



**Decree of the Rector n. 1324 of 12/12/2023**  
Competition for awarding 1 research grant at the University of Udine

**DISCLAIMER:**

The official and legally binding call for applications is in Italian only.  
This document cannot be used for legal purposes and is only meant to provide information in English on the call for applications (Decree of the Rector n. 1324 of 12/12/2023). Please refer to the official call published on: <https://www.uniud.it/it/albo-ufficiale>

Any change and integration will be made available on the above mentioned web page. Therefore, no personal written communication regarding the examination date and/or competition results shall be provided to applicants.

**Annex 1**

**Competition announcement for the assignment of 1 research grant at the University of Udine, entitled "Design and development of a software system for acquiring and managing sensory data from a lake ROV" SSD: INF/01 (principal investigator, Marco Comini)**

**Research grant co-funded by the resources of the project PRIN 2022 - Prot. n. 2022KBASSY**

**Art. 1**

A selection procedure is hereby launched for the award of 1 research grant at the University of Udine, as identified in Attachment A which constitutes an integral part of the present announcement.

The research grant is linked to the research project and is subject and conditioned upon the relative funding.

The fellowship may be renewed, in compliance with Art. 22, Law No. 240 of 30 December 2010 (as in the text in force before the implementation of the Conversion Law of the D.L. 36/2022, L. 79/2022), Law No. 11 of 27 February 2015, and the current regulations of the University of Udine for awarding research grants, issued with the Rector's Decree No. 182 of 31 March 2021. The renewal is subject to the scientific coordinator's positive assessment of the researcher's activities, an adequate scientific rationale, and a corresponding financial covering.

The research fellowship does not give rise to any right with regards to accessing University posts.

Any personal communication to candidates related to this selection will be sent exclusively to the email address indicated when registering for the selection, as mentioned in Art. 5.

**Art. 2**

The research grant described in this competition announcement and the required qualifications to apply for the position are identified in Attachment A. The lack of the admission requirements leads to the automatic exclusion from the competition procedure.

Possession of a PhD or equivalent degree obtained abroad or, only for the interested areas, of a medical specialization accompanied by an adequate scientific production, constitutes a preferential qualification for awarding the research fellowship of this selection, if it has not been provided as a mandatory requirement.



For the only purpose of the admission to the competition, the Examining Board (Art. 7) shall assess the equivalence of the qualification obtained abroad, except for the evaluation of the medical specialization qualification to which Article 38 of the Legislative Decree 165/2001 and subsequent modifications and additions, and EU regulations on the matter, shall be applied.

The Examining Board will proceed to the evaluation of the qualification obtained abroad according to the documentation attached to the application form. The Examining Board may exclude the candidate if the submitted documentation does not provide sufficient information for the assessment. Therefore, applicants must enclose all the documentation in their possession relating to their qualification in order to provide the Examining Board with sufficient information for assessment.

Candidates holding a qualification issued by a **European Research Area country**, if successful, must submit, if not already attached to the application form one of the following options:

- Supplement Diploma in English issued by the competent University.
- CIMEA Certificate of comparability of the foreign qualification, issued by CIMEA (Information Centre on Academic Mobility and Equivalence) via the "diplome" service at <https://cimea.diplo-me.eu/udine/#/auth/login>

Candidates holding a qualification issued by a **non-European Research Area country**, if successful, must submit, if not already attached to the application form one of the following options:

- Declaration of the on-site value of the qualification and the certificate relating to the degree with examinations and grades. A certificate in a language other than Italian or English must be accompanied by an official translation into one of these languages (certified by the competent diplomatic-consular authority or certified by a court in Italy).
- CIMEA Certificate of comparability of the foreign qualification, issued by CIMEA (Information Centre on Academic Mobility and Equivalence) via the "diplome" service at <https://cimea.diplo-me.eu/udine/#/auth/login>

If the Supplement Diploma or the statement/attestation of comparability are not available when signing the contract, the applicant must demonstrate that he/she has requested the documentation and submit it as soon as possible.

Any exclusion from the selection procedure due to lack of eligibility requirements, absence of required documents, failure to sign the selection application or submission of the selection application in a manner different from what is provided for in this call for applications will be communicated to applicants exclusively at the email address indicated in the application form.

