About Us

Who are we?
SKA Robotics is a Pittsburgh-based engineering firm focused on field robotics and autonomous systems designed for deployment in unstructured, unpredictable, and mission critical environments.

What do we do?
With deep expertise in robotic hardware, software, and systems engineering, our high-caliber teams embed directly into your workflows—accelerating robotic systems development while ensuring delivery is on time and within budget.

What is the SKA advantage?
We expedite your robotics engineering programs with lean, agile, and transparent teams—rapidly onboarding world class talent from our network to save you the time and cost of building equivalent in-house capabilities.

SIEMENS energy Google CAT®

Our Associates

Technical Program Managers

Subject Matter Experts

Systems Engineers

PhDs

Design Engineers

FPGA Engineers

Software Engineers

Electrical Engineers

Mechanical Engineers

What We Do

Mechatronic Engineering

- Hardware Design
- Electrical Board & Harness Development
- Electrical Integration
- Mechanical Development & Integration
- Firmware Development & Integration
- Light Manufacturing

Robotic Systems Engineering

- Robotic Systems Architecture
- Concept of Operations (ConOps)
- Requirements Capture
- State Machine Diagrams
- Action Diagrams
- Regulatory Compliance
- Verification and Validation (V&V)
- Installation, Training, and Support

Robotic Software Development

- Perception Engineering
  - Computer Vision (Spectral, Thermal, Visual), RADAR, LiDAR
  - Sensor fusion
  - IMU
  - GPS
- Simultaneous Localization & Mapping
- ETL, Data Analytics, Machine Learning
- Custom Robotics Algorithms, including 3D Mathematics & Kinematics
- Embedded Systems and Drivers
- FPGA
- Testing and Refinement

The SKA Advantage: Expedited Engineering

Preliminary Discovery

- Understand Requirements.
- Negotiate Scope For Maximum Probability of Success
- Execute project

Staging

- Brainstorm Options
- identify 3-5 viable paths
- Prioritize function over form
- Identify + Assign Goals
- Order all materials ASAP

Engineer 2-4 Viable Options In Parallel

- Frequent check-ins
- Cut off non-viable paths quickly and assign resources
- Treat it like multiple AGILE projects
- Use off-the-shelf components as much as feasible
- Test early and often

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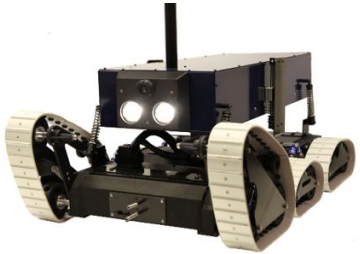


Refinement + Initial Delivery

- Combine Best Elements
- Harden All Systems Through Continued Testing
- Document + Support

Case Study: Siemens Energy Maintenance Robot

The robot SKA co-developed is used to tighten fasteners inside of 1 gigawatt utility-scale generators, while driving in the air gap between the rotor and the stator of the generator.

- This capability allows Siemens Energy to perform routine maintenance on 1,500 to 2,500 fasteners without needing to disassemble the generator
- Increases uptime by approximately 3 days and decreasing the opportunity cost of maintenance by approximately **$1.73M per deployment**.
- Project would take an individual contributor 18 months to complete - SKA delivered this project in **4 months**

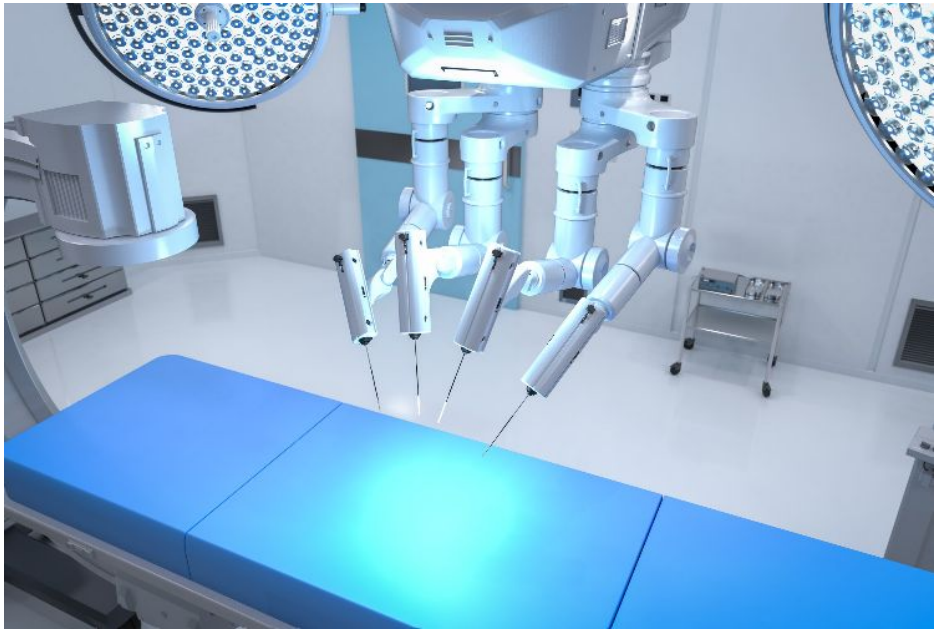
Case Study: Construction & Mining Autonomy

SKA Robotics assisted in the automation of multiple construction and mining machines across multiple brands ranging in working weight from under 500 pounds to more than 3,000,000 pounds.

- Our machine-mounted electronics packages enable the connection of sensors and compute for robotic autonomy and navigation to existing machines, enabling collision avoidance, autonomous navigation, and other types of autonomous operations.
- SKA's expertise in robot autonomy positions us to then implement these features.
- These retrofits reduce operator error, increase efficiency, and take operators out of dangerous situations.

Case Study: Teleoperated Surgery Robot

Medical client was building a surgical robot that could be teleoperated and needed to quickly develop software to detect and proactively mitigate collisions with out-of-bounds areas during remote surgery to enable a surgeon to conduct operations that would not be feasible using a hand tool.



- Executed with a 7-person team spent 2.5 months creating embedded software optimized to run on a low-level chipset including an STL parser, custom collision detection and mitigation algorithms, and interfaces to the rest of the client's stack.
- SKA built and maintained a software simulator / visualizer that was used for demonstrations and internal development and a test suite that was used to conduct quality assurance throughout the project.
- Project would take an individual contributor 1.5 years to complete - SKA delivered this project in **2.5 months**

Case Study: Autonomous Blast Hole Drill

An international manufacturer of construction and mining machines wanted to develop autonomous navigation for a new blast hole driller.

- After assisting in building a 1:12 scale miniature of the vehicle for test and development purposes, SKA created navigational software using GPS information as an input.
- The software enabled the machine to use waypoint navigation and autonomously move to each hole location, drill blast holes, and geotag the holes, all while keeping human operators at a safe distance.
- An autonomy kit based on the work done with miniatures, was integrated onto the full scale machines.

Case Study: Rucktