

OTC Disclosure No. D2024-0013

*(For office use only)*

**TECHNOLOGY DISCLOSURE FORM**

This Technology Disclosure Form (TDF) is used to disclose and assign inventions, copyrightable works, and other types of Purdue Intellectual Property (“Technology”) in accordance with Purdue University Policy I.A.1 (“Purdue IP Policy”).

The TDF is designed to assist you in the disclosure process. Please fill out every section as completely as possible as it pertains to the Technology you are disclosing. Have questions along the way? Please call the Purdue Research Foundation (PRF) Office of Technology Commercialization (OTC) at 765-588-3475.

Following submission of the TDF to OTC, you will be contacted by a member of the OTC team to schedule a disclosure meeting to further discuss the disclosed Technology and next steps.

OTC is excited to learn about this Technology. **All documents submitted to OTC are treated as confidential, including technical and personal information submitted within this TDF**.

**Submit Date:** **Nov 16, 2023**

1. **TITLE OF TECHNOLOGY (***Title must be short, simple and non-confidential.)***:**

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| Pivot+ for Autonomous Agricultural Sensing and Control at Scale |

1. **WHO CONTRIBUTED TO THIS TECHNOLOGY?**

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| **Name** | **Organization** | **Contact** |
| **Lead (Contact) Contributor:**  **James V Krogmeier** |  | **Telephone: 765-494-3530**  **Email: jvk@ecn.purdue.edu** |
| **Contributor 2:**  **Steven R Dunlop** | **Purdue University-MR** | **Telephone: 447-0492**  **Email:** |
| **Contributor 3:**  **Dennis Buckmaster** |  | **Telephone: 765-379-3770**  **Email:** |
| **Contributor 4:**  **Andrew D Balmos** |  | **Telephone:**  **Email: abalmos@purdue.edu** |

1. **ABOUT THE TECHNOLOGY:**
   1. **Provide a brief Abstract of the Technology.** (Please attach any drawings, figures, graphs, supporting manuscripts, posters, abstracts, presentation slides, etc. that would assist OTC in understanding the Technology.)

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* 1. **What problem is solved by the Technology?**

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| **Autonomous monitoring and interaction with crops at field scale.** |

* 1. **How is this problem currently being addressed by others in the field? Who are the key players producing a competitive or complementary product?**

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| **Much of the technologies in question are currently only deployed in lab and growth chamber environments. Some outdoor, field scale work sensing is done with UAVs caring similar sensor payloads. However, this technique is largely limited by payload weight and battery capacity. While there has been some research adoption, there is little meaningful commercial usage.**  **Valley (and likely other Pivot manufactures) have demonstrated some capability of adding sensing systems to their pivots, but not at the scale or autonomy levels proposed here.** |

* 1. **How is this Technology different/better than existing solutions?**

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| **Fully autonomous (UAVs require human operators during flights). Operates 24/7 in all weather conditions. No power or networking limitations for the sensing and manipulation payloads. Closes the system's loop by not just sensing, but also has the capability to apply inputs through nutrient irrigation and physical manipulation.** |

* 1. **What are the elements of this Technology that need to be protected?** Examples: methods, processes, devices, chemical compositions, research tools, works of authorship, ornamental designs, software code, presentation materials.

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| **System design / methods. Control processes. Software code.** |

* 1. **Who are the potential users/customers and licensees for the Technology?** (Optional: Provide the names and contact information for any contact(s) at a potential licensee with whom a PRF representative could discuss commercialization and potential licensing of this Technology.)

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| **Government (NSF, etc.). Universities. Pivot manufacturers (Valley, etc.). Farmers.** |

* 1. **Is there on-going research or will future work be conducted on the Technology? If so, please elaborate on the on-going research or future work.**

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| **Yes** |

* 1. **Can this Technology be integrated into an existing product or platform? Or will a new product or platform need to be created to implement the Technology?**

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| **The technology is integrated on-top of existing center pilot irrigates.** |

i. **Are you interested in forming a Start-up company?**

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| **No** |

1. **PUBLIC DISCLOSURE:**
   1. **Have you, or anyone else, made any public disclosure (written or verbal) of any part of the Technology?** (A public disclosure is any non-confidential communication including printed or online journal papers, submitted manuscripts, presentations, posters, theses and open defenses, dissertations, materials on a website, publicly available abstracts of funded grant proposals, public use or sale.)

**No**

**If yes, please provide details of the public disclosure: What was disclosed? When was it disclosed (exact date)? How was it disclosed (written or verbal)? And where?**

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* 1. **Do you, or anyone else, plan to make a public, non-confidential, disclosure of any part of the Technology in the future?**

**Yes**

**If yes, please include details: what was disclosed, when was it disclosed (exact date), how it was disclosed, and where?**

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* 1. **Is the Technology related to any prior Technology disclosure(s) to OTC?**

**No**

**If yes, please provide details of the related Technology, including the PRF Ref. No., if known.**

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1. **OUTSIDE ACTIVITIES:**

**Have you submitted any Reportable Outside Activities (as defined in Purdue University** [**Policy III.B.1**](https://www.purdue.edu/policies/ethics/iiib1.html) **(Conflicts of Commitment and Reportable Outside Activities)) for approval by the Unit Head or OA Officer?**

**Yes**

**If yes, what are your approved Outside Activities** (Please include the approved activity description)**?**

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1. **EXPORT CONTROL:**

Certain types of technology are subject to U.S. laws that control the use and export of those technologies including products, equipment, devices, organisms, components, parts, materials, software, etc. that the U.S. considers to be of military value, important to national security. Please review the statements below to assist us with determining whether or not this Technology is subject to export or publication control.