### Art. 3

#### **The research grant referred to in this call for applications cannot be awarded:**

- a. to employees of Universities and the entities referred to in Article 22, section 1, of Italian Law no. 240 of 30 December 2010 (in the text prior to the reform introduced by Law no. 79 of 29 June 2022);
- b. to those who have already been awarded research grants pursuant to Italian Law no. 240 of 30 December 2010 (prior to the reform introduced by Law no. 79 of 29 June 2022) for the maximum period provided by law, even if not continuously, excluding the period in which the grant was used in conjunction with the doctorate, up to the legal term of the relative course;
- c. to those who have already benefited from research grants and fixed-term researcher contracts provided for, respectively, in Articles 22 and 24 of Italian Law no. 240 of 30 December 2010 (in the



text prior to the reform introduced by Law no. 79 of 29 June 2022), for a total of 12 years, even if not consecutive;

- d. to anyone who has a degree of kinship or affinity, up to and including the fourth degree, with:
- the Rector, the Director General or a member of the Board of Directors of the University of Udine;
  - the scientific supervisor or a professor/researcher belonging to the department or organisation hosting the research grant in question.

The research grant provided for in this call for applications cannot be combined:

- a) with scholarships of any kind, except for those granted by Italian or foreign institutions to supplement, by means of stays abroad, the fellow's training or research activities;
- b) with other research grants;
- c) with an employment relationship, even if part-time, without prejudice to the relevant provisions for employees of public administrations.

The grant awarded under this call for applications is also incompatible with simultaneous attendance at university degree courses, either Bachelor's degree or Master's degree courses, research Doctorates with scholarships and medical specializations, in Italy or abroad.

#### **Art. 4**

Applicants must enclose with their application, under penalty of exclusion, the following documents:

- a) their professional scientific CV, highlighting the candidate's aptitude for carrying out and implementing the research project (Attachment A);
- b) their identity card, their passport or any other identification document<sup>1</sup>;
- c) (for candidates with a foreign qualification only) certification or self-certification of both the academic qualification required for the admission to the selection, and of the exams (with evaluation) took during the period of study abroad, and of any other document that can be useful to the evaluation of the degree by the Examining Board.

Applicants can attach to the application, publications and any other certification considered useful to demonstrate the qualification based on the research program (Attachment A) and to certify any research activity accomplished at public or private institutes (indicating the starting and ending date and the duration).

The documents and qualifications mentioned above must be submitted in Italian or English. Those that are not as requested will not be evaluated. Documents originally written in a language other than Italian or English must come with a translation in Italian or English, that the candidate will do on its own responsibility. The translation can be an abstract concerning the thesis.

Italian and Community candidates wishing to submit qualifications referring to conditions and facts attested by Public Administrations must proceed exclusively with self-certification.

Non-EU citizens legally residing in Italy may self-certify only data that can be verified or certified by Italian public bodies. They may also use declarations in lieu when provided for by an international convention between Italy and the declarant's country of origin.

Non-EU citizens not residing in Italy cannot self-certify.

Only the qualifications possessed by the candidate on the date the application form is submitted and submitted in accordance with the procedures set out in Article 5 will be assessed.

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<sup>1</sup> Please be aware that the residence permit is not an identification document.



Failure to submit mandatory documents provided for in this article will constitute grounds for exclusion from the selection.

#### **Art. 5**

The submission of the applications for the present call starts on January 12, 2024 at 2:00 pm (Italian time) and ends on May 19, 2024 at 2:00 pm (Italian time).

The application to take part in the selection must be completed, under penalty of exclusion, using the appropriate online procedure, available at the link <https://pica.cineca.it/>. The procedure involves an applicant registration step, for those who do not already have an account, and then an application completion step.

Once completed, the online application must be signed in the manner described in the online procedure (manual signature with attached identity document or digital signature), under penalty of exclusion from selection. The application does not have to be signed if you access the above-mentioned online procedure using your SPID ID.

The qualifications referred to in Article 4 must be attached to the application in .pdf format. Individual .pdf files may not exceed 30MB.

