

Catalyst Connection, University of Pittsburgh School of Business

Pennsylvania Robotics and Technology Fellowship

Previous Project Descriptions



Penna Flame



The team was required to conduct thorough market research to unveil opportunities for Penna Flame's potential investment in new induction hardening capabilities. Their task revolved around comprehending the heat-treating market, pinpointing its growth sectors, analyzing competitors to discern their key value propositions and success factors, and identifying potential customers.

Through research, the team unearthed over 100 potential customers, categorizing them and offering a clear geographic representation, highlighting Ohio, Michigan, and Pennsylvania as the top states of interest.

The findings provide Penna Flame with a holistic view of the market, enabling informed strategic decisions regarding their induction hardening capabilities, fostering their ability to seize opportunities and strategically position themselves within the industry.

Eisenwood



Eisenwood, a woodworking company based in Pittsburgh, specializes in tailor-made woodworking projects for local businesses and homes.

The primary hurdle the company faces pertains to monitoring their progress on each job, managed through an Excel spreadsheet for production and job tracking. The student team collaborated with the client to explore and evaluate different digital job tracking tools available in the market. Their objective was to pinpoint the most suitable tool for Eisenwood's needs.

This involved conducting market research, engaging in interviews with similar businesses, and exploring demos from potential digital tool providers. The team meticulously narrowed down their findings to recommend a tool that best aligns with the client's requirements.

Additionally, they assisted Eisenwood in implementing the chosen tool and offered a series of general recommendations for enhancing production management on the job floor to bolster efficiency.

AIRVIZ

Airviz's IoT products are designed to collect and transmit crucial data concerning air quality and greenhouse gases in areas encompassing oil and gas wells, cities, and industrial settings. Airviz aims to offer their sensors to large-scale enterprise clients in the long term. Currently, their low-cost, Raspberry Pi-based sensors are configured with password protection and relay data to a database at Carnegie Mellon University, shared among lab users.

The student team worked to identify and recommend leading security vendors to protect data for IOT applications. While the data transmission occurs via Wi-Fi, basic password-based security is in place; however, the database is publicly accessible unless marked private, lacking encryption for data in transit or at rest.

The student team delved into the architecture, identifying potential security vendors, and focusing on compatibility and consolidation of solutions to address Airviz's concerns, particularly the need for robust IoT data security aligned with cost-effective considerations.

Sloan Lubrication Systems



Sloan Lubrication Systems manufactures, installs, and services lubrication systems that exceed industry standards. They were curious about opportunities to improve the design of their pumps to drive business value, while maintaining 100% customer satisfaction.

With this in mind, the student team thoroughly reviewed the current pump design and established criteria for a redesign. They completed a cost analysis to determine which components required the costliest materials and assembly.

The results of this research informed their recommendations to transition to a casting process to consolidate parts, thus reducing assembly time and production costs, or pursue an alternate design of the pump, which would maintain original parts and reliability while facilitating implementation.

Siemens Energy



Siemens Energy sought to explore the viability of outsourcing some of its tooling supply chain for its 29 Stock Keeping Units (SKUs) used in maintaining stability of the energy grid.

The student team worked with Siemens to examine digital solutions for its approach to supply chain management. They started with a cost-benefit analysis to determine the financial and operational impacts of outsourcing versus in-house management of tool rentals.

Through a combination of market research, competitor analysis, and evaluation of digital tool providers, the team proposed a series of system integration concepts designed to enhance the efficiency of tool management.

The project culminated in a set of forward looking recommendations, including a nuanced approach to outsourcing, a negotiation of transportation costs, and a consolidated tool management strategy.

NeuEsse



NeuEsse's flagship product, OmegaSkin, is a human skin substitute made from naturally occurring soy protein designed to enhance healing outcomes and quality of life for patients.

To further its mission to help millions suffering from injured, diseased, and traumatized skin conditions, NeuEsse sought to enhance the shelf life of OmegaSkin.

Through collaboration with the client, the student team explored several possibilities for further preservation of the product without sacrificing therapeutic benefits.

Students then rigorously conducted technical risk assessments and feasibility studies for the solutions, providing NeuEsse with a roadmap and next steps for future exploration.

Rapid TPC

RapidTPC

The orthotics industry is currently challenged by the need to deliver custom-fit solutions affordably, constrained by insurance reimbursement models and the complexities of composite material manufacturing.

