Hannah Gillespie

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EDUCATION

Gonville & Caius College, University of Cambridge, Cambridge, United Kingdom — Est. September 2025
MPhil in Engineering for Sustainable Development

Imperial College London, London, United Kingdom — September 2024
*MSc in Computing – Recipient of the two-year **2023 Marshall Scholarship** for graduate study in the UK* — **Distinction**

University of Notre Dame, Notre Dame, Indiana, United States — May 2020
BS in Mechanical Engineering, Concentration in the Grand Challenges Scholars Program, Minor in Theology — **GPA: 3.98/4.00**

- Recipient of the Chick Evans Caddy Scholarship, a full tuition and housing scholarship for deserving golf caddies
- Best performance in class for capstone senior design project to develop traction-controlled autonomous vehicle
- **Publication:** Juliano, T., Bustard, A., Gillespie, H., & Hayashi, T. (2023) Investigation of a high-speed duct flow with global surface measurements and background orient schlieren. *AIAA AVIATION Forum*

RESEARCH EXPERIENCE

Imperial College London, London, England — May 2024-September 2024
MSc Researcher

- **Thesis:** Detection of Acute Oak Decline Risk Levels by Unmanned Aerial Vehicle with Real-Time Deep Learning
- Created pipeline to generate and label synthetic data automatically with the 3D modeling software Blender/Python API
- Curated dataset of over 10,000 images composed of real, synthetic, and augmented images of trees with four unique classes defining low-risk oak, medium-risk oak, high-risk oak, and non-oak
- Developed custom YOLO-based object detection model for a drone to inspect oak trees for novel decline disease achieving a mean Average Precision (mAP) of 0.902 across all classes at 50% intersection-over-union (IOU)
- Tested inference in ROS2/Gazebo simulation as well as field testing in woodlands at Attingham Park National Trust

International Scholars Program, Kellogg Institute for International Studies — August 2017-May 2020
Research Investigator

- Assessed homeowner behavior motivations in post-natural disaster reconnaissance situations through a National Science Foundation-funded research project to increase community resilience
- Devised and actuated a 60+ question offline survey in Creole through the Fulcrum app with programmed display logic
- Traveled to Haiti to train community members to implement new survey technology
- Processed results from 1392 surveys collected in Léogâne and Les Cayes, Haiti

Department of Aerospace and Mechanical Engineering, Notre Dame, Indiana, United States — August 2018-May 2020
Research Assistant

- Streamlined cross-correlation software and post-processing code to implement background-oriented schlieren (BOS) technique in new Mach 6.0 wind tunnel in the White Fields Research Laboratory on campus
- Coordinated multiple BOS experiments using high-resolution camera in ACT-1 wind tunnel to validate technique

Imperial College London, London, United Kingdom — June 2017-August 2017
Research Assistant

- Developed a robotic proxy for remote physician palpation in low-income areas around the world as part of the MOTION Project, a three-year £1.2 million research project through the Dyson School of Design Engineering
- Created physical phantom organs, calibrated three different sensors, and synchronized the data collection routine through MATLAB and a hardware pulse for an integrated percussion experiment

PROFESSIONAL ENGINEERING EXPERIENCE

Boeing Commercial Airplanes, Everett, Washington — January 2022-September 2024
Autonomous Systems Engineer

- Developed framework using OpenCV, ROS, and Docker containers on project to support visual perception and Simultaneous Localization and Mapping (SLAM) of aircraft as it approaches the runway
- Launched a portable platform to record GPS data with real-time kinematics (RTK) capabilities for runway intruder vehicles
- Established data labeling pipeline with third-party company Appen, ensuring quality labeling of runway-based keypoints
- Supported field test missions on a Cessna Caravan by recording test conditions and solving compute squawks in-air

Insitu, Hood River, Oregon — July 2021-January 2022
Flight Sciences Engineer

- Contributed to the Guidance, Navigation, and Control (GNC) team for a six-month rotation with Boeing subsidiary Insitu
- Developed “Troll App” (UDP sender/receiver in C++) to evaluate Troll Systems antenna compatibility with Insitu platforms

- Identified the root issue in over 11 mishaps of the unmanned ScanEagle platform by plotting flight telemetry and evaluating performance in a simulation replay
- Wrote and carried out flight test plans for RQ-21A platform with Insitu to evaluate GPS-independent navigation

