor cores, 998 GB of RAM and disks with a total capacity of almost 100 TB.
- **computational cluster** made up of 6 servers with a total of 144 processor cores, 1280 GB of RAM, 60 TB of SSD storage.
- **GPU computational cluster** made up of 4 servers for graphics card computing each equipped with: 8 core processor, 64 GB of RAM, 2.5 TB of SSD space, GeForce RTX 3090 24GB graphics card.
- **storage sharing servers** with a total capacity of **256 TB**.

In addition, there are about 250 computers installed in the computer labs, which if necessary can be made available to perform calculations in the form of a **distributed computing cluster**. Each computer is equipped with 4-core processor, 8 GB of operating memory and 250 GB of space on SSD drives.

**The Faculty of Physics** owns additional specialist equipment known as the **Anechoic Chamber**. A specially designed room that completely absorbs sound reflections. It simulates a free field, i.e. there are virtually no reflections, no reverberation or echo, like high above the ground with no partitions such as walls, ceiling or floor. It is also isolated from waves incoming from the surroundings based on separate funds, without a rigid connection to the surrounding building.

**EMS BrainSTIM tDCS Stimulator** Transcranial direct current stimulation (tDCS) and transcranial alternating current stimulation (tACS, tRNS) are used to generate neuromodulations of spontaneous neuronal activity. **Neumann KU100, Bruela&Kjaer BK4128 head and torso** - The artificial head is very important in psychoacoustics and room acoustics.

**Faculty of Modern Languages and Literatures** has a multimodal laboratory equipped with hardware and software enabling the acquisition of video and audio recordings, in particular recordings of human communication which meet the criteria of learning/testing sets for AI. The laboratory equipment includes, among others: an anechoic cabin, customisable acoustic systems, basic recording equipment for work in both studio and field conditions (e.g. **Sony NEX-FS700R Super 35** cameras, **Neumann TLM 103, DPA 4066, AKG C4000** microphones and **Roland R26** portable recorders), workstations with software, including **Sony Sound Forge Audio Studio, Sony Movie Studio Platinum**, database systems supporting the management of remote team work on annotation and processing of corpora containing recordings of vision and sound, or **OptiTrack Flex** - a multi-camera system for motion capture. The available intangible assets include corpora of recordings of speech, mime and gesture, and tools for automatic identification of correlations between annotation layers in multimodal corpora.

#### 4. Facilities or incentives to establish an AI Centre of Excellence in the entity (max. 1 A4 page).

The staff of the prospective Poznań Centre will have access to AMU modern infrastructure and research facilities. Access to our infrastructure and the University's staff offers the Centre leverage for its daily operation and sustainable development.

Undoubtedly, its modern infrastructure, well-equipped laboratories and office space are the strengths of AMU. Constant availability of AMU infrastructure can be an added benefit to the project. The Centre's staff will have guaranteed access to all research equipment, qualified service personnel/technicians and a repair shop.

In addition, Adam Mickiewicz University, Poznań commits itself to:

- provide the required additional average funding of PLN 100,000 per annum over the entire funding period and fulfil the other requirements set out in the Regulations.
- provide accommodation for the Centre Leader and his/her family in the initial phase of the project. AMU will furthermore assist other team members in finding suitable accommodation.
- offer assistance in finding relevant employment for the Leader's spouse.
- ensure that all the Centre members have equal rights and access to University employee schemes, incl. e-sport card, University health care and special medical services programs, University vacation centres, etc.
- assign an institutional mentor for the Leader. This person will guide the Leader through the AMU regulations and working culture during the first year of the project.
- offer assistance in matters related to project implementation (AMU Project Support Centre).

The Centre will also have at its full disposal the infrastructure currently being developed in the DARIAH-PL project, which comprises a broad spectrum of resources, both equipment and intangible assets. The AMU team is developing e.g. infrastructure components for: automatic normalisation, dating and searching of Polish texts (Faculty of Mathematics and Computer Science), production and analysis of multimodal corpora (Faculty of Modern Languages and Literatures), a digital audio-visual archive together with archive development tools (Faculty of Art Studies), a set of tools for music, speech and gesture analysis with a database of music waveforms (Faculty of Art Studies, Institute of Musicology), a cloud platform of software tools and large digital resources for linguistic and literary studies (Faculty of Polish and Classical Philology), a corpus of translators' handwritten notes and software for smart note analysis (Faculty of English).

5. Other information concerning internationalisation of the entity, foreign scientists employed in this institution, availability of seminars in English, etc. (max. 1 A4 page).

The AMU International Relations Centre updated bilateral contracts (a total of 338 contracts) and renewed contracts with partner institutions. The website was launched to disseminate information about foreign mobility programs for undergraduates, graduates, Ph.D. students, and scholars.