Rapid TPC aims to fill this gap, leveraging thermoplastic composites to offer cost-effective, customizable orthotic kits tailored to patient needs in a single visit, thus elevating both the standard of patient care and accessibility.

The student team conducted market research to generate customer personas to determine the features of Ankle-foot orthoses (AFOs) which customers find most valuable. Using this data, the student team assessed three AFO designs to determine which most effectively meets customers' needs.

The team then evaluated possible kit designs for this AFO model, and proposed recommendations for a path forward to optimize the product's impact and reach.

Aerotech



Aerotech specializes in engineering and manufacturing advanced motion control and precision positioning systems, serving a wide range of sectors, including medical devices, semiconductors, and other industries that demand high-precision engineering.

The student team collaborated with Aerotech to integrate AI into the company's Special Engineering projects. The primary objective was to streamline the design process for new projects by leveraging existing engineering data, thereby reducing redundancy and enhancing efficiency. This initiative aimed to improve the client's operational agility and customer satisfaction through faster project turnaround times.

The team evaluated various solutions, developed a workflow process map, and implemented a process for efficient database analysis.

A technical demonstration and cost-benefit analysis were conducted as a proof of concept, showcasing the potential for accelerated project design and response times.

pathVu



pathVu develops technologies that help municipalities evaluate and plan their critical sidewalk and curb ramp infrastructure projects. The project focused on identifying an effective tool for data collection of curb ramp measurement.

The team evaluated a variety of tools, including LiDAR, photogrammetry, and Intel Realsense for capturing ramp data. The team also documented a step-by-step data collection and processing guide, which covered folder structures, application functionalities, time requirements and challenges like seasonal effects and device limitations.

The team concluded that LiDAR offered scalable, flexible, and compliant solutions for curb ramp evaluations, providing a viable foundation for future developments.

Stellar Precision Components



Stellar Precision Components was looking to enhance its queue management system to improve scheduling and resource utilization.

The student team began by mapping the current workflow to identify automation opportunities, focusing on barcode scanning for enhanced traceability.

Deliverables included a Python-based QMS prototype. This tool automates scheduling, manages sketch queues, logs daily metrics to support efficiency analysis, and allows for data recovery and trend tracking.

The project ultimately provided Stellar Precision with scalable tools to enhance their scheduling efficiency, improving their quality management and resource allocation during the inspection process.

DMI Companies, Inc.



DMI Custom Sealants sought to conduct market research on trends, customer demands, and strategic opportunities for its products.

The student team provided DMI with insights to tailor its product offerings to effectively address regional demands. Through regional analysis, the team found not only distinct preferences and demands across regions, but also general customer preference for sealants with long shelf lives.

From this analysis, strategic recommendations were provided such as enhancing customization options to meet region-specific requirements through, for example, product quality, technical support, and eco-friendly materials.

Suggested next steps involve addressing lead times, introducing missing product options, and refining customization tools to align with market expectations.



Humotech is a leader in prosthetics, orthotics, and exoskeletons. Their innovative Caplex™ System is a groundbreaking platform for real-time emulation in human mobility assistance. The company collaborated with a Pitt team to explore new market opportunities beyond its organic growth strategy, focusing on high-potential sectors such as Defense, Consumer, and Work domains.

Through in-depth market research and a structured decision matrix, the team identified key industries, assessed growth potential, and prioritized market segments based on factors like total addressable market, ease of entry, and competitive intensity. The resulting recommendations included targeted outreach strategies, tailored marketing collateral, and a phased engagement plan to support Humotech's sales efforts.

These insights provide a clear, scalable framework for the company's new sales leadership, paving the way for impactful growth in emerging markets.

Gray Swan AI



Gray Swan AI is a startup that specializes in securing large language models (LLMs) from evolving threats. Gray Swan collaborated with the Pitt team to explore new market opportunities and assess the demand for AI security solutions.

Through deep secondary research and targeted outreach, the team analyzed over 300 companies across 10 industries to identify gaps in awareness of AI security risks, particularly in high-stakes sectors like healthcare and finance. While facing challenges in direct outreach due to confidentiality concerns, the team leveraged expert networks and industry data to develop actionable recommendations.

These included educational outreach to raise awareness, targeted B2B marketing, and a refined go-to-market strategy to differentiate Gray Swan AI's offerings. These insights position Gray Swan AI to expand its customer base and strengthen its impact in the AI security space.

