E4C IMPACT PROJECTS

ANNUAL

REPORT 2025

engineering FOR CHANGE

By Engineers, for Everyone

WE ARE
A BRIDGE

Between Engineering &
Sustainable Development

We prepare, educate and activate
the international technical
workforce for the benefit of people
and the planet

A Year's Overview
IMPACT PROJECTS

Engineering for Change (E4C) is a non-profit organization dedicated to preparing, educating, and activating the international technical workforce to improve the quality of life of people and the planet.

We cultivate change agents by providing resources, platforms, and access to expertise to accelerate the development of solutions and infuse engineering into sustainable development.

E4C was founded jointly by the American Society of Mechanical Engineers (ASME) and other leading engineering societies.

E4C Impact Projects advance the sustainability objectives of impact-driven organizations by sourcing exceptional talent through our Fellowship Program to address critical design needs and research questions to advance the UN's Sustainable Development Goals. Impact Projects fall into one of our three key streams: Design forGood, Impact Research, and Advancing Workflows.

2025 STATISTICS DASHBOARD

Canada
United States
Nigeria
Cameroon
Ghana
Kenya
Uganda
Rwanda
India
Sri Lanka
Philippines
Australia

Photo credits: Created with mapchart.net

25 Impact Projects

22 Organizations

31 Fellows

12 Fellow Nationalities

43% Women Fellows

AUTODESK
FOUNDATION

In 2025, E4C welcomed 31 Fellows from all over the globe. This year, the Autodesk Foundation collaborated with E4C to support 25 of these Fellows, matching them with practical design and research projects from the Autodesk Foundation's portfolio of nonprofits and startups. These savvy early-career designers and engineers from all over the world drew on their experience and expertise in Autodesk technology to provide tangible impact for their partner organizations. Projects included development or improvement of products, advancement of workflows in organizational design and Autodesk technology, and targeted research.

In 2026, the Autodesk Foundation and E4C are collaborating again to provide portfolio organizations the opportunity to receive targeted technical support while simultaneously growing the human infrastructure and local capacity of the next generations of technical professionals.

Read full reports at:
engineeringforchange.org/research

Read more about our Fellowship and Fellows:
www.engineeringforchange.org/fellowship

Find out about becoming a project partner:
www.engineeringforchange.org/impact-projects

PROJECT FUNDERS & PARTNERS

AUTODESK FOUNDATION

ASME SETTING THE STANDARD

engineering FOR CHANGE

SEA FREIGHT LABS Innovate Better

BAMCORE®

BLULEVER EDUCATION

Build Health International

finEQUITY

good•machine

hometeam VENTURES

JARC JANE ADDAMS RESOURCE CORPORATION

KHEYTI

M2X

Nᵀᴴ CYCLE

OPERO

PROMETHEUS MATERIALS

Resham Sutra

safisana

Splash Social Enterprises

STACKS+JOULES

synapses

UNHCR The UN Refugee Agency

URAVU

2025 FELLOW TEAM LEADS

ALICE WACHERA

MANAGING FELLOW

Alice is a detail-oriented Civil and Structural Engineer with 3 years of experience. She specializes in structural design, project management, and carbon emission studies and is proficient in Revit, AutoCAD, Civil3D, Robot, and BIM 360.

EMMANUEL ANNOR

MANAGING FELLOW

Emmanuel is a passionate software and IoT engineer focused on developing sustainable, scalable solutions that advance accessible, affordable technologies and clean energy, driving impactful innovation and fostering growth in the industry.

2025 FELLOW TEAM LEADS

NANCY NYAWIRA WANGARI

MANAGING FELLOW

Nyawira is an engineer working at the intersection of technology and sustainable development across Africa. With a background in Electrical Power Systems, she focuses on applying systems thinking and innovation to projects that drive inclusive, community-centered progress.

WILLIAMS IBEH

MANAGING FELLOW

Williams is a Design Engineer in the steel fabrication and manufacturing industry, with a B.Eng. in mechanical engineering. He craves forward momentum in all aspects of his life and career.

2025 FELLOW TEAM LEADS

ZULA COLEY

MANAGING FELLOW

Zula is a mechanical engineer currently working in power generation, retrofitting new solutions for existing facilities and building new systems. She is passionate about sustainable solutions and all things global development engineering, and she can almost always be found with a good cup of tea.

OLUWATOBI OYESHILE

TECHNICAL LEAD FELLOW

Oluwatobi is a mechanical engineer with expertise in hardware design, additive manufacturing, and industrial design. He is skilled in creating innovative, efficient solutions from concept to production for diverse engineering challenges.

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Advancing Workflows

Technical Economic Analysis of Waste-to-Resource Factories

MANAGING FELLOW
Nancy Wangari

Safisana is initiating, designing, constructing and operating waste-to-resource factories in order to improve the sanitary conditions in low and medium income countries. This project focused on supporting Safisana with its business development activities, primarily TEA (technical – economic analysis). One of the core aspects of the TEA process is the quantification of material streams, for example, what are the expected outputs for a potential new factory, and which inputs would be required? This helps to make informed decisions at the early stages of the project pipeline.

This work focused on the modeling, using simulation software and spreadsheets. Previously, Safisana had been working with static models (spreadsheets) but aimed to expand to simulation models, enabling the addition of a time dimension. The results from these would feed directly into the financial models to support the business cases and decisions.

An in-depth evaluation was conducted to confirm the selection of a suitable simulation modeling approach as well as the software. This included extensive training in two softwares (Ventity & FlexSim). Following the selection of FlexSim software, a simulation model was built, with the output connecting to the existing financial models. The resuls were then validated by comparing the output with that of the existing static model.

The key deliverables of the project were a simulation model, a partner facing report with a user manual, and a public facing report.

Additionally, a knowledge database was created with the gathered training resources. The outputs of this projects will support Safisana's business development activities and informing future decisions.

Key technology/tools used: FlexSim, GSuite
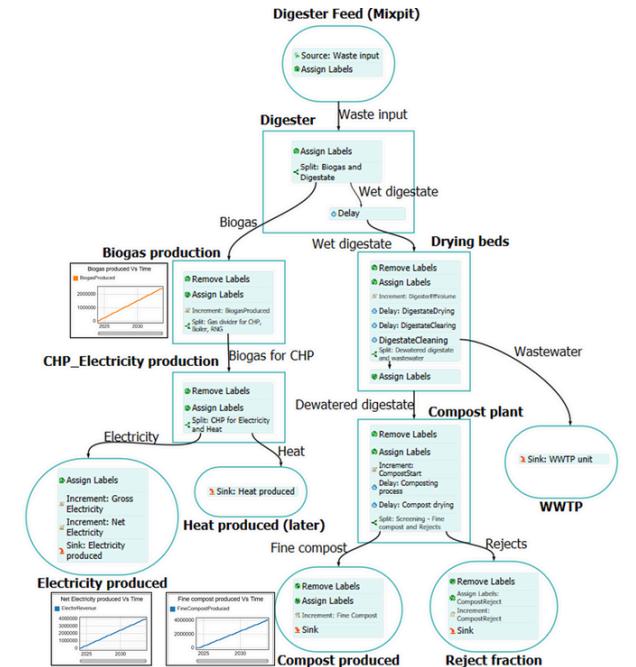
Discrete event simulation model
Attribution: Model created using FlexSim by Namrata Mhaddolkar

Namrata Mhaddolkar

Austria | Waste Management

Waste management professional with a focus on sustainable solutions for plastic waste. Her goal is to contribute to the development of innovative and sustainable waste collection systems.

Project Partner

Safisana is a leading innovator in the circular economy, sanitation, and waste-to-energy sectors. It launched its first waste treatment plant in 2017 in Ashaiman, Ghana, and is in the process of scaling across the African continent.

Funder
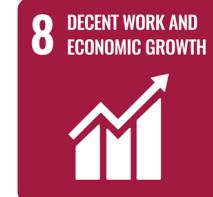
E4C Fellow Alumni - Measuring Impact, Outcomes, and Needs

MANAGING FELLOW
Nancy Wangari

As the Engineering for Change (E4C) Fellowship has evolved, so too have alumni needs. A fellow in 2016 faced a very different professional landscape and set of opportunities compared to one in 2024. Yet, E4C's evaluation methods have not fully captured these differences. Past data collection methods were too broad and infrequent, often resulting in declining participation.

The aim of this project was to address an important gap: building a sustainable, alumni-centered impact measurement framework to understand outcomes, track long-term change, and capture alumni needs that E4C could provide support on.

The new approach moves beyond simple, one-off surveys to build a dynamic, longitudinal model that tells the complete story of the Fellowship's impact on alumni and their journey since completing the program.

Using a dual-survey model (at one, three and five years post-fellowship), it will track both immediate outcomes and long-term career trajectories. This quantitative data is enriched by tailored, in-depth interviews that capture the qualitative success stories and testimonials that bring the data to life. This will provide a holistic view of alumni success by measuring five core dimensions (detailed in the figure below).

This robust, mixed-methods approach will generate powerful, data-driven stories of impact, allowing E4C to clearly articulate the return on investment for its partners and strategically adapt the program to better support its growing network of global changemakers.

Key technology/tools used: Google Suite, Qualitative & Quantitative Research Skills

Process flow for the E4C Fellow Alumni project
Attribution: Tanushree Banerjee
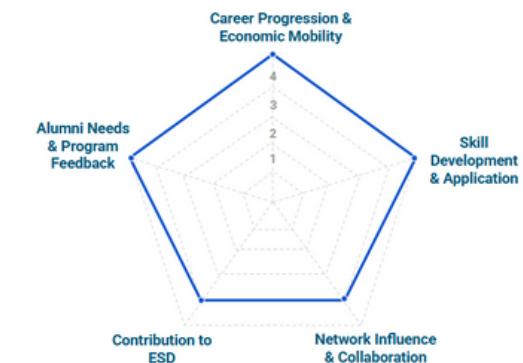
The 5-dimensional framework for measuring alumni impact
*Attribution: Tanushree Banerjee*

Tanushree Banerjee

India | UX Designer

User-experience designer working in the AI space with a background in electronics and communication engineering.