The application for participation in the selection is automatically sent to the University of Udine with the definitive closing of the online procedure.

The University Administration:

- is not responsible if it is impossible to read the submitted documentation in electronic format due to damaged files;
- shall not accept or take into consideration qualifications or documents received in paper form or by any means other than what is specified in this article.

Reference to documents or publications already submitted in connection with other competitions is not allowed.

The Administration is not responsible for any missing document or communication because of inaccurate indication of residence and/or address submitted by the candidate during the application. Also, the Administration is not responsible if the candidate has not communicated changes in this information, or has communicated them too late. The Administration is also not responsible for any postal or telegraphic problems not attributable to the Administration itself.

Applicants are advised not to wait until the last few days before the closing date to submit their application. The University accepts no responsibility for any malfunctions due to technical problems and/or overloading of the communication line and/or application systems.

#### **Art. 6**

The selection procedure is held in accordance with the modality indicated in Attachment A.

The test will aim to assess the general preparation, experience and aptitude for research of the candidate. It will consist in the evaluation of the professional scientific curriculum, of the publications and qualifications presented, and of the interview, where foreseen.



### **Art. 7**

The Examining board for the competition is identified in Attachment A of the present competition announcement, of which it is an integral part.

At its first meeting, the Examining board shall appoint its President and Secretary, and establish the criteria and methods for evaluating the qualifications and the interview, where foreseen.

The results of the qualifications assessment must be disclosed to applicants during the interview, where foreseen.

The Examining board can award a maximum of 100 points (one hundred out of one hundred) to the selection.

At the end of the evaluation procedure, the Examining board shall formulate the general merit list based on the overall score of each candidate, and draw up the minutes of the whole competition procedure.

Based on the ranking list, the assignment is awarded to candidates who have obtained a minimum overall score of 70/100 (seventy out of one hundred).

The Examining board's judgement is final.

The ranking list will be made public exclusively through publication on the University's official website.

Applicants will not be notified of the outcome of the evaluation.

Those who do not declare their acceptance of the research grant and do not present themselves at the research centre within the deadline communicated by the latter, even if not formally, shall lose the right to receive it. Exceptions to this term will only be granted in cases of documented force majeure.

### **Art. 8**

The research activity cannot be started before signing the contract defining the terms and conditions of the collaboration.

The activity covered by the research grant must have the following characteristics:

- a) it must be carried out as part of the research programme covered by the grant and not be a merely technical support to it;
- b) it must have a close connection with the realization of the research program for which the winner of the grant has been awarded the contract;
- c) it must be continuous and, in any case, temporally defined, not merely occasional, and in coordination with the overall activity of the University;
- d) it must be carried out autonomously, solely within the limits of the programme prepared by the programme supervisor, without predetermined working hours.

The researcher is required to submit a detailed written report on the work carried out and the results achieved, accompanied by the opinion of the scientific supervisor, to the reference organisation at the intervals set out in the contract. The researcher must also submit interim reports and timesheets, if requested by the reference organisation.



Either the fellow or the reference organisation may withdraw from the contract.  
The reference organisation may terminate the contract not only in the cases referred to in Article 9, sections 2 and 3, of the "Internal rules for awarding research grants pursuant to law 240 of 30 December 2010" of the University of Udine, but also in the event the research project and therefore the financial coverage on which the research grant is based cease to exist.

#### **Art. 9**

The following legal dispositions shall apply to the grant referred to in this call for applications:

- for tax matters, the provisions of Article 4 of Italian Law no. 476 of 13 August 1984, as subsequently amended and supplemented;
- for social security matters, the provisions of Article 2(26) *et seq.* of Italian Law no. 335 of 8 August 1995, as subsequently amended and supplemented;
- for mandatory maternity leave, the provisions of the Italian Ministerial Decree of 12 July 2007;
- with regard to sick leave, the provisions of Article 1(788) of Italian Law no. 296 of 27 December 2006 and subsequent amendments.

During the period of mandatory maternity leave, the allowance paid by INPS according to Art. 5 of the Italian Ministerial Decree of 12 July 2007 is supplemented by the University up to the full amount of the research grant.

The grant will be paid in monthly instalments.

