



RESEARCH PROJECT SPECIFICATION AND SOW

This Research Project Specification and SOW sets forth the research University will perform subject to the following terms and conditions ("Agreement").

1. Parties:

Czech Technical University in Prague, an educational institution having its office at Jugoslávských partyzánů 1580/3, 160 00 Praha 6 – Dejvice, Czech Republic; Czech Technical University is a public university incorporated under the Act No. 111/1998 Coll., with no statutory duty to registry in the Commercial Register and registered in the Trade Register; ID No. 68407700, VAT ID No. CZ68407700.

contacting address:

Faculty of Electrical Engineering, Department of Computer Science, Artificial Intelligence Center, Karlovo náměstí 13, Prague 2, Czech Republic, represented by prof. Mgr. Petr Páta, Ph.D., Dean ("CTU" or "University")

and

Honeywell International s.r.o., a company having its registered office at V Parku 2325/16, Praha 4, Postcode 148 00, ID No. 276 17 793, VAT ID No. CZ27617793, registered in the Commercial Register under the File No. C 119257 maintained by the Municipal Court in Prague, represented by Mgr. David Kozák, Executive director ("Honeywell").

2. Research Project Title and Description:

Title	Description
Explainable AI Research framework for Aerospace – Pilot project	

3. Proposed field of use:

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4. Problem Statement

Future generation of Honeywell cockpit needs to offer disruptive features (e.g. pilot state sensing, natural interaction with avionics, enablers for simplified operations). These novel and advanced features are not possible to implement without elements of Artificial Intelligence. Many of AI techniques are not directly applicable in aerospace due to regulatory aspects.

5. Principal Investigator(s):

	CTU	Honeywell
Name:		
Title:	Senior Researcher	Lead Software Engineer, HTS ARDE_ACE
Address:	Department of Computer Science, Artificial Intelligence Center, Karlovo náměstí 13, Prague 2, Czech Republic	Tuřanka 100, 627 00 Brno, Czech Republic
Telephone:		
E-Mail:		

6. Statement of Work (SOW):

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Honeywell is running R&D activities in the area of biosensing, feature extraction, classification and signal fusion to monitor and understand certain states of the pilot in the flight deck. The system employs several input modalities from various sensors, such as vision system and smart wearables. These modalities are parametrized using various signal processing techniques, resulting in a big set of potential features. Currently, the best features for detecting certain state are identified using well-known feature selection techniques (based on redundancy and relevance). The classification is done using shallow machine learning techniques, with a special focus on decision tree due to their interpretability. One of the challenges is the fusion of the modalities under examination to maximize the detection performance of the entire system, which can be done on the level of features or classifier.

The main deliverable shall be Research Report which will be continuously updated during the project and will contain at least the following:

- **State of the art overview** – Based on the input from Honeywell, CTU will provide study of applicable scientific methods, their technical risks, opportunities and potential, and propose the preferred approach.
- **Description of used method and methodology** – CTU will describe details of selected approach for solution of the defined problem based on discussion with assigned Honeywell experts. Then CTU applies this scientific approach on data provided by Honeywell.
- **Analysis of results obtained** – CTU provides analysis of results and conclusions. It shall contain discussion of methodology constraints, its applicability on other use cases or different classes of problems.
- **Lessons learned and next steps** – Summary of key findings and recommendations of future actions.
- **Proposal for set up of joint lab with Honeywell and CTU** – Based on the experience with the joint work on common scientific topic, both parties shall define the framework for broader collaboration in the field of explainable AI. This deliverable will provide basis for approval of extension of the pilot project into longer term strategic collaboration.

It shall provide the recommendation for:

- scope for future phase of collaboration (technical/scientific problems)
- management plan (project structure, key stakeholders, basic management processes, Data management, IP management principles)
- Funding proposal
- Project Plan with deliverables, milestones and decision gates.

