

## University of Pittsburgh Joseph M Katz Graduate School of Business Robotics & Technology Fellowship Previous Project Descriptions



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 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.



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 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.



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.



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.

# 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.

## 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.

# 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 is required 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 has 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.



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.

# PENNA FLAME

Established 1968

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.



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.



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.