Project Partner

Engineering for Change is a non-profit organization dedicated to preparing, educating, and activating the international technical workforce to improve the quality of life of people and the planet.

Funder

8 DECENT WORK AND ECONOMIC GROWTH

E4C Impact Project Partners - Measuring Impact, Outcomes and Needs

MANAGING FELLOW
Nancy Wangari

Engineering for Change's (E4C) Impact Projects have connected mission-driven organizations with technical expertise since 2019. However, the lasting value to partners has not been fully measured or communicated. Current evaluations capture outputs at the end of each project but rarely assess long-term impacts, such as whether solutions were adopted, strategies reshaped, or new opportunities created. This has left a critical blind spot in understanding the real, sustained impact of the program.

This project set out to close that gap by developing a partner-centered Impact Measurement and Management (IMM) framework that captures both immediate outcomes and longer-term organizational change. The framework links E4C's theory of change to practical measurement tools, combining end-of-project surveys with six-month follow-ups and semi-structured interviews. It focuses on four dimensions of value: Implementation Status, Sustained Impact, Social Impact Tracking and Future Engagement Potential.

This new system aims to shift measurement from transactional reporting to transformational insight. It provides E4C with an understanding of how projects inform strategy, strengthen internal systems, and advance Sustainable Development Goals (SDGs). Importantly, it also provides a replicable, handover-ready process embedded in Airtable, ensuring consistency, comparability, and long-term scalability.

The result is a more coherent and actionable understanding of partner value. The framework strengthens E4C's ability to communicate results to funders and stakeholders, inform decision-making, and continuously improve program design and delivery.

Beyond quantitative results, it aims to build on the qualitative dimensions of change - the stories of how E4C's collaborations spark new initiatives, build local capacity, and strengthen innovation ecosystems.

Ultimately, this work reinforces E4C's position as a learning organization that not only measures outcomes but also uses data to drive reflection, alignment, and continuous improvement. The IMM framework represents a significant step toward embedding impact thinking at different stages of E4C's partnership lifecycle, ensuring that collaborations contribute meaningfully to both organizational growth and global SDGs.

Key technology/tools used: Google Suite, Qualitative & Quantitative Research Skills

Theory of Change
Attribution: Garda Rosemary

Garda Rosemary

Mauritius | Electrical Engineer

Early-career engineer with a background in electrical power systems and consulting. She combines technical expertise with a passion for strategy, sustainability, and communications.
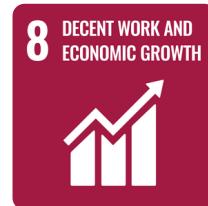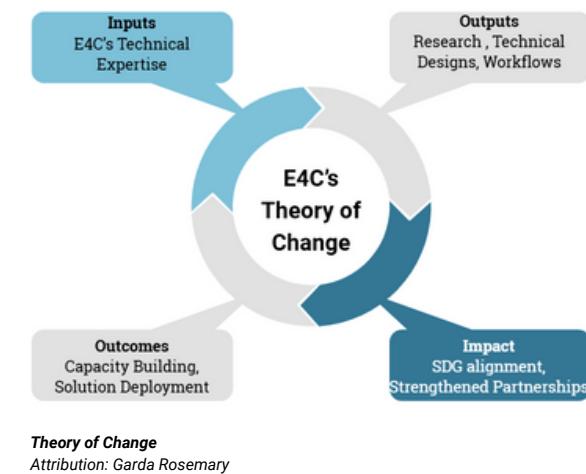
Project Partner

Engineering for Change is a non-profit organization dedicated to preparing, educating, and activating the international technical workforce to improve the quality of life of people and the planet.

Funder

Material Research for Sustainable and Efficient Recovery of Critical Metals

MANAGING FELLOW
Williams Ibeh

Critical metals like cobalt and nickel are essential for electric vehicles and renewable energy technologies, yet their production is energy-intensive and dependent on mining (Grandell et al., 2016). Recycling from waste streams is crucial to closing supply gaps and reducing environmental impacts.

Nth Cycle's Joyce 4.2 electro-extraction system provides a cleaner alternative to traditional smelting and chemical leaching for recovering critical metals like nickel, cobalt, and manganese from used batteries and other industrial wastes. These metals are essential for building electric vehicles and renewable energy technologies, but today's production methods are energy-intensive and polluting. The goal of this project is to study new materials and methods to improve the energy efficiency, selectivity, and durability of the current electro-extraction system.

The project advanced in three stages. First, chemical modelling showed that metals behave differently depending on the acidity of the solution, and that there is a 'sweet spot' where cobalt can be separated before nickel. Second, hundreds of possible electrode materials were reviewed, and a small group was selected for having the right balance of high activity, stability during operation, and affordability. Third, different types of membranes were compared, focusing on those that can conduct ions quickly, last a long time under both acidic and alkaline conditions, and resist fouling. By combining these findings, the research pointed to materials that make Joyce 4.2 more efficient today while also showing what innovations may be useful in the future.

This research project produced detailed literature review reports, material comparisons, and practical recommendations that Nth Cycle can use to improve Joyce 4.2. These outputs could help lower the energy cost of metal recovery, increase the purity of the recovered materials, and extend the lifetime of the system.

One of the key lessons learned in this research was that pairing cost-effective electrodes with durable membranes can deliver immediate benefits while setting the stage for long-term innovation. This work could strengthen circular economy solutions for critical metals and contribute to global goals for clean energy, sustainable production, and climate action.

Key technology/tools used: Visual MINTEQ, Google Scholar, MS Excel

Illustration of an electrochemical separation process, representing how membranes and electrodes enable sustainable metal recovery
Attribution: AI-generated concept illustration via Illustrae (2025).

Ralph Carlo Evidente

Philippines | Chemical Engineering

Specializes in energy materials, circular economy strategies, electrochemical systems, and critical raw material recovery, and advocates for science-policy integration to advance sustainable technologies.

Project Partner

Nth Cycle is an industry leader in critical metal refining, using patented electro-extraction technology to recover critical metals from end-of-life batteries, scrap metal and mined ore right where they're sourced.

Funder

NTH CYCLE

AUTODESK FOUNDATION

ASME ISHOW Impact Measurement & Management

MANAGING FELLOW
Nancy Wangari

This ISHOW Impact Measurement & Management (IMM) project was designed to strengthen ASME's ability to track, evaluate, and showcase the long-term impact of ISHOW alumni ventures. Since 2015, ISHOW has supported over 240 hardware-led innovators across Africa, India, and the Americas, yet systematic follow-up has been inconsistent, leaving gaps in data and alumni engagement.

The objective was to help ASME strengthen ISHOW's long-term IMM system by redesigning alumni surveys, improving data collection processes, piloting AI-enabled tools, and developing engagement pathways that capture both quantitative and qualitative outcomes. Collectively, these updates could improve data consistency, reduce response fatigue, create a foundation for automated alumni tracking, and richer storytelling about ISHOW's global impact.

This project's work began with a desk review of past IMM data, intake forms, and predecessors' reports, which highlighted issues of inconsistent formatting, missing records, and a lack of standardized outreach. The Typeform survey was subsequently redesigned with clearer framing, confidentiality notes, and an interview scheduling link to reduce back-and-forth. The flow of questions was refined with semi-structured calls and internal review with ASME. Outreach through Mailchimp, LinkedIn, and WhatsApp, tested different engagement strategies, while AI exploration focused on assessing whether APIs and automated scrapers could supplement surveys with publicly available updates on venture progress.

The outcome of this project was a clearer and more consistent survey structure, richer qualitative stories that reveal venture progress, and a replicable framework for alumni engagement and long-term impact measurement. These outcomes addressed previous gaps in follow-up and set the foundation for more systematic and reliable tracking of ISHOW ventures.

The work resulted in an updated Typeform survey fully integrated with Mailchimp, creating both a streamlined data collection process and improved analytics on alumni engagement. An interview pipeline was established, targeting past finalists and winners for deeper qualitative insights. In parallel, a comprehensive internal and external report was developed.

Key technology/tools used: Google Suite, Typeform, Mailchimp, Canva

ASME ISHOW Impact Measurement Project
Attribution: Esther Abel, created using Canva

Esther Oyiyechi Abel

United States
Artificial Intelligence in Business

MSc in Artificial Intelligence in Business and a B.Tech in Information Technology. Experience on AI acceleration teams, integrating AI tools to optimize systems.

Project Partner

The American Society of Mechanical Engineers (ASME) is a not-for-profit professional organization that enables collaboration, knowledge sharing, and skill development across all engineering disciplines.

Funder

ASME
SETTING THE STANDARD

ASME
SETTING THE STANDARD

Research and Development of Feedstock Formulation for Concrete 3D Printing

MANAGING FELLOW
Alice Wachera

3D printable concrete is a major step toward sustainable construction. Its layer-by-layer method allows precise material placement, reduces waste by 70–90%, and eliminates the need for wood molds and metal forms, lowering both cost and carbon footprint compared to traditional Ordinary Portland Cement (OPC) concrete. However, current feedstocks rely on carbon-intensive Type IL cement with chemical additives. Developing decarbonized 3D concrete feedstocks can maximize both the environmental and functional benefits of 3D printing.

ProZERO™, developed by Prometheus Materials, is the first carbon-negative supplemental blend designed as a 1:1 replacement for OPC cement. This project aimed to identify, evaluate, and optimize ProZERO™ feedstock formulations for 3D printing by screening various cement additives and refining their material properties to ensure printability, structural integrity, and compatibility with 3D printing processes.

The project involved an intensive literature review on 3D printing concrete and mixtures that enable it, as well as several iterations of identifying and testing potential formulations.

The project's key deliverables included a 3D Concrete Printing Feedstock Research Summary, a literature review database, and nine feedstock formulas recommended for further testing. This work lays the groundwork for future research on additive behavior in mixtures containing ProZERO™.

Continued development of ProZERO™ feedstock formulations for 3D printing could enable rapid, cost-effective construction of housing and shelters while simultaneously reducing global warming potential.

Key technology/tools used: JMP Statistical Discovery

Concrete-paste mixtures 1-16 extruded onto parchment paper
Attribution: Meghan Eliza Stancliff

Meghan Stancliff

USA | Design Theory and Methodology

Interdisciplinary Design Theory and Methodology researcher focusing on designer-stakeholder interactions, empathy, and equity within design.

Project Partner

Prometheus Materials is a carbon-negative supplemental cement blend manufacturer and research startup focused on reducing cement-related CO_2 emissions to net zero.

Funder

Mercy C. Wanjiku Nduati

Kenya | Communication

Communication professional with experience working as an Editorial Staff for Kenya Engineer and the Industrial Journal, publishing engineering and technological articles in East Africa and beyond.

17 PARTNERSHIPS FOR THE GOALS

Engineering for Change & Mechanical Engineering Magazine Editorial Fellowship

MANAGING FELLOW
Nancy Wangari

The American Society of Mechanical Engineers (ASME) Editorial Fellowship offers journalists a distinctive opportunity to gain knowledge and context for reporting on sustainable development. This year's engagement was also in partnership with Engineering for Change (E4C), exploring scientific and technological issues shaping global progress, and highlighting engineered solutions to critical yet often under-reported challenges or issues in sustainable development.

This project focused on delivering fresh, insightful stories and features related to the UN's Sustainable Development Goals (SDGs), reaching and informing audiences worldwide.

This involved developing story ideas (both independently and in collaboration with editors), researching topics, and conducting interviews with relevant stakeholders. Based on this research, articles were published on the E4C website and ASME journals.

The key deliverables of the engagement were long-form articles, news briefs, and a feature-length article for ASME's monthly flagship publication - Mechanical Engineering (ME) magazine. This feature-length article, developed in collaboration with ME staff, focused on geothermal exploration in Kenya and Africa and explored the history, development, and impact of geothermal plants in Kenya. It also highlighted challenges such as financing, environmental concerns, climate change mitigation, and ommunity engagement. By telling this story, the article's goal was to inform and showcase Kenya's leadership in renewable energy innovation across Africa.

Altogether, the published articles and the feature-length capstone project aim to help inform the audience on global issues and advance their understanding of sustainable development.

Key technology/tools used: Google Suite, Grammarly, Slack, Zoom

An example of a Printed Circuit Board (PCB) manufactured by Gearbox Europlacer in the Kenyan market.
Attribution: Gearbox Europlacer

Project Partner

The Engineering for Change / ASME Editorial Fellowship empowers journalists to report on engineered solutions to global challenges in sustainable development.

Funder

engineering FOR CHANGE

ASME
SETTING THE STANDARD

Assessing Climate Resiliency of Water and Sanitation Infrastructure

3 GOOD HEALTH AND WELL-BEING

MANAGING FELLOW
Alice Wachera

As reported in UNHCR's Focus Area Strategic Plan for Climate Action 2024-2030, 84% of refugees and asylum seekers originate from 15 highly climate-vulnerable countries. They often lack access to environmentally sustainable resources, as well as the economic or physical capacity to prepare for, withstand, recover from, and be protected against the impacts of climate change.

For UNHCR (The United Nations High Commissioner for Refugees), whose mandate is to protect forcibly displaced populations and help them rebuild their lives, climate change is making this work increasingly difficult, whether through hazards such as prolonged droughts that deplete water sources or floods and storms that bring an excess of it, placing millions of already vulnerable people at even greater risk.

This project focused on strengthening climate resilience in UNHCR's water, sanitation, and hygiene (WASH) infrastructure, particularly against floods, droughts, and cyclones. It addressed the urgent need for facilities that can withstand such hazards.
Research was undertaken to establish core principles of climate resilience and WASH, while interviews with UNHCR WASH Officers provided insights into the contextual
impacts of climate hazards on services and interventions.

These findings were then compared with solutions from the literature to assess alignment with current adaptation practices. The existing WASH drawings and bills of quantities (BOQs) were subsequently revised, reviewed, and validated by a UNHCR Technical Review Panel.

In addition, a presentation was prepared for the UNHCR WASH community of practice to share the project's findings and facilitate discussion with practitioners and key field stakeholders in the sector.

Key technology/tools used: AutoCAD, Microsoft Excel.
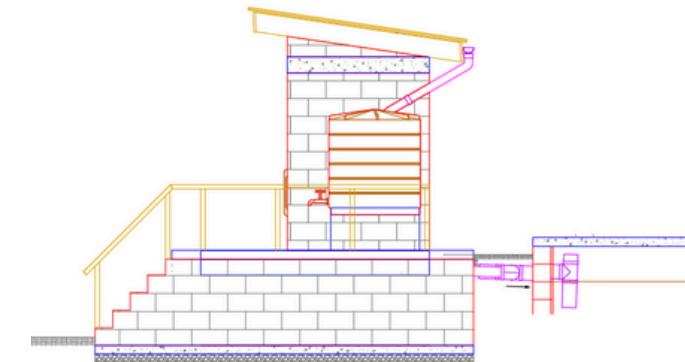
NOTES

1. Pit depth and platform height to be determined by site conditions (e.g. hard rock depths, groundwater table levels, flood levels).
2. Proper drainage in flood prone areas to convey away flood water.
3. In situations of floods in emergency context, can use sandbags to protect the infrastructure from damage

Pour-flush toilet with a revised raised option to improve flood resilience
Attribution: Arnold Kasumba

Arnold Kasumba

Uganda | WASH Engineering

Dedicated WASH professional with four years of experience in the water, sanitation, and hygiene sector of Uganda.

Project Partner

UNHCR is a global organisation provides life-saving assistance, like shelter, food, water and medical care, building better for refugees, forcibly displaced communities, and stateless people.

Funder

UNHCR The UN Refugee Agency

engineering FOR CHANGE

5 GENDER EQUALITY

AI Voice Assistant for a Textile Marketplace App in Rural India

MANAGING FELLOW
Emmanuel Annor

Digital access remains a critical barrier for rural women artisans in India's silk industry. Many face challenges with low literacy, limited familiarity with smartphones, and language mismatches in English-dominant apps. As a result, they often remain dependent on intermediaries, losing both income and autonomy. Resham Sutra, a social enterprise empowering women through sustainable textile livelihoods, partnered with E4C to address this gap by introducing an AI Voice Assistant for Gram Sootra, their mobile marketplace platform.
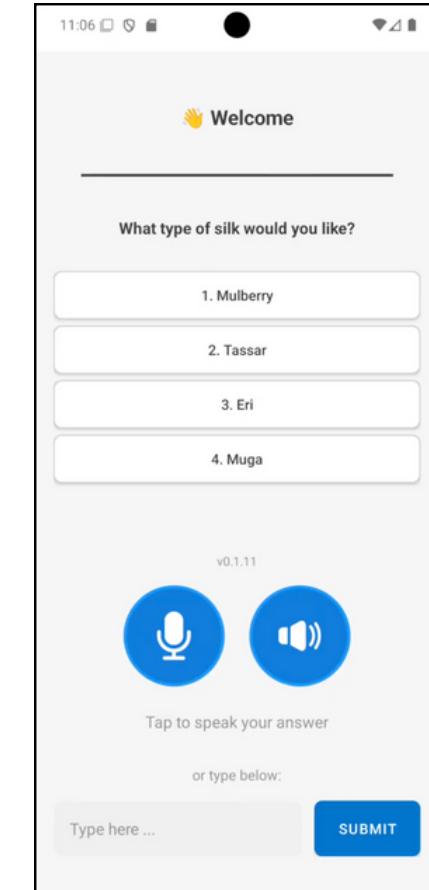
The project delivered a proof-of-concept voice workflow in English that allows users to list products entirely through speech, replacing "read & type" with "talk & listen." Packaged as a 40 MB offline module, the system runs on low-end Android devices too and combines Whisper.cpp for speech recognition, fuzzy logic for intent mapping, and Android's native text-to-speech for guidance. Integrated directly into Gram Sootra, it enables product listing without the need for typing.

The solution represents a significant step toward SDG 5.b – promoting the empowerment of women through ICT. By making Gram Sootra accessible to women with low digital literacy, the assistant enhances economic autonomy, reduces reliance on middlemen, and opens pathways to fairer livelihoods. Looking forward, the system is ready to expand into Hindi and Marathi and extend voice workflows to browsing and purchasing, ensuring more inclusive participation in India's digital economy.

Key technology/tools used: Java, C++, Python, Fuzzy Logic, Whisper.cpp, Android Native TTS, Figma

Voice Assistant in Gram Sootra
Attribution: Punjaya Wickramasinghe

Punjaya Wickramasinghe

Australia | Software Engineering

Mechatronics engineer with experience on drone systems (GPS-denied navigation, battery design) and AI solutions (sensing platforms, RAG pipelines, automated reporting).

Project Partner

Resham Sutra is a social enterprise empowering rural women in India's silk industry through sustainable livelihoods. By developing solar-powered textile machinery and digital platforms like Gram Sootra.

Funder

Resham Sutra

AUTODESK FOUNDATION

Design of a Durable Non-Plumbed WASH Station

MANAGING FELLOW
Zula Coley

50% of water, sanitation and hygiene (WASH) programs fail after 2-5 years (UNICEF). This is a problem that Splash Social Enterprises (SSE) wants to help solve. SSE's handwashing and drinking station designs emphasize durability, child-friendliness, and water-conservation, encouraging positive hygiene behaviors while being easy to maintain. However, the stations SSE currently provides depend on a plumbed water source. Innovative, non-plumbed designs that are tailored to meet the different conditions required for more remote areas are essential to closing the access gap while ensuring long-term consistent use in low-resource settings.

The process began with determining key design considerations, including portability, durability, child-friendliness, and water hygiene. At the same time, it was necessary to ensure that the solution was cost-effective, with the goal to stay under $30 per unit, and could be manufactured and assembled locally. Designing with regionally sourced, easily fabricated materials would reduce costs and support sustainable solutions.

A product requirements and specifications document was developed to guide initial concept generation, incorporating detailed testing protocols and grounded in contextual and user-centered research on water access challenges. Additionally, an illustrated storyboard was developed to further explore user context in remote African school settings. Finally, a detailed analysis of similar solutions already on the market highlighted pitfalls to avoid and important features to include in the design.

Eleven concepts were sketched and ranked against the previously defined design specifications. Several concepts were then advanced to the next stage which included generating preliminary bills of materials (BOMs) for each. Final concept packages marked the conclusion of project delivery, including initial manufacturing considerations and refined images that were generated using AI tools and precursory hand-drawn sketches. This project's goal was to support SSE's future product development efforts, identifying important features to prioritize as well as possible obstructions or design flaws to circumvent.

Key technology/tools used: Google Suite, GPT-4o, Gemini 2.5 Flash Image
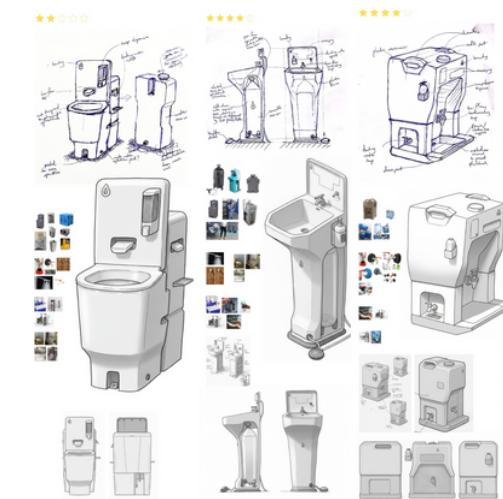
Concept ideation excerpts
Attribution: Erioluwa Morenikeji / Splash Social Enterprises

Erioluwa Morenikeji
Nigeria | Mechanical Engineering

Mechanical Design Engineer, developing high-performance systems for electric vehicles and sustainable mobility.

Project Partner

Splash Social Enterprises (SSE) works to develop drinking and handwashing stations and provide trainings that offer an innovative, practical, and lasting way to improve health and hygiene outcomes.

Funder

Splash Social Enterprises

AUTODESK FOUNDATION

Modeling and Simulation of Air-to-Water Technology

MANAGING FELLOW
Williams Ibeh

By 2040, vast regions across the globe are projected to face high to extremely high water stress, with more than 40% of withdrawals exceeding available supply (World Resources Institute, 2023). Countries across South Asia, the Middle East, Northern Africa, and parts of Europe and the Americas will be particularly affected, intensifying the urgency for scalable, sustainable water generation technologies.

Against this backdrop, Uravu Labs is developing a renewable air-to-water device with a capacity of 2000 litres per day (LPD), designed to produce clean drinking water from the atmosphere using thermal energy. Within this system, the absorber subsystem is critical for capturing moisture, and its performance directly impacts efficiency, energy use, and scalability. Optimizing this subsystem is therefore essential to addressing future water scarcity challenges.

The objective of this project was to refine the absorber design using computational fluid dynamics (CFD). The focus was on identifying suitable packing materials and configurations, validating subsystem performance under realistic conditions, and addressing inefficiencies such as recirculation of dehumidified air back into the system.

The project advanced in several stages. First, baseline CFD simulations were conducted to characterize existing absorber performance under defined boundary conditions - pressure drop and flow rates. Second, airflow integrity analyses were carried out to identify and mitigate potential backflow of treated air.

Third, other parameters, such as temperature, humidity, and liquid phase, were introduced to replicate the actual conditions. Iterative modelling allowed the team to compare tradeoffs, refine designs, and converge on an optimized configuration.

The project delivered optimized CAD models of the absorber subsystem, detailed CFD simulation reports validating system performance, airflow integrity analyses, and documentation of design iterations with performance tradeoffs. The results provide Uravu Labs with actionable engineering data to improve absorber efficiency, reduce operational losses, and strengthen the foundation for commercial deployment of the 2000 LPD air-to-water device.

Key technology/tools used: Autodesk Inventor, Autodesk CFD.
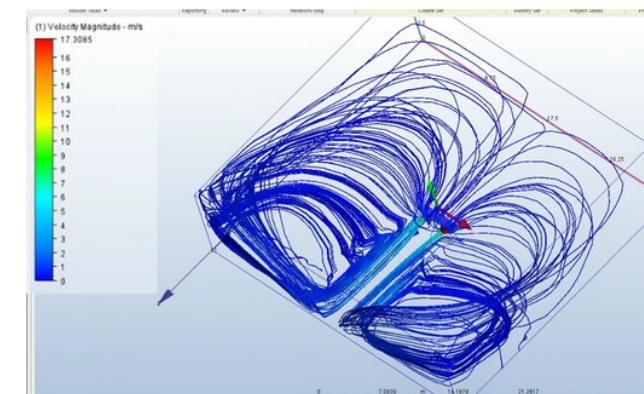
CFD velocity streamline visualization of airflow distribution around the absorber unit inside a room domain, highlighting recirculation patterns and velocity magnitude
Attribution: Model snap from Autodesk CFD

Harsh Vyas

India | Mechanical Engineering

Mechanical Engineer with a strong interest in product design, specializing in computational fluid dynamics and simulation-driven design.

Project Partner

Uravu is pioneering water solutions through the development of a high-efficiency air-to-water device. By extracting clean drinking water directly from atmospheric moisture, its device provides a sustainable alternative to groundwater dependence.

Funder

URAVU

AUTODESK FOUNDATION

Design of a Fossil-Fuel-Free Irrigation System

MANAGING FELLOW
Williams Ibeh

In the 2024 Global Hunger Index, Syria's hunger level was classified as "serious," with a score of 30.3. Approximately 12.4 million Syrians, accounting for more than 60% of the country's population, are starving from the critical food shortages. Severe drought has put Syria's food supply in jeopardy, leading many Syrian provinces to experience 50% to 70% less annual rainfall.

This project aimed to experimentally prove the winning solution to the International Rescue Committee (IRC) open-innovation challenge "Reducing Fossil Fuel Dependency of Syrian Irrigation Systems", by creating a detailed design which can be prototyped.

SeaFreight Labs, which is supporting IRC to make this system in reality, aims to reduce Syrian farmers' dependence on fossil fuels, which rely on proper working infrastructure, contrary to the situation in most parts of Syria. By replacing diesel generators with solar-powered alternatives, the project addresses both climate sustainability and agricultural resilience in conflict-affected regions.

The work included refinement of the design, and creation of a bill of materials and technical drawings, so the prototype can be fabricated and the system can be experimentally validated. The design includes a solar-thermal energy system capable of generating 5kW of clean electrical power to operate deep-well irrigation pumps in off-grid agricultural settings.

The design process started by reviewing the problem statement, previous concept design, Syrian context and supporting research material.

It went into extensive design updates, considering design for manufacturing criteria, actual material sourcing, and fabrication constraints.

The test data, gathered from the prototype, will help understand how the system would behave when a scaled-up solution works in the field, and areas of improvement can be further optimized to fit the goals and requirements.

The key deliverables were CAD designs accompanied by design documents such as bill of materials, detailed technical drawings, and instruction documents that will facilitate fabrication, assembly, and testing of the prototype. It also included high-quality renders and animation videos that can be during assembly and as pitch material.

Key technology/tools used: Autodesk Inventor, Autodesk Viewer, Fusion 360, KeyShot, Google Suite

Photorealistic render of the fossil-fuel-free irrigation system prototype
Attribution: 3D Model created using Autodesk Inventor and Fusion 360

Vincent Muchiri
Kenya| Mechatronics Engineering

Mechanical Engineer with a strong interest in product design, specializing in computational fluid dynamics and simulation-driven design.
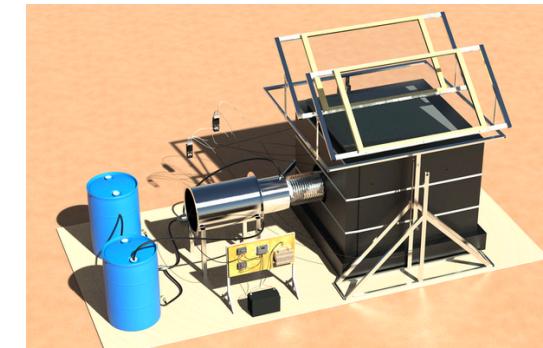
Project Partners and Funders

SeaFreight Labs is a consultancy delivering crowd-solving services to businesses and non-profits. It advises on projects solving global challenges to cost-effectively deliver breakthrough innovation to intractable problems.

SEA FREIGHT LABS — Innovate Better

INTERNATIONAL RESCUE COMMITTEE

engineering FOR CHANGE

Development of Instructional Drawings for Careers in Manufacturing Programs

MANAGING FELLOW
Zula Coley

The Jane Addams Resource Corporation (JARC) promotes strong communities by helping low-income workers attain financial self-sufficiency through both high quality skills training and support services.

In support of that mission, the project goal was to provide JARC with materials that better support both classroom lessons and hands-on practice for the Careers in Manufacturing Programs (Computer Numerical Control (CNC), Welding, and Mechanical Assembly), developing a collection of instructional drawings that are clear, consistent, and designed to become progressively more complex.

The work began with CNC milling and turning drawings, which introduced key drafting elements such as principal orthographic (front, top and right) and isometric views. Next came welding drawings that incorporated industry welding symbols along with bills of materials (BOMs). The project concluded with two assembly drawings, which brought together different components using fasteners such as bolts, nuts, and washers, as well as drawing upon skills learned in the CNC and welding programs. These assemblies were supported with BOMs, exploded views, and a parts list covering all the completed work.

To ensure consistency and support JARC's future drawings, a dedicated title block was created specifically for JARC and applied across all drawings. This provided a standardized format that reflects industry expectations while also being tailored to JARC's specifications.

The key deliverables of this project are a structured collection of instructional drawings across the three program areas: CNC, Welding, and Mechanical Assembly. These resources provide JARC a stronger foundation of training materials that can make teaching more effective, help prepare trainees for future work in the manufacturing industry, and support employer partners to skill up their incumbent workers.

Key technology/tools used: Autodesk Fusion 360, Google Suite

Assembly Drawing 1: assembled cube with fasteners
Attribution: Kamilia Kalmoni / JARC
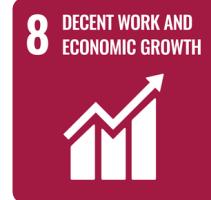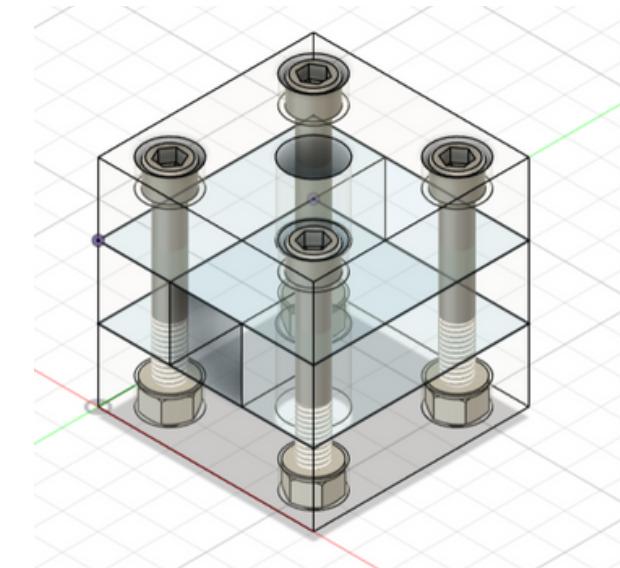
Kamilia Kalmoni

Ghana | Mechanical Engineering

Mechanical engineer from Ghana with a strong interest in aerospace and sustainable technologies. She is dedicated to 3D modeling, technical design, and advancing workforce development.

Project Partner

The Jane Addams Resource Corporation (JARC) is a nonprofit organization dedicated to empowering job seekers to gain self-sufficiency through high-quality manufacturing skills training and wrap-around support services.

Funder

JARC JANE ADDAMS RESOURCE CORPORATION

AUTODESK FOUNDATION

8 DECENT WORK AND ECONOMIC GROWTH

Developing Features and Integrations for Financial Wellness Tool

MANAGING FELLOW
Emmanuel Annor

finEQUITY, a tech nonprofit, drives their prosperity-focused mission by restoring financial health and dignity to justice-impacted individuals and their families. This project focused on accelerating the organization's product roadmap by delivering high-impact technical solutions across five key initiatives, including Glide app development, Twilio integration, Plaid feasibility assessment, and GPT-powered tools - enhancing user engagement and strengthening internal operational capacity.

Throughout the project, the team achieved meaningful progress across key areas of development. Glide features were upgraded to deliver a more seamless user experience, introducing redesigned onboarding flows, embedded forms, and an enhanced survey page with additional questions to capture richer insights. Communication capabilities were strengthened through Twilio integration, enabling real-time alerts that provide clients with immediate updates whenever decisions are made regarding their reward submissions.

Substantial progress was also realized in Plaid integration, where both Pipedream and React.js were configured and tested to ensure secure financial data connectivity. This integration now supports advanced functionality, such as users viewing and tracking their recurring subscriptions directly within the platform.

The development process was structured around clear milestones, allowing the team to monitor progress and adapt to challenges. Taken together, these deliverables provide a strong foundation for scaling the solution, ensuring stability and adaptability while setting the stage for advanced features to come. Most importantly, these improvements translate into a smoother, more transparent user experience, empowering users with actionable insights into their finances and fostering deeper engagement with the platform.

Key technology/tools used: Glide, React.js, Google Suite, Visual Studio, Pipedream, Netlify

Enhanced user home page
Attribution: Briane Cornish

finEQUITY Plaid link page
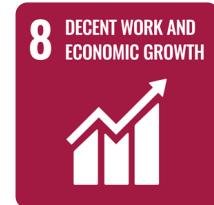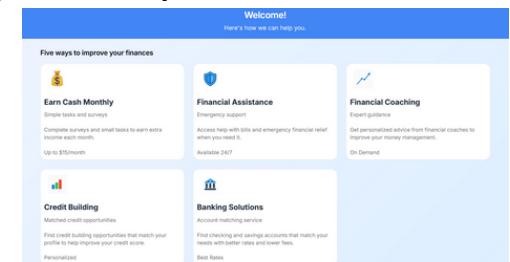*Attribution: Briane Cornish*

Bernard Odartei Lamptey

Ghana | Software Engineering

Software engineer. He specializes in full-stack development, DevOps, and secure digital systems, with experience building impactful solutions in digital identity and fraud detection.
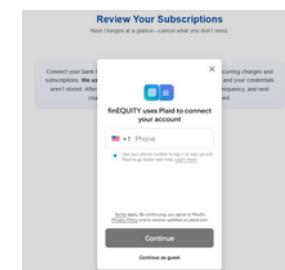
Project Partner

finEQUITY.org is a community sourced tech-nonprofit that addresses the financial toll that incarceration has on families by filling financial voids, establishing financial histories, and offering no-cost financial services.

Funder

finEQUITY

engineering FOR CHANGE

Developing an AI Tool for a Database of Transformative Construction Technologies

MANAGING FELLOW
Emmanuel Annor

Hometeam Ventures' mission is to close the housing gap by investing in early-stage construction and housing innovators. Driven by this mission, they manage a growing database of thousands of companies, which involves manually receiving, categorizing, and tracking them. With this database growing every week, the process is time-consuming, laborious, and limits efficiency. This project aimed to develop an AI tool to automate the process, enabling faster tagging, tracking, and resulting in better investment decisions.

The first deliverable was an AI Tagging Engine that scans company data to spot missing tags and automatically fills them in with the help of a trained machine learning model. Stakeholders can review and adjust the results before updates are pushed back into an Affinity Database, keeping the process fast while ensuring accuracy. Alongside this is a Retrieval Augmented Generation (RAG) system, powered by GPT-4, which combines retrieval with reasoning to deliver context-aware answers about Hometeam Ventures and its portfolio. Instead of simply pulling data, it synthesizes insights and supports deeper knowledge discovery.

In addition, a scalable frontend interface was designed and built, bringing these machine learning and artificial intelligence systems together in one place. Built-in security safeguards ensure controlled access and protect data integrity, making the platform practical and secure for all users.

This solution streamlines the tagging process, making it faster, more efficient, and significantly more accurate, while ensuring seamless access to insights across the dataset. Hence, saving Hometeam Ventures time spent on tagging companies manually.

Key technology/tools used: Next.js, Figma, Python, GPT-4, Qdrant, Git, GitHub, Shell scripts
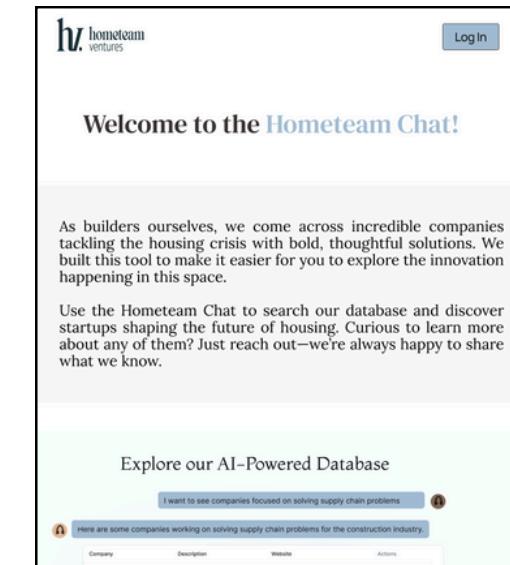
Visual output showing the frontend interface
Attribution: Sergius Justus Nyah

Sergius Justus Nyah

Cameroon | Software & AI Engineering

Innovation-driven engineer with a passion for developing human-centered products. He thrives at the intersection of technology, and user-centric problem-solving,.

Project Partner

HomeTeam Ventures is dedicated to addressing the global housing crisis by backing entrepreneurs who are building innovative, scalable, and affordable housing solutions.

Funder

hometeam VENTURES

AUTODESK FOUNDATION

Open Digital Infrastructure For Rural Agriculture and Energy in India

MANAGING FELLOW
Emmanuel Annor

Open digital infrastructure in agriculture can reduce transaction costs, improve farmer incomes, and enable climate-smart practices. With food demand rising and resource constraints intensifying in India, interoperable systems like Beckn are vital for creating inclusive, scalable solutions. By linking farmers, financiers, and service providers on a common protocol, such innovations can help build resilient rural economies while advancing sustainability goals.

The objective of this project was to explore and develop open digital infrastructure for rural agriculture and energy services using the Beckn protocol. While previous pilots had tested closed, app-based models for agri-commerce, this project aimed to research and prototype an open, interoperable system that could connect farmers, farmer producer organizations, lenders, and service providers seamlessly.

The work began with field and desk research on the challenges of rural agriculture, including access to credit, fragmented digital platforms, and inefficient resource use. This was followed by a deep dive into the Beckn protocol, its architecture, and integration with complementary technologies such as Aadhaar for KYC (Know Your Customer), Unified Payments Interface for micropayments, IoT (Internet of Things) devices for telemetry, and Artificial Intelligence/Machine Learning models for advisory and credit scoring.

Based on this foundation, high-impact use cases were analyzed and modeled — including pay-as-you-go solar pumps, soil-health lab marketplaces, bulk-buy auctions, and carbon MRV (Monitoring, Reporting, and Verification) systems.

System diagrams, flow models, and prototype integration blueprints were created, enabling design of demonstrable MVPs. Cost-benefit and feasibility comparisons were conducted to benchmark open-protocol models against proprietary alternatives.

The key deliverables were a Beckn integration blueprint, a stakeholder and use-case map, and a portfolio of scalable applications for agriculture and rural energy. This work contributes to building sustainable, inclusive, and interoperable digital public infrastructure for smallholder farmers.

Key technology/tools used: Beckn Protocol, UPI, Aadhaar/DigiLocker, IoT devices, AI/ML models.

Open Digital Infrastructure use-cases
Attribution: Hargun Kaur

Hargun Kaur

India | Software Engineering

Full-stack developer and artificial intelligence & machine learning engineer, specializes in modern web, cloud-native systems, and generative AI.

Project Partner

Synapses is on a mission to back STEM-led innovations in climate, agriculture, and health. By combining capital, expertise, and global networks, it supports science-driven entrepreneurs in building scalable solutions.

Funder

synapses

AUTODESK FOUNDATION

Development of a Dimension Drawing Automation Tool for Revit

MANAGING FELLOW
Alice Wachera

The global construction industry faces unprecedented challenges in meeting housing demand while reducing environmental impact. Rapid urbanization and the growing urgency of climate change are driving the need for more efficient building processes, making automation technologies critical for scaling sustainable construction.

According to UN-Habitat, 3 billion people will require adequate housing by 2030, underscoring the urgent need for construction workflows that can deliver quality housing both faster and more sustainably.

In response to these challenges, BamCore has pioneered a sustainable, carbon-negative structural framing system for buildings, utilizing fast-growing bamboo as its core material. The company's innovative approach combines engineered bamboo with industrialized construction technologies, such as Building Information Modelling (BIM) and prefabricated panels, to deliver more affordable, faster, and environmentally friendly building solutions.

To further streamline BamCore's workflow, the objective of this project was to develop an automated dimensioning tool for Revit to support BamCore's panelized wall system, replacing the previously manual, time-consuming, and labor-intensive process with a plugin designed to automate dimensioning, minimize errors, and integrate seamlessly into BamCore's industrialized construction workflow.

To achieve this, interviews with the BamCore technical team and desk research were conducted to analyze existing processes, identify workflow inefficiencies, and benchmark available Revit automation tools.

Based on these insights, proof-of-concept scripts were designed and refined into a functional plugin. Revit models provided by BamCore were used for testing and iterative development.

The key deliverables of the project were an automated Revit dimensioning tool and supporting implementation documentation. Together, these outputs are expected to reduce manual drafting effort, improve accuracy, and streamline drawing production, thereby enhancing workflow efficiency and supporting BamCore's sustainable building practices.

Key technology/tools used: Autodesk Revit, Visual Studio, C#, Revit API

Dimensioned Building Section of BamCore's Panelized Wall System
Attribution: Timothy Ajani, Revit model courtesy of BamCore

Timothy Ajani

Nigeria | Electrical / Electronics Engineering

Electrical and Electronics and Software Engineer with expertise in both hardware and software to design innovative, sustainable solutions.
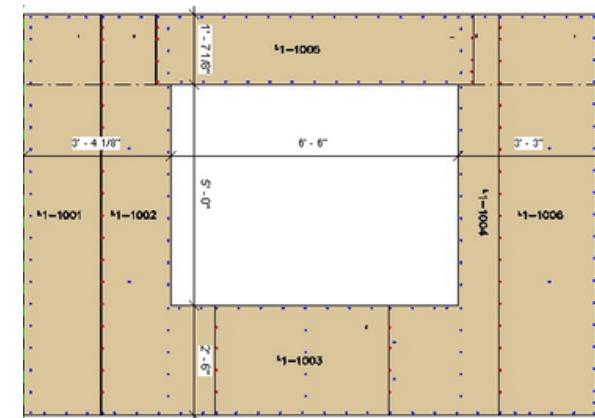
Project Partner

BamCore aims to transform the construction industry by providing innovative, sustainable building materials. It focuses on creating durable, eco-friendly structural solutions that improve efficiency.

Funder

BAMCORE®

AUTODESK FOUNDATION

13 CLIMATE ACTION

Mechanical Design of a Container Based Gas Clean-up System

MANAGING FELLOW
Williams Ibeh

Landfill biogas, produced from the natural breakdown of organic waste, presents both an environmental challenge and a renewable energy opportunity. Its main component, methane, is a highly potent greenhouse gas with a far greater heat-trapping effect than carbon dioxide. When left uncontrolled, methane emissions from landfills significantly intensify climate change and degrade local air quality.

This project focused on the development of a modular, containerized gas cleanup system designed to remove harmful impurities such as hydrogen sulfide, moisture, and non-methane organic compounds. By delivering a cleaner gas stream that can be harnessed for energy use, the system reduces environmental risks while enabling flexible deployment across landfill sites.

This project builds on M2X's initial trailer-based version, advancing it into a modular gas clean-up system housed in a double 40-ft container configuration positioned side by side.

The design was refined through targeted component modifications, layout reconfiguration, and optimized sub-skid placement.

Additional efforts focused on defining access points, positioning manifolds, and planning electrical connection outlets, with equipment strategically grouped for efficiency.

Project outputs include detailed 3D models showcasing optimized containerized layout, equipment placement and piping routes, high-quality renderings, and comprehensive technical reports to support M2X with scale-up, manufacturing, and global deployment.

Key technology/tools used: Autodesk Inventor

M2X Containerized Gas Cleanup System with the two 40ft containers placed side by side
Attribution: Model created using Inventor by Wisdom Chidiebere

Layouts for each container showing skid location and access points
Attribution: Model created using Inventor by Wisdom Chidiebere

Wisdom Chidiebere

Nigeria | Mechanical Engineering

Design Engineer currently working in steel fabrication and power generation.
His primary interests include sustainable manufacturing and material conservation.
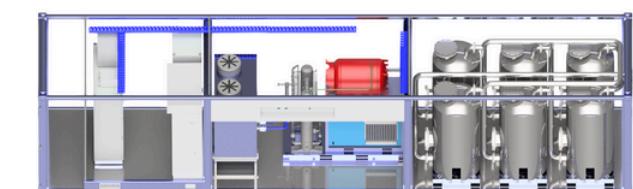
Project Partner

M2X Energy develops modular technology to convert waste methane from sources like gas flares, landfills, and stranded gas into valuable products. M2X aims to address climate change and ensure access to renewable energy.

Funder

M2X

AUTODESK FOUNDATION

Dorothy Akinyi

Kenya | Mechanical Engineering

Engineering Board of Certified Mechanical Engineer. With experience in HVAC design, green building services for EDGE Certification, and sustainable engineering.

13 CLIMATE ACTION

Design and Technical Support to Integrate Agrivoltaics into Greenhouses

MANAGING FELLOW
Williams Ibeh

The integration of solar panels with crop production can increase land-use efficiency while promoting renewable energy and food security. According to the IEA, global solar capacity must triple by 2030 to meet climate goals, while farmers face rising pressure to adapt to climate change. Developing innovative agrivoltaic systems and adapting traditional farming practices are essential to closing the food-energy gap while providing affordable and sustainable solutions for communities.

This project aimed to design and offer technical research support while integrating agrivoltaics to Kheyti's greenhouses using a crop-first approach. Specifically, to identify optimal solar design options, suitable panel types, and affordable design concepts and configurations. The design concept considered four perspectives: agronomy or crop perspective; farmers or user perspective; technical perspective; and policy and business perspective.

From an agronomic standpoint, investigations were conducted to understand all requirements, which are crop light exposure, soil and water factors, suitable crop types, and the implications of shading from solar panels. A literature review of global agrivoltaic case studies helped identify best practices and avoid past pitfalls. On the business side, revenue model evaluations, land use issues, subsidy opportunities, and regulatory frameworks were considered to ensure the system could be practical and scalable.

The project resulted in a concept-level integrated agrivoltaic design package that maintained a crop-first approach, prioritizing crop productivity while incorporating solar integration for dual-use of land.

Deliverables included site and feasibility assessments, a solar technology analysis with emphasis on affordable bifacial panels, structural layout concepts, and energy-crop balance analyses.

In addition, 3D models and draft specifications were developed to help visualize the greenhouse configuration with solar integration. Key lessons learned include the importance of prioritizing farmer usability and affordability alongside engineering performance, and the need to adapt global agrivoltaic practices to the specific constraints of Indian smallholder contexts.

The findings position Kheyti to refine its Greenhouse-in-a-Box with solar integration, strengthening its capacity to deliver climate-smart farming solutions at scale. The next phase is prototyping and field validation, where the design will be tested in practice to confirm its effectiveness for smallholder farmers.

Key technology/tools used: Autodesk Revit, AutoCAD, Robot Structural Analysis, Oasys GSA

Kheyti Greenhouse-in-a-Box model
Attribution: Model created using Fusion 360 and Autodesk Revit
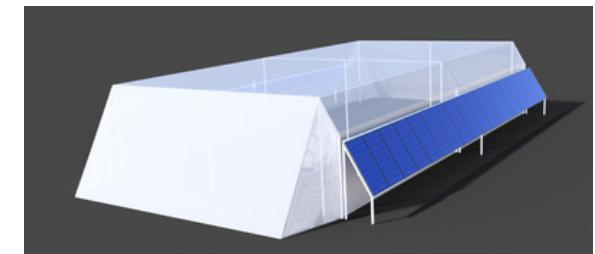
Project Partner

Kheyti is an award-winning agritech social enterprise transforming smallholder farming through its innovative Greenhouse-in-a-Box solution. Its affordable modular greenhouses, are up to 90% cheaper than conventional options.

Funder

KHEYTI

AUTODESK FOUNDATION

13 CLIMATE ACTION

Developing New Features for High-Altitude Platform Capturing Earth Observation Data

MANAGING FELLOW
Zula Coley

Automated deforestation detection algorithms have the potential to be an extremely powerful tool used to better understand current ecological trends, locate areas in need of restoration, and to prevent and mitigate illegal logging, which accounts for about 15-30% of the lumber industry world-wide. One of the main reasons illegal logging is so prevalent is because it is very difficult to detect and enforce. Having algorithms that can scour vast areas of forest and detect change as it happens would help deter illegal logging and protect forests.

While deforestation detection is a problem that has been solved in the past with deep learning, those models typically only utilize imagery with RGB (red green blue) signals. However, satellites record light of many wavelengths which can be useful for determining plant health and diversity. The project goal was to develop a model that could use this multispectral data to predict which segments of the forest need protection.

The first approach was to train the model using an off-the-shelf dataset, consisting of ~750 image pairs and a corresponding mask of the true deforested areas which acted as a ground truth reference. A U-Net architecture was used to take in the images and produce a novel mask, a prediction of the deforested area, which is then compared to the ground truth reference. The model is trained by repeating this process over all the examples.

Initial results using this method were promising but not perfect. It was clear from the results that more data was necessary. The next step then became acquiring enough data to train the model sufficiently.

A new dataset was developed using satellite imagery from Sentinel 2, a satellite launched in 2015 by the European Space Agency. It consisted of ~54,000 image pairs, a significant improvement on the previous dataset.

After training the model, the results are promising but further refinement is needed. When locating large areas of deforestation, the model can perform accurately. However, when only a small amount of deforestation is present, it overgeneralizes and predicts no deforestation at all. Further development could include using a "course to fine" approach - first ruling out areas that are true negatives, then zeroing in on what remains to find the true positives.

Key technology/tools used: PyTorch, Zarr, Google Earth Engine, AWS

Ground truth deforestation compared to predicted deforestation from AI model
Attribution: Theo McArn / Organized Matter

Theo McArn

USA | Software Engineering

Graduate student working towards his MS in Robotics at Northeastern University. Bachelor's in Computer Science at Brown University, and has a background in Deep Learning, and Robotic Systems.
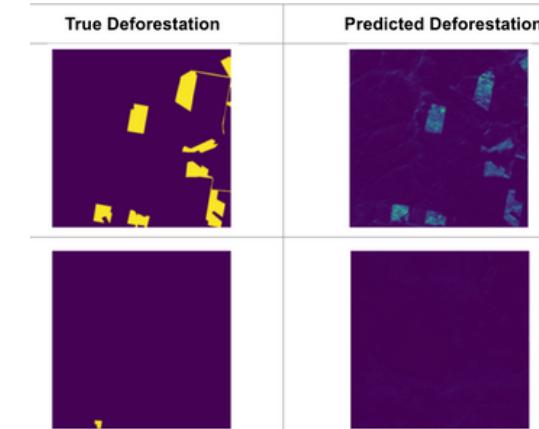
Project Partner

Organized Matter is developing a geospatial platform which allows users to conduct machine learning analysis on the data. It is part of Good Machine, a venture studio creating solutions for a regenerative world.

Funder

good • machine

AUTODESK FOUNDATION

3 GOOD HEALTH AND WELL-BEING

Implementation Plan for Adoption of Sustainable Design Approaches

MANAGING FELLOW
Alice Wachera

In today's world, where the effects of climate change are increasingly evident, integrating environmentally conscious design into infrastructure is no longer optional but essential. This is especially true for healthcare facilities in resource-constrained settings, where reliable access to energy, water, and safe environments directly shapes patient outcomes.

The objective of this project was to build on earlier efforts to develop Key Performance Indicators (KPIs) for BHI's design process, refining them to better measure environmental impacts and establish clearer guidance for integrating and reporting sustainability across project stages. While BHI's core team delivers projects through the tools and workstreams outlined in its 'How We BIM' document, this project aimed to improve consistency in its framework for embedding sustainability and to communicate its outcomes to clients more effectively.

To achieve this, desk research was conducted to review relevant KPIs and metrics across project phases, followed by an evaluation of existing tools for analysis, reporting, and dashboard automation. A concept for tracking sustainability and reporting impacts within BHI workflows was then developed and tested on a real-world project—the African Children's Healthcare Fund Hospital Campus in Mutengene, Cameroon.

The key deliverables included an implementation workflow plan for integrating impact reporting into BHI's processes, recommendations for generating impact reporting analytics across project stages, and revisions to the How We BIM document to embed impact reporting steps.

Key technology/tools used: Autodesk Revit, Autodesk Forma, Revit Insight, EC3, Tally
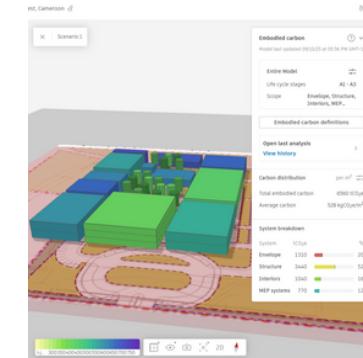
Sustainability impact reporting - Forma analysis
Attribution: Ijunghi Olivia Loh

Sustainability implementation workflow
Attribution: Ijunghi Olivia Loh

Ijunghi Olivia Loh
Cameroon | Civil Engineering

Civil engineer with strong interest for sustainability in the built environment. Dedication to promoting decarbonization, healthy, inclusive, and resilient buildings
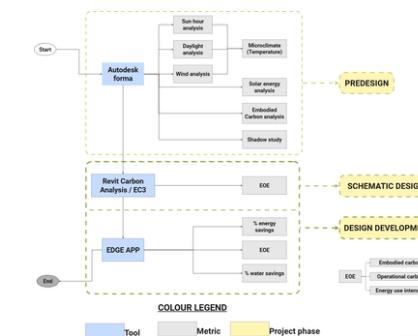
Project Partner

Build Health International provides access to and build capacity for high-quality, dignified and affordable healthcare infrastructure in resource-restrained settings worldwide.

Build Health International

Funder

AUTODESK FOUNDATION

Organisation-Wide Salesforce Implementation for Student Information System

MANAGING FELLOW
Emmanuel Annor

BluLever works with youth from low-income households and partners with employers to transition graduates into dignified, sustainable careers. To scale its model and track learning-to-employment outcomes end-to-end, BluLever is extending Salesforce into a full Student Information System (SIS). A unified platform will consolidate recruitment, on-campus learning, portfolios of evidence, and placement data, reducing fragmentation and enabling early-warning flags for timely learner support.

The objective of this project was to design and deploy an organization-wide Salesforce Student Information System that is integrated with the Canvas Learning Management System (LMS) and interoperable with other internal and partner systems. Data from legacy sources (e.g., Google Drive, spreadsheets, and other repositories) had to be normalized and migrated into a new platform that maps and automates the full learner lifecycle, centralizes documents, and delivers analytical reports, dashboards, and early-warning insights to improve progression, employment outcomes, and alumni engagement.
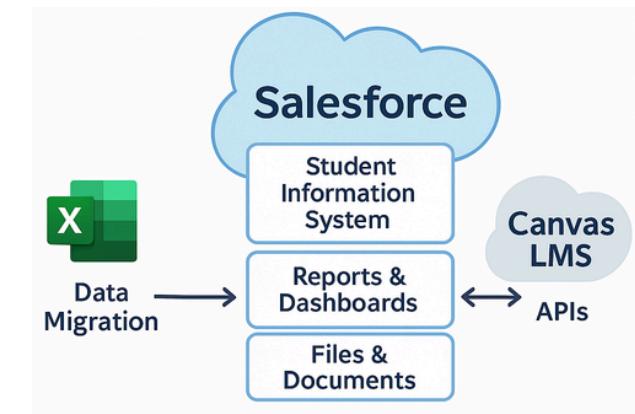
A structured methodology for the project involved reviewing data across multiple sources and designing a robust Entity Relationship Diagram (ERD) to anchor the target model.

Figma prototypes were used to validate user journeys, guiding the development of Salesforce custom objects and interfaces aligned with the ERD. Legacy data was cleaned and normalized using Python, followed by the import of documents and migration of records.

Finally, the Canvas LMS integration was implemented in Apex, enabling seamless synchronization of courses and enrollments for end-to-end learner tracking.

The key deliverables for this project focused on strengthening data management and integration within Salesforce by migrating legacy data, mapping student workflows, and integrating with Canvas (LMS) and other priority systems.

Key technology/tools used: Salesforce Platform, Apex/External Services, REST APIs, Canvas LMS API, Data Import Wizard, Node.js, jsforce, Python, pandas, Figma, dbdiagram.io, and draw.io.

High-level components of the system
Attribution: This image was generated using ChatGPT

Ngirimana Schadrack

Rwanda | Senior DevOps Engineering

Cloud engineer and full-stack developer who designs secure, scalable cloud solutions. Committed to quality and excellence in cloud computing and full-stack technologies.

Project Partner

BluLever serves young people from households, delivering high-quality technical training and apprenticeships that lead to skilled blue-collar employment, higher earnings, and dignified, sustainable careers.

Funder

Advancing the Digitization of a Community Center and Student Curriculum

MANAGING FELLOW
Alice Wachera

According to the Department of Labor Statistics, 32% of students who earn a high school diploma are not prepared for college for a career, representing over five million young Americans, many from low-income families, communities of color, and recent immigrant households.

Stacks+Joules (S+J), a nonprofit organization, addresses this gap by helping students develop skills in computer programming and coding, with a focus on building automation controls. By fostering post-secondary achievement before high school graduation, the program opens pathways into careers in coding, the Internet of Things (IoT), and technology-driven industries.

Using the 301 Henry Street Settlement (301 HSS) building as a case study, this project provided students with hands-on training in building automation and digital twin technology through Autodesk Revit and Tandem. The existing training materials were enhanced to improve student understanding, and new content was developed to give a broader perspective on the digital twin creation process.

In addition, as part of S+J's mission to digitize 301 HSS in order to improve energy performance and strengthen building management, the project also involved the analysis of existing energy data from the building management system (BMS) sensors installed in targeted areas, and past energy bills.
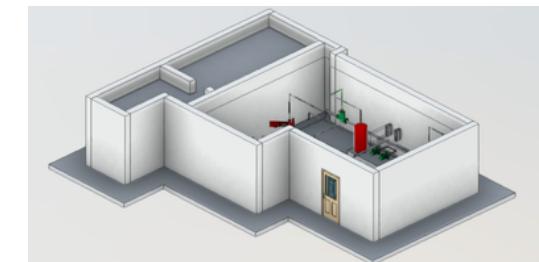
The key deliverables of the project included training materials, a BMS data analysis report, and a roadmap white paper.
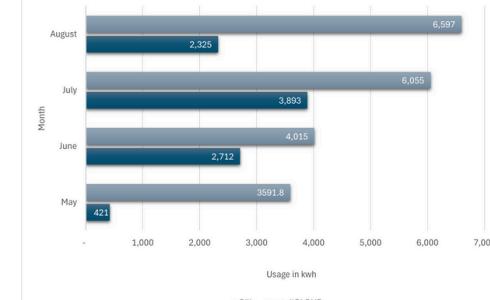
Beyond improving efficiency in smaller buildings, the project demonstrates how technology can drive more sustainable building management while creating pathways for the next generation of skilled professionals.

Key technology/tools used: Autodesk Revit, Autodesk Tandem, Microsoft Excel, EnteliCLOUD

Boiler room digital twin training model.
Attribution: Created using REVIT and TANDEM by Christopher Arrey

Energy usage comparison (enteliCLOUD vs BILLS)

Month		
August	2,325	6,597
July	3,893	6,055
June	2,712	4,015
May	421	3591.8

Usage in kwh

■ Bills ■ enteliCLOUD

BMS analysis data comparison
Attribution: Charts created using EXCEL by Christopher Arrey

Christopher Arrey

Cameroon | Structural Engineering

Structural engineer with strong commitment by developing technological solutions for affordable housing and designing energy-efficient structures.

Project Partner

Stacks+Joules is a project-based learning program in computer programming and wireless network management.

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STACKS+JOULES

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Fusion 360 Workflow Design and Process Improvement

MANAGING FELLOW
Zula Coley

Nth Cycle is an industry leader in critical metal refining, using patented technology to recover critical metals from end-of-life batteries, scrap metal, and mined ore that are needed for the electric grid, electric vehicles, and more. Nth Cycle's modular Oyster system contains cells that are modified with each iteration, working to solve a challenge faced by the previous design. This requires a flexible workflow to avoid bottlenecks in the design process. The goal of this project was to reduce the design-build-test-learn (DBTL) cycle time to 4 weeks and the Right First Time (RFT) metric to 5% by developing improved Fusion 360 processes and workflows to accelerate rapid prototyping capabilities.

The project involved studying the current processes and understanding each team member's functions and goals to develop improved workflows, template models, file organization, and other best practices. Time was spent with the team representatives from the design and manufacturing unit to review their typical designs and understand their needs.

The team faced challenges when organizing assembly structures that could be easily exported to an accurate and organized bill of materials (BOM). This made it challenging to order all the correct parts quickly and without errors for any given design.
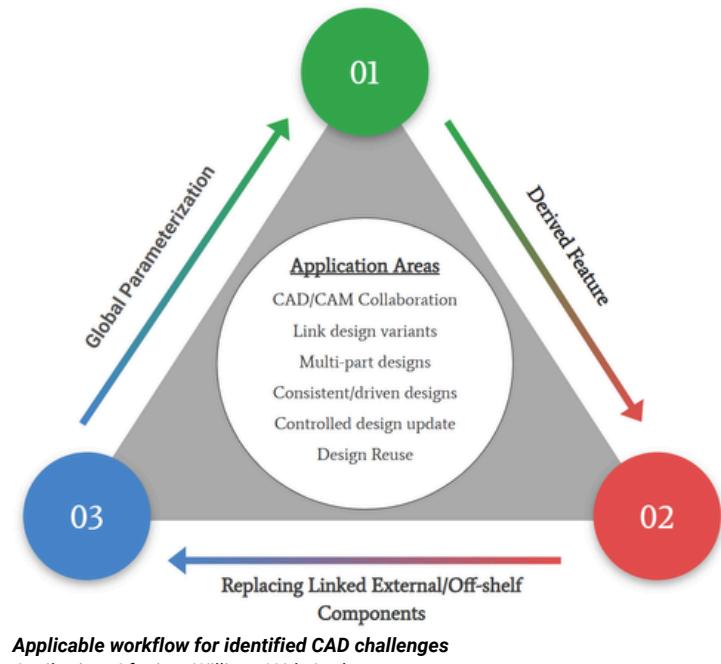
The manufacturing team also experienced setbacks with certain CAM processes such as repetitive toolpath programming, and the need to replace milling tools attached to a set of 2D CAM operations, without having to redo the entire tool setup.

The main project work was to create and develop a Fusion 360 workflow and process guide, template models, file management and organisation best practices, CAM toolpath templates, and CAM standard processes, all customised to Nth Cycle's specific team and process needs.

Key technology/tools used: Autodesk Fusion 360, Fusion Manage Enterprise, Google Slides

Applicable workflow for identified CAD challenges
Attribution: Ofonime William / Nth Cycle

Ofonime William

Nigeria | Mechanical Engineering

Autodesk Certified Instructor, instructional designer and technical specialist in CAD, CAM and CAE tools. He integrates multiple workflows to solve analytical problems.

Project Partner

Nth Cycle is an industry leader in critical metal refining, using patented electro-extraction technology to recover critical metals from end-of-life batteries, scrap metal and mined ore right where they're sourced.

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AUTODESK FOUNDATION

Accelerating the Impact of Entrepreneurship Support Organisations and their Ventures

MANAGING FELLOW
Nancy Wangari

As part of its goal to support hardware innovation in East Africa, ASME rolled out this pilot study to explore how technical talent matching can enhance the impact of Entrepreneurship Support Organizations (ESOs) and their ventures. For this project, the chosen ESO was Opero Services - a Kenyan engineering, business development, and market research firm specializing in scaling water, sanitation, and hygiene technologies and enterprises. It brings together innovation, technical expertise, and knowledge of local markets to address WASH challenges.

The objective was to help Opero Services move the PuPu Pump from development to reliable field use by establishing clear post-sale service protocols, a technician-facing maintenance routine, a cost-grounded pricing calculator, a concise Customer Relationship Management (CRM), and a spare-parts and inventory framework. Together, these systems raise first-time-fix rates, reduce delays, and translate customer follow-up into consistent, predictable service.

Work began with a desk review of prior Engineering for Change project-related reports, Opero's service records, CRM snapshots, and website content to frame problems and draft the toolset. Semi-structured interviews with Opero leadership, technicians, store staff, manufacturers (Practica), and a working session with Pit Vidura, refined immediate priorities. Field visits in Rwanda, Uganda, and Kenya helped in testing the checklist, pricing logic, kit readiness, and stock rules.

The key deliverables for Opero were a field-ready service toolkit: post-sale protocol and maintenance checklist, a cost-grounded pricing calculator, a visual quick guide, a concise CRM, and a spare-parts and inventory framework. Together, these resources standardize service, improve traceability, and keep critical parts ready for reliable operations.

In addition to the resources for Opero, a report was developed for ASME to capture key learnings, effectiveness and recommendations from the pilot project with the ESO to inform further projects.

Key technology/tools used: Google Suite, Photoshop, Canva, Cubenet, ChatGPT

Core tools delivered: (From top to bottom) Post-Sale Protocol, CRM Analysis, Maintenance Protocol, and Quick User Guide
Attribution: Image created using Canva by Bisa Hubert

Bisa J. Hubert Igiraneza

Rwanda | Civil Engineering

Civil engineer and entrepreneur. He supports the development of practical, community-driven engineering solutions that improve lives and promote long-term resilience.

Project Partner

Opero Services is an engineering and business development firm that offers expertise in water, sanitation and hygiene technologies. ASME is a not-for-profit professional organization that enables collaboration and skill development across all engineering disciplines.

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