Boeing Research & Technology, Tukwila, Washington July 2020-July 2021
Manufacturing Research & Development Engineer for Commercial Derivative Aircraft

- Worked with aircraft mechanics to design a fastener collar retainer device (US 63/227826 patent pending) that received 1st place and a $10,000 reward in an enterprise-wide innovation competition
- Programmed sensors, motors, and feedback control laws in Python and C++ (Raspberry Pi, Teensy) for hand-controlled mechatronic robotic platform capable of moving a 20,000 pound load
- Advanced new applications for 3D scanners and micro unmanned aerial vehicles (UAVs)
- Designed, prototyped, and implemented 13 innovative and value-driven solutions estimated at $2.5 million in annual savings for the 747, 767 Freighter, KC-46A Pegasus Tanker, and 777/777-9 airplane manufacturing environments
- Championed a novel production device with a 97.3% reduction in time for Method 2 wet installation that earned second place and the People's Choice Award in the 2020 Innovation Grand Challenge for Puget Sound
- Collaborated directly with mechanics and engineering to increase safety and reduce foreign-object debris (FOD)

LEADERSHIP INITIATIVES

Development i-Teams, Cambridge, England May 2025-present
Research Assistant

- Bridging research from the University of Cambridge's architecture faculty with on-the-ground needs in Cali, Colombia to prototype an innovative, low-cost, culturally sensitive permanent housing design for displaced community members
- Leading stakeholder engagement, forming academic and international partnerships, and securing funding to advance project development and community impact

Design, Build, Fly, Notre Dame, Indiana January 2017-July 2022
President & Mentor

- Led 25 student engineers split into five technical subteams to design, manufacture, test, and present multiple iterations of a remote-controlled aircraft to meet mission requirements of annual AIAA Design, Build, Fly international competition
- Ran day-to-day club operations, organized schedule, budget, and meeting plans, and oversaw engineering design decisions
- Increased quality of documentation and established a mentoring program with Notre Dame alumni working for Boeing
- Improved the club from finishing in the lower tier of the pool to finishing in 7th place out of 100 teams in 2021

Filtre Biosand Haiti, Léogâne, Haiti August 2018-May 2020
Project Founder

- Assembled team of four engineers to complete a human-centered design thinking project to increase access to clean water
- Recruited six local community members to serve as the focal for each of the six "zones" (neighborhoods) in Léogâne, Haiti
- Collaborated directly with zone leaders and two translators to survey local residents and conduct focus groups in Creole
- Organized seven parallel brainstorming sessions in each Léogâne zone and on campus at the University of Notre Dame
- Designed innovative biosand filter using materials local to Leogane at 50% less cost than other biosand filters on market
- Developed extensive instruction manual with pictures, videos, and captions in Creole using prototyped proof-of-concept
- Co-designed a three-tier social business plan to enable community members to build biosand filters using local materials

AWARDS & GRANTS

- Marshall Scholarship (2023)
- US20230030042A1 (U.S. Patent through Boeing) (Applied August 2022, awarded December 2024)
- Boeing Defense, Space and Security Foreign-Object Debris Reduction Winner (1st Place, $10,000 award) (2021)
- Boeing Defense, Space and Security Innovation Award (1st Place) (2021)
- Boeing Enterprise Additive Manufacturing Award (3rd Place) (2021)
- Boeing Enterprise Innovation Grand Challenge (2nd Place) (2020)
- College of Engineering through the Grand Challenges Scholars Program to develop Biosand filter in Leogane, Haiti (2019)
- Kellogg Institute for International Studies / Engineering2Empower grant to Leogane, Haiti to collect research data (2018)
- Nanovic Institute for European Studies summer grant of $5000 to conduct research at Imperial College London (2017)
- Western Golf Association Evans Scholarship award of $200,000 (estimated) (2016-2020)

INTERESTS & SKILLS

- **General:** mechatronics, machine learning, 3D printing, data science, human-centered design thinking, field testing
- **Skills:** Python (OpenCV, numpy, Pytorch), C++, Linux, Docker, git, ROS, Gazebo, Rviz, MATLAB, SolidWorks, CATIA V5
- **Personal Interests:** basketball, netball, rowing, piano, music, golf, skiing, cycling, baking, teamwork