#### **Art. 10**

The data collected as part of the procedure referred to in Art. 5 are necessary to properly manage the selection procedure, for any subsequent management of the research grant and for purposes related to managing services provided by the University. The University of Udine is the Data Controller. At any time, the data subject may request access, rectification and, depending on the University's institutional purposes, cancellation and restriction of processing or oppose the processing of their data. The data subject can always lodge a complaint with the Italian Data Protection Authority. The complete disclosure is available on the University of Udine website in the "Privacy" section, accessible from the home page [www.uniud.it](http://www.uniud.it) Direct Link: <https://www.uniud.it/it/it/pagine-speciali/guida/privacy>

#### **Art. 11**

For all matters not expressly mentioned in this call for applications, refer to the regulations in force on the subject cited in the introduction and to the "Internal rules for awarding research grants pursuant to Italian Law no. 240 of 30 December 2010" of the University of Udine, issued by Rector's Decree no. 182 of 31 March 2021.

#### **Art. 12**

The procedure supervisor is Dr Sandra Salvador, Head of the Research Services Area of the University of Udine.

The Responsible office at the University of Udine is "Area Servizi per la Ricerca - Ufficio Formazione per la Ricerca", via Mantica n. 31 - 33100 Udine, Italia.

To request information about the call for applications, please complete the following form available on the University of Udine website:

[https://helpdesk.uniud.it/SubmitSR.jsp?type=req&accountId=universityofudine&populateSR\\_id=42105](https://helpdesk.uniud.it/SubmitSR.jsp?type=req&accountId=universityofudine&populateSR_id=42105)



## Attachment A

### Responsabile scientifico della ricerca / Principal investigator:

Nome e cognome / Name and surname: Marco Comini

Qualifica / Position: Professore Associato / Associate Professor

Dipartimento / Department: Scienze Matematiche, Informatiche e Fisiche (DMIF) / Mathematics, Computer Science and Physics

Area MIUR / Research field: 01 – Scienze matematiche e informatiche

Settore concorsuale e Settore scientifico disciplinare / Scientific sector: 01/B1; INF/01 – Informatica

### Titolo dell'assegno di ricerca / Topic of the research fellowship "assegno di ricerca":

*I bandi sono consultabili dal sito dell'Ateneo, del MUR e di Euraxess / The calls are available on the University, MUR and Euraxess websites*

#### Testo in italiano:

Progettazione e sviluppo di un sistema software di acquisizione e gestione dei dati sensoriali di un ROV lacustre.

#### Text in English:

Design and development of a software system for acquiring and managing sensory data from a lake ROV.

### Obiettivi previsti e risultati attesi del programma di ricerca in cui si colloca l'attività dell'assegnista di ricerca / Foreseen objectives and results of the research programme performed by the research fellow "assegnista di ricerca":

*I bandi sono consultabili dal sito dell'Ateneo, del MUR e di Euraxess / The calls are available on the University, MUR and Euraxess websites*

#### Testo in italiano:

Il progetto prevede lo studio e la realizzazione di un sistema di gestione, comunicazione e visualizzazione dei dati acquisiti e generati da un veicolo a pilotaggio remoto (Remotely Operated Vehicle, ROV). Nel caso specifico il ROV è un veicolo di superficie (Unmanned Surface Vehicle) per il monitoraggio di laghi glaciali alpini, ovvero, di ecosistemi acquatici il cui stato di salute è un indicatore significativo dei cambiamenti climatici in atto.

Inizialmente si studierà come interfacciare i sensori di bordo del ROV ad un sistema embedded di tipo SoC (System on a Chip) a basso consumo, dotato delle porte hardware e delle periferiche di comunicazione necessarie alla gestione dei vari task di acquisizione dei dati grezzi dai sensori, di primo filtraggio e memorizzazione su un supporto locale e di comunicazione in cloud. Verrà anche gestita una fotocamera di bordo per implementare delle tecniche SLAM (Simultaneous Localization And Mapping).

Per garantire i collegamenti di rete, si prevede di dotare il sistema di molteplici tecnologie di comunicazione al fine di consentire l'handover da una forma all'altra, a seconda delle necessità contingenti. Quindi il sistema sarà in grado di sfruttare eventuali hotspot Wi-Fi nelle vicinanze, un modulo GSM/UMTS con SIM dati (nel caso non ci sia connessione Wi-Fi, ma una rete cellulare) ed infine un modulo sub-GHz, per tentare di trasmettere i dati con tale tecnologia verso il gateway più vicino (ad esempio, presso il rifugio alpino più prossimo al lago da monitorare), nel caso non sia disponibile nemmeno la rete cellulare. In ogni caso, un operatore in prossimità del veicolo potrà sempre collegarsi ad esso, sfruttando l'hotspot Wi-Fi locale generato dal SoC in assenza di altre connessioni.



La progettazione software dovrà tener conto delle velocità diverse di acquisizione dei dati dei vari sensori e ricorrerà quindi ad un'architettura a microservizi in cui ogni sensore verrà gestito da un thread diverso, per evitare eventuali perdite di dati dovute all'attesa dei dispositivi più lenti o eventuali race condition che portino alla corruzione delle strutture che li rappresentano in memoria centrale.

Viste le condizioni estreme dell'ambiente operativo finale ed il carattere instabile della connessione alla rete, sarà inoltre opportuno salvaguardare i dati acquisiti mediante una memoria a stato solido (facilmente rimovibile da un operatore), in grado di memorizzarli localmente, nel caso la connettività di rete si interrompa o degradi al punto tale da non permettere la loro trasmissione in cloud. Infatti, il maltempo o anche semplicemente la posizione geografica potrebbero non garantire una sufficiente copertura della zona da parte dell'infrastruttura di rete esistente.

I dati saranno poi disponibili e visualizzabili mediante opportune dashboard in rete, anche in modalità remota, mediante un'applicazione mobile per consentire all'operatore di connettersi al ROV e di monitorarne lo stato, dialogando con il sistema a bordo. Sarà anche possibile inviare dei comandi per avviare la missione dopo il dispiegamento in loco del mezzo o per richiamarlo a riva al momento delle periodiche ispezioni/manutenzioni o in caso di necessità.

#### Text in English:

The project activities concern the design and development of a software system enabling the management, communication and visualization of data acquired and generated by a Remotely Operated Vehicle (ROV). More in details, the ROV is a surface vehicle (Unmanned Surface Vehicle, USV) for monitoring Alpine glacial lakes, that is, aquatic ecosystems whose state of health is a significant indicator of ongoing climate changes.

Initially, we will study how to interface the ROV's on-board sensors to a low-power SoC (System on a Chip) embedded system, equipped with the hardware ports and communication peripherals necessary for i) managing the various tasks of raw data acquisition from the sensors; ii) performing an initial filtering and storage on local memory; and iii) communicating data in a cloud infrastructure. An on-board camera will also be managed to implement SLAM (Simultaneous Localization And Mapping) techniques.

In order to guarantee network connections, the system will be equipped with multiple communication technologies in order to allow handover from one form to another, depending on contingent needs. Therefore, the software will be able to exploit any nearby Wi-Fi hotspots, a GSM/UMTS module with data SIM (in case there is no Wi-Fi connection, but a cellular network is available), and finally a sub-GHz module, to attempt to transmit the data with this technology to the nearest gateway (for example, to the closest alpine refuge), in case even the cellular network is not available. In any case, an operator in the surroundings of the vehicle will always be able to connect to it, using the local Wi-Fi hotspot generated by the SoC in the absence of other connections.

The software design will have to take into account the different data acquisition speeds of the various sensors and will therefore use a microservices architecture in which each sensor will be managed by a different thread, to avoid any data loss due to waiting for the slower devices or any race conditions that may lead to the corruption of the structures that represent data in central memory.

Given the extreme conditions of the final operating environment and the unstable nature of the connection to the network, it will also be advisable to safeguard the acquired data using a solid-state memory (easily removable by an operator), capable of storing data locally, in case the connectivity of network is interrupted or degraded to the point that it is not possible to transmit data to the cloud. In fact, bad weather or even simply the geographical position may not guarantee sufficient coverage of the area by the existing network infrastructure.





The data will then be available and viewable via appropriate online dashboards, even remotely, via a mobile application to allow the operator to connect to the ROV and monitor its status, communicating with the on-board system. It will also be possible to send commands to start the mission after the vehicle has been deployed on site or to recall it to shore at the time of periodic inspections/maintenance sessions or in case of need.

**Struttura dell'Università di Udine presso la quale verrà sviluppata l'attività di ricerca / Department or other structure of the University of Udine where research activities will be carried out:**

Dipartimento di Scienze Matematiche, Informatiche e Fisiche (DMIF) - Laboratorio di Sistemi Autonomi (modulo SMACT3, Lab Village) / Department of Mathematics, Computer Science and Physics - Autonomous Systems' Laboratory (SMACT3 module, Lab Village)

**Importo dell'assegno di ricerca (al lordo oneri carico assegnista) / Total grant gross for the research fellowship:**

€ 19.367,00

**Durata dell'assegno di ricerca / Duration of the research fellowship "assegno di ricerca":**

12 mesi / months

**Finanziamento / Financed by:**

La copertura finanziaria graverà su:

- progetto PRIN 2022 – "MARMOT - Modular Alpine Robotic MONitoring Tools"; Prot. n. 2022KBASSY. Decreto di finanziamento n. 960 del 30/06/2023 - Settore PE7. Codice CUP G53D23000390006. Ministero dell'Università e della Ricerca (Finanziato dall'Unione Europea, NextGenerationEU);
- piano strategico del Dipartimento di Scienze Matematiche, Informatiche e Fisiche (DMIF). Codice U-GOV: PSD\_2022\_2025\_RIC\_Libera.

**Requisiti di ammissione / Minimum qualifications necessary:**

- Possesso di un diploma di laurea vecchio ordinamento (ante decreto 3 novembre 1999 n. 509) o di laurea specialistica/magistrale (ex decreto 3 novembre 1999 n. 509 e decreto 22 ottobre 2004 n. 270) o titolo equivalente conseguito all'estero;
- possesso di un curriculum scientifico professionale idoneo allo svolgimento dell'attività di ricerca contemplata.
- University degree obtained before Decree n. 509 of 3 November 1999 or specialistic/Master's degree (post decree n. 509 of 3 November 1999 and decree n. 270 of 22 October 2004) or equivalent degree obtained abroad;
- professional scientific curriculum suitable for the research activity above mentioned.

**Procedura selettiva / Competition procedure:**

Valutazione per titoli e colloquio / Evaluation of titles and oral exam



I risultati della valutazione dei titoli saranno resi noti agli interessati nel corso del colloquio / The evaluation of the qualifications will be disclosed to candidates during the interview

Calendario del colloquio / Calendar of the oral exam	Modalità / Modality	In presenza / On site
	Data / Date	7 giugno / June 2024
	Ora / Time	14:30 / 2:30 pm (Italian time)
	Luogo / Place	Sala riunioni al I piano del Dipartimento di Scienze Matematiche, Informatiche e Fisiche (DMIF) – via delle Scienze, 206, Udine / Meeting room at the first floor of the Department of Mathematics, Computer Science and Physics – via delle Scienze, 206, Udine

Per sostenere il colloquio i candidati devono esibire un valido documento di riconoscimento. / Candidates must come to the interview with a valid identity document.

Eventuali variazioni saranno rese note esclusivamente mediante pubblicazione all'albo ufficiale on line dell'Ateneo / Any change will be made public solely through publication on the University web site [http://web.uniud.it/ateneo/normativa/albo\\_ufficiale](http://web.uniud.it/ateneo/normativa/albo_ufficiale)

#### Commissione giudicatrice / Examining Board:

Nome e Cognome	Qualifica	SSD	Università
<b>Membri Effettivi / Permanent members</b>			
Marco Comini	PA	INF/01	Università degli Studi di Udine
Gian Luca Foresti	PO	INF/01	Università degli Studi di Udine
Ivan Scagnetto	RU	INF/01	Università degli Studi di Udine
<b>Membri Supplenti / Temporary members</b>			
Claudio Piciarelli	PA	INF/01	Università degli Studi di Udine
Marino Miculan	PA	INF/01	Università degli Studi di Udine