7. Term/Period of Performance:

09/2020 – 12/2020

8. Deliverables:

#	Deliverables	Deliverable Due Date	Acceptance Criteria	Review Completion Date
1	Project Report 1 st update	30 days after Agreement is concluded	Honeywell's review and sign-off	10 days after the date of delivery
2	Project Report final version	80 days after Agreement is concluded	Honeywell's review and sign-off	10 days after the date of delivery
3	Proposal for joint research lab setup	90 days after Agreement is concluded	Honeywell's review and sign-off	5 days after the date of delivery

9. Key Milestones:

#	Milestone Date	Event	Completion Criteria
1	30 days after Agreement is concluded	Review concept and agreement on detailed approach	Reviewed and accepted by Honeywell
2	70 days after Agreement is concluded	Initial Review of project results	Reviewed and accepted by Honeywell
3	80 days after Agreement	Final Review of project results	Reviewed and accepted by



	is concluded		Honeywell
4	90 days after Agreement is concluded	Final review of the proposal for joint research lab setup.	Reviewed and accepted by Honeywell

10. Other Considerations:

Honeywell is interested in novel methods in the field of Explainable AI. Therefore, it is Honeywell's expectation that CTU focuses mostly on these elements while the other elements, such as data fusion algorithms, human state classification and system airworthiness are used primarily as they are (Background) and only extended as appropriate for the program. These extensions are considered the Foreground of the Project.

11. Technology and Intellectual Property Rights

- a. **Honeywell Trademarks:** No license, either express or implied, is granted to University hereunder to use as a trademark or otherwise the word "Honeywell" or any other trademark or trade or product name of Honeywell, or any word or mark similar thereto.
- b. **Intellectual Property Assurances:** All University personnel participating in the performance of this Agreement will be under written agreements with the University to assign all rights in University's Foreground Technology to University. University will disclose to Honeywell all inventions created, conceived, or developed by University personnel that constitute Foreground Technology and that per the terms of this Agreement may be owned (in whole or in part) by or licensed to Honeywell within 14 days of such creation, conception, or development. University and its personnel will provide Honeywell, and/or any Honeywell designee, all reasonable assistance and execute all documents necessary to assist and/or enable Honeywell to perfect, preserve, register and/or record Honeywell's rights in University's Foreground Technology and Joint Technology.
- c. **Background Technology:** Each Party will retain all right, title and interest in and to their respective Background Technology, subject to the following licenses: (1) Honeywell hereby grants to University a fully paid-up, non-exclusive license to use Honeywell's Background Technology, Foreground Technology, and Joint Technology solely as necessary for University to complete its obligations under this Agreement; and (2) University hereby grants to Honeywell a worldwide non-exclusive, royalty free license to use University's Background Technology to the extent incorporated into any Deliverables provided under this Agreement for the purposes of using the Deliverables as reasonably contemplated.
- d. **Foreground Technology:** All Foreground Technology will be the sole and exclusive property of Honeywell and Honeywell will retain any and all rights to file any patent applications or other registrations thereon. To the extent required, University hereby agrees to grant and grants to Honeywell any and all license rights in University's Background Technology required for Honeywell to use the assigned Foreground Technology in the normal course of Honeywell's business operations.
- e. **Joint Technology:** All Joint Technology will be the sole and exclusive property of Honeywell. University hereby irrevocably assigns, transfers, and conveys to Honeywell all right, title and interest in and to all Joint Technology with Honeywell having the sole and exclusive right to obtain, hold and renew, in its name only or for its own benefit, patents, copyrights, registrations, or other appropriate protection. No Joint Technology rights of any kind are reserved or retained by University.
- f. **Transfer of Technology Ownership:** Each work of authorship constituting University's Foreground Technology is deemed to be a "work made for hire" under U.S. Copyright Law and Honeywell will be deemed the author of such work. If any such work is determined not to be a work made for hire, this article will operate as an irrevocable assignment by the author and the University of all right, title and interest throughout the world in the copyright in the work, including the right to make derivatives thereof and revisions thereto. Further, to the extent that exclusive title and ownership rights in Foreground Technology does not originally vest in Honeywell, University hereby irrevocably assigns, transfers, and conveys to Honeywell all right, title and interest in and to all Foreground Technology with Honeywell having the sole and exclusive right to obtain, hold and renew, in its own name or for its own benefit, patents, copyrights, registrations, or other appropriate protection. No Foreground Technology rights of any kind are reserved or retained by University.
- g. **Deliverables:** University hereby assigns all right and title in and to all Deliverables to Honeywell. Honeywell's ownership of the Deliverables and the associated Intellectual Property Rights is not intended, and will not be construed, to grant Honeywell the right to use any University owned Background Technology other than the Deliverables themselves and the information contained therein except to the extent such rights or licenses are expressly granted to Honeywell in this Agreement. Honeywell has the right to use Deliverables for any purpose and without restrictions of any kind (including, but not limited to reproduction, distribution, display, modification, performance and preparation of derivative works based on Deliverables as well as to use Deliverables to make, have made, sell, offer to sell, import, use, or otherwise dispose of products and services) and to grant licenses directed to the foregoing.