**This Technology was commissioned by a Department of Defense for a specific military project.**

**No**

**This Technology is related to firearms, weapons, explosives, armor or gear for armed forces.**

**No**

**This Technology is for use in Nuclear Reactors or Nuclear Power applications or for the improvements of either.**

**No**

**This Technology is related to any substance(s) that is considered a toxicological agent (including chemical, biological agents or microorganisms) for potential warfare use.**

**No**

**This discovery is related to the improvement of military aircraft, spacecraft, satellite or any non-commercial carriers including navigation, sonar or avionics equipment.**

**No**

**Does this Technology require a Technology Control Plan (TCP)?** (A TCP is a customized management plan developed in coordination with the Purdue Export Controls Office (ECO) that outlines the procedures in place to prevent unauthorized export of protected items, products, data or technology deemed to be sensitive to national security or economic interests.)

**No**

**If yes, does the ECO have a copy of the TCP**

1. **FUNDING SOURCE and SPONSOR RIGHTS:**

**What is the source of the funding that was used to support the work that resulted in the conception or development of the Technology?**

* 1. **Government Support:** Was the Technology generated using funds obtained under a grant or contract from the US Government or any foreign government source?

**Yes**

**If yes, please provide the details below**:

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| **Funding Agency** (NIH, NSF, DoD, etc.)**:** |  |
| **Grant/Contract #:** |  |
| **SPS Spending Account #:** |  |
| **Project Title:** |  |
| **Project Initiation Date:** |  |
| **Project Termination Date:** |  |

* 1. **Corporate or Foundation Support:** Was the Technology generated using funds obtained under a sponsored research contract with a corporation or foundation?

**No**

**If yes, please provide the details below:**

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| **Sponsor Name:** |  |
| **Purdue Agreement #:** |  |
| **Project Title:** |  |
| **Project Initiation Date:** |  |
| **Project Termination Date:** |  |

* 1. **Sponsor’s Intellectual Property Rights:** Have you received or are you aware of any funding for this Technology that was accepted in exchange for an agreement to assign intellectual property rights to the sponsor?

**No**

**If yes, please provide the name of the sponsor:**

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* 1. **Other Support:** Please list any and all other financial or in-kind support received and used in the work that resulted in the conception or development of the Technology.

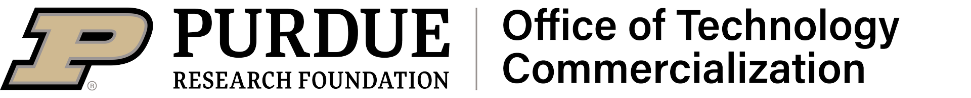
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1. **GENERAL DISCLOSURE & ASSIGNMENT OBLIGATIONS:**

**Purdue Intellectual Property** must be disclosed to the Office of Technology Commercialization according to the Purdue IP Policy. This includes execution of a general assignment of title in favor of the PRF for all Purdue Intellectual Property (see Technology Assignment below). In some situations, technology may be disclosed to OTC without executing the corresponding assignment.

**Purdue Intellectual Property Determination:** While most cases are clear, in certain cases, a technology may be disclosed to PRF so that OTC can assist in the assessment of whether or not the disclosed technology constitutes Purdue Intellectual Property. In these cases, only when the technology is determined to be Purdue Intellectual Property will the Technology Contributors need to execute the general assignment of title for Purdue Intellectual Property. These determinations and assignments are generally made after submission of the Technology Disclosure form at the subsequent disclosure meeting with OTC.

**Disclosure of Non-Purdue Intellectual Property:** In the event the technology is not or is unlikely to be Purdue Intellectual Property, the Technology Contributor(s) may still complete and submit a Technology Disclosure Form which will be maintained in confidence by OTC. Submitting the Technology Disclosure Form allows PRF to discuss the options and implications of executing a general assignment of title for non-Purdue Intellectual Property at a disclosure meeting with OTC.



**TECHNOLOGY ASSIGNMENT**

The undersigned hereby attests that to the best of their knowledge all of the foregoing information is true and accurate. I (We) acknowledge and agree that this disclosure is made pursuant to and controlled by the provisions of Purdue University Policy I.A.1. To the full extent of my (our) right(s) in the above-disclosed technology, by signing this document I (we) hereby unconditionally assign ownership of the above-disclosed technology to Purdue Research Foundation.

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|  | **Printed Name** | **Signature** | **Date** |
| **1** | **Name:**  **Title:** |  |  |
| **2** | **Name:**  **Title:** |  |  |
| **3** | **Name:**  **Title:** |  |  |