New inter-university cooperation agreements were concluded with, among others: Japan, China, Uzbekistan, Indonesia, and Kazakhstan. Bilateral agreements with partner universities were extended, e.g. with: Shenzhen University, China; Peter The Great St. Petersburg Polytechnic University, Russia; Belgorod National Research University, Russia; Hanoi University of Mining and Geology, Vietnam; Istanbul Aydin University; Caucasus University, Georgia; Ivane Javakhishvili Tbilisi State University, Georgia; Financial University under the Government of the Russian Federation, Russia; Confucius Institute Headquarters of China; Borys Grinchenko Kyiv University, Ukraine; Abai National Pedagogic University. The first competition of the SGroup ICon Grants 2021 was held in 2020. The AMU International Relations Centre continued projects within the framework of programs supporting the internationalisation of the University, such as: AMU Forward, SUCTIA and TAPIH. A Welcome Centre was launched at AMU as part of AMU Forward program. The Centre is an information and integration point for foreigners coming to the University. The project SUCTIA involves training courses for AMU employees to increase their intercultural competences, while TAPIH mainly involves courses for AMU staff that upgrade their communication with foreigners skills.

In 2020, AMU submitted the maximum allowable number of three applications to NAWA (National Academic Exchange Agency) in the new edition of the Welcome to Poland Program. Implementation of 6 new projects financed by NAWA commenced. These were, e.g.: a mobility program for scholars with Belgium-Valonia; Czech Republic; and the "Solidarity with Belarus" project. Within the NAWA program known as the Promotion of the Polish Language, the AMU International Relations Centre supported the application and implementation of projects: CoolFraz.pl and ADAM.PL, related to teaching aids to develop phraseological competence in Polish, and Pol-Uk - we teach Polish in Ukraine, promoting Polish culture and language in Ukraine. As part of the ERASMUS+ program, in 2020 the AMU continued international projects of Strategic Partnerships, e.g.: SERP-Joint European Master in Surface, Electro, Radiation and Photo-chemistry; Declame'FL-Développement d'un espace collaboratif FLE: Littérature, Apprentissage, Migration, Exil; EISIPS-Eurasian Insights: Strengthening Indo-Pacific Studies in Europe; EULALIA- Enhancing Univ. Language courses with an App powered by game-based Learning and tangible user Interfaces Activities; MALW - Mehrsprachigkeit in DaF- und DaZ-Lehr-Lernkontexten wahrnehmen, aufgreifen und nutzen; RiTE-Research in Teacher Education; DESTIN-Journalism Education for democracy in Ukraine: Developing Standards, Integrity and Professionalism; INCLUDE - Inclusive Leadership in the Digital Age; SOS-Digital-Providing Support to Students in Distress; CLASS-Development of the interdisciplinary master program in computational linguistics of CA Universities; EU DYNAMICUS-European Union-Economic Development, Young Europeans and Innovations in Crisis Overcoming and Union's Sustainability; ImpEA-Facilitating Implementation of the European Approach for Quality Assurance of Joint Programs; NORTIA-Network on Research and Teaching in EU Foreign Affairs oraz Rethinking Regional Studies: The Baltic-Black Sea Consortium.

Furthermore, new projects within the framework of Erasmus + Strategic Partnerships commenced in 2020. 154 international scholars are employed by AMU under a job contract. According to AMU PIE offers as many as 408 courses run in English.



6. Other significant information confirming the experience and resources of the institution (max. 1 A4 page).

Adam Mickiewicz University, Poznań is the largest science and academic institution in Poznań and one of the leading Polish universities. AMU's reputation in domestic and international Academia is mainly due to the scientific accomplishments of its staff and its attractive teaching offer. AMU currently employs around 3,000 academics, nearly one third of whom are full professors and university professors. The Host Institution has professional and experienced project staff as well as financial, accounting and administration personnel. The Host Institution has necessary resources for the project implementation: fully equipped office premises, where the administration of the project will be carried out.

AMU has the human resources potential necessary to implement the project as it employs over 2,200 non-academic staff who can become involved. The project is furthermore important for AMU due to the possible participation of all its units and central administration, including the Rector and Vice-Rectors.

On 30 October 2019, AMU won the competition of the Minister of Science and Higher Education titled Initiative of Excellence - Research University. AMU was among the 10 laureates of the above project and its submission was highly evaluated by a team of international experts. AMU ranked 3rd among the laureates, sharing its position with the Jagiellonian University, Warsaw University of Technology and AGH University of Science and Technology.

Priority Research Areas, acc. to the All Science Journal Classification codes:

POB 1 AgriEarth: Agricultural and Biological Sciences, Earth and Planetary Sciences

POB 2 BioGenMol: Biochemistry, Genetics and Molecular Biology

POB 3 ChemMat: Chemistry, Materials Science

POB 4 MathPhysComp: Mathematics, Physics and Astronomy, Computer Sciences

POB 5 HumSoc: Arts and Humanities, Social Sciences

As one of five higher education institutions in Poland, AMU is part of a consortium Academy of Innovative Applications of Digital Technologies (AI Tech), run by the Office of the Council of Ministers. The principal objective of the AI Tech project is to create a model of a systemic education of top-notch AI, machine learning and cybersecurity specialists. This is a key issue from the point of view of modern economy and various applications of digital technologies. AI Tech is the next step in the implementation of activities aimed at supporting the development of advanced digital competencies and preparing staff for the digital economy. The project is financed by the Operational Programme "Digital Poland 2014-2020". Project value for the entire consortium is PLN 51,521,859.00; part-financing by the European Union is PLN 43,602,949.27.