Background Technology:

CTU	Honeywell
Binary classification with additional constraints as implemented in: https://github.com/VaclavMacha/AccuracyAtTop.jl	<i>Information introduced in the Statement of Work</i>

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The abovementioned list of Background Technology is an initial list and is not comprehensive. Before the works on a particular Deliverable are launched, or within 15 working days upon the work has started, either Party may propose to add any Background Technology to the list and that will notify the other Party of the relevant Background Technology to be added to the list.

If the Parties have not identified Background Technology before the work on the Deliverable, for which the Background Technology will be used, has started or within the first 15 working days, all Intellectual Property Rights used during the execution of the Agreement are treated as arising from work performed under the Agreement, unless and until the Party provides the other Party with evidence of the relevant Background Technology's prior existence. Such proven Background Technology will be added to the above-mentioned list.

12. Publication

University, its employees and students engaged in work under this Agreement have the right to publish the results of research completed under this Agreement. University agrees to submit to Honeywell a copy of any such reports, papers, or other publications, including submissions for scientific meeting presentations, for Honeywell review, comment and written approval at least 30 business days prior to publication. Honeywell has the right to require a modification or request a delay in publication for a period not to exceed 1 year from the date of submission to Honeywell for the protection of inventions, discoveries, or Honeywell's Confidential Information disclosed in the publication, provided that Honeywell makes a written request and justification for such delay within 30 business days from the date the proposed publication is submitted to Honeywell.

13. Budget and Payment Schedule:

This is a fixed price Agreement. The budget and payment schedule is based upon the completion and Honeywell acceptance of the Deliverables. The budget represents Honeywell's financial obligation to CTU for the Project and Honeywell is not obligated to pay CTU in excess of the stated amount, unless agreed otherwise between the Parties. CTU must perform the Project within the budget provided by Honeywell. Formal authorization to begin work under this Agreement is the Honeywell purchase order.

	Deliverable or Milestone	Eligible for Payment	Labour cost (CZK)	Material	Amount (CZK)
1	Project Report 1 st update	upon Deliverable's Acceptance	40%	N/A	80 000,-
2	Final review of Project results	Upon Gate review	60%	N/A	120 000,-
	Total fees for the initial part of the Project				200 000,-

All prices without VAT.

IN WITNESS WHEREOF, the Parties have caused this Research Project Specification and SOW to be executed in English by their duly Authorized Representatives.

Honeywell International s.r.o.

By: _____

Name: Mgr. David Kozák

Title: Executive director

Date: September 16, 2020

Czech Technical University in Prague

Faculty of Electrical Engineering, Department of
Computer Science, Artificial Intelligence Center

By: _____

Name: prof. Mgr. Petr Páta, Ph.D.

Title: Dean of Faculty of Electrical Engineering

Date: _____