FS Elliott



FS-Elliott, a global leader in industrial compressors, partnered with the Pitt team to streamline its time-intensive proposal process. The current manual process reviewing customer specification documents, can lead to quote delays. Recognizing this bottleneck, the team set out to develop a scalable AI solution to reduce response time and improve accuracy.

The result was a functional assistant capable of parsing technical PDFs and returning relevant answers in real-time. Initial testing showed a significant reduction in review time. With clear business value and system scalability, the solution sets the foundation for smarter, faster quoting across FS-Elliott's global operations.

Haemonetics

HAEMONETICS®

Haemonetics is a global leader in blood management solutions, founded in 1971. Their plant in Clinton, PA is responsible for manufacturing plasma donation devices, blood analysis systems and medical components. This project addressed the efficiency of part of the manufacturing process, looking for solutions to separate out recyclable components in the assembly process.

The team provided a feasibility analysis of technologies, including various tooling and cutting systems. From this, the team provided a set of evaluation criteria related to safety, automation potential and ROI. Additionally, the team provided a roadmap and next steps related to cost validation and budgeting, piloting implementation and key data points to monitor for successful roll-out moving forward.

Mapless AI



Mapless AI is a mobility-tech startup advancing remote vehicle repositioning through teleoperation, offering a smarter alternative to fully autonomous systems. Partnering with the Pitt PA-RTF team, Mapless aimed to realign its market strategy by targeting scalable, B2B-focused microfleet opportunities—particularly in healthcare and institutional mobility.

The team conducted an extensive market assessment across hospitals, universities, and airports to evaluate high-priority use cases like fleet rebalancing, cleaning logistics, and EV repositioning. With detailed financial modeling and user research, they identified healthcare fleets as the most viable entry point—offering strong ROI potential and operational fit.

To support scale, the team developed a go-to-market roadmap, competitive positioning, and pricing model, including an optional SaaS dashboard upsell. These insights position Mapless AI to scale its teleoperation platform across institutional partners, enabling efficient vehicle logistics while improving utilization, sustainability, and customer experience.

DMI Airoverse



Airoverse is a drone-tech startup advancing automation in aerial logistics and energy infrastructure. Airoverse partnered with the Pitt PA-RTF team to develop a machine learning solution to enhance its ability to qualify commercial leads at scale.

To address the inefficiencies of manual outreach and lead qualification, the team built a solution that combines automated detection with smart lead list generation to help streamline sales intelligence and scalable targeting.

In addition to delivering a functional prototype and interactive demo, the team proposed a phased roadmap to improve detection accuracy, an analytics dashboards, and a CRM integration capability. These solutions position Airoverse to identify high-value leads across commercial and industrial markets.

Setex



Setex is a precision manufacturing company aiming to streamline its packaging process through cost-effective automation. Collaborating with the Pitt PA-RTF team, Setex explored ways to reduce operator strain, improve counting accuracy, and increase throughput efficiency without high capital expenditure.

The team mapped the current workflow, identified key bottlenecks, and prototyped three low-cost solutions using simulation to guide recommendations. Despite challenges typical to manual-heavy operations, the team delivered a phased roadmap emphasizing ergonomic aids, an upgraded counting tunnel, and scalable automation concepts.

These strategies demonstrated strong impact potential—prototypes cut task time by up to 40%, and simulation results showed throughput gains of up to 30%. With these insights, Setex is well-positioned to scale automation gradually while improving consistency, efficiency, and operator experience.

Farm to Flame Energy



Farm to Flame Energy (FTF) is a clean-tech company that turns agricultural and industrial biomass waste into clean, carbon-neutral energy. FTF partnered with the Pitt PA-RTF team to support its business development strategy and refine its generator technology for broader industrial deployment.

To accelerate market engagement, the team developed a comprehensive Standard Operating Procedure (SOP) that outlines how to identify, evaluate, and engage high-potential industries and companies. This SOP serves as a repeatable toolkit for conducting market analysis, prioritizing targets based on sustainability goals and energy intensity, and initiating structured outreach to key decision-makers.

In tandem, the team conducted an industry deep dive across four sectors—waste management, sawmills, packaging, and paper mills—identifying major growth opportunities and energy pain points. These efforts position Farm to Flame to strategically scale its operations, leveraging data-driven outreach and cost-effective energy solutions to serve industrial partners in the U.S. and beyond.

Premier Labs



Premier Labs is a venture initiative accelerating industrial AI adoption through modular, scalable technology. In collaboration with the Pitt team, Premier Labs aimed to identify high-impact AI use cases across sectors like manufacturing, automotive, and defense by building a data-driven discovery engine and applying real-world validation.

To address fragmented insights and AI implementation challenges, the team developed Excel-based tools such as an AI Use Case Library and Prompt Builder. These tools leveraged LLM APIs to score market accessibility, identify low-barrier entry points like machining, and generate quality controlled outputs. A Market Accessibility Score was also introduced to prioritize industries and streamline pilot efforts. These reusable AI tools and modular strategies provide a strong foundation for broader adoption and sustained innovation across industrial markets.

Mapless AI (Project 2)



Mapless AI, partnered a second time with the PA Robotics and Technology Fellowship to explore market opportunities and adoption strategies for its remote-driving system in healthcare and community transportation. The project focused on identifying how Mapless AI's technology could improve fleet rebalancing, medical transport, and last-mile mobility while addressing trust and safety concerns that often hinder adoption in highly regulated sectors.

The student team conducted stakeholder interviews and secondary research to assess the needs of healthcare systems, as well as non-profit and logistics organizations serving vulnerable populations. They found that proving safety and transparency are critical to building trust among partners and regulators.

The project concluded with actionable recommendations, including a three-stage pilot roadmap, as well as steps related to partnership development and regulatory alignment. These insights position Mapless AI to enter the market responsibly—demonstrating how teleoperated mobility can enhance safety, reduce costs, and expand equitable access to transportation across communities.

Phantom Robotix



Phantom Robotix partnered with the PA Robotics and Technology Fellowship to identify high-potential markets for its autonomous mobile robotics (AMR) platform and define a focused market-entry strategy. Through comprehensive market research, competitive analysis, and stakeholder interviews the team assessed the economic potential, technical feasibility, and regulatory requirements across various sectors.

Deliverables from the team included a detailed market gap analysis, competitive matrix, and entry roadmap outlining integration models and scalable applications for Phantom Robotix's platform. The project positions the company to strategically penetrate niche, safety-critical markets by leveraging its core strengths in mobility, sensing, and automation, paving the way for future growth.

Swank Construction Company



Swank Construction partnered with the PA Robotics and Technology Fellowship to develop a model that automates the identification process for a new storage facility for raw materials. The goal was to replace the current manual assessment process, which is time-consuming and prone to human error, with a scalable, data-driven solution that enhances efficiency and reduces financial risk.

Deliverables included a working model, an implementation roadmap, and an analysis of outsourcing opportunities for future expansion. The project demonstrated that enhanced analytics capabilities can significantly improve Swank's decision-making in site selection, reduce costs, and strengthen its competitive position in Pennsylvania's growing \$8 billion infrastructure market.

BehAlvior



Behaivior is on a mission to democratize addiction and mental health recovery using AI, behavioral health technology, and wearables for crisis aversion and mental health support. The goal of this student project was to explore how the company's AI-powered early detection and response platform can be best leveraged for faster adoption.

To tackle this, the student team conducted a market segmentation and customer analysis. The former looked to identify high-potential customer segments both in the near-term and long-term. The latter looked at potential customers in the healthcare, government and private sector and how the company's core product could provide potential benefits. Finally, the team provided updates on the regulatory environment for the organization as well as an ROI model to move forward.

Thoro AI



Thoro is a software-first robotics company enabling OEMs to launch safety-certified, autonomous solutions with minimal internal development.

The student team focused on understanding and optimizing the organization's system for Thoro's autonomous vehicles to improve localization and mapping performance.

To accomplish this, the team undertook a high-level literature review of their specific system, looking for ways to improve accuracy, decrease cost and increase computational efficiency. Following this, the team proposed a hybrid solution, balancing various operational frameworks.

The team then spent the final weeks of the project validating and testing the solution, confirming costs and providing ways for future improvement/system integration.

Coherent Corporation



Coherent Corporation is the global photonics leader. With locations in 20 locations around the world, the company provides solutions for industry leaders across datacenter, communications and industrial markets.

One of Coherent Corporation's challenges is translating manual FAI reporting from engineering drawings across its multiple manufacturing locations. The company tasked the team to develop a proof-of-concept tool to demonstrate the feasibility of the tool for data extraction. The team first conducted research on existing tools and their applicability to this challenge. From this, the team developed their own pipeline testing it on samples and preliminary information.

They delivered a final, validated technical approach as well as an implementation manual for the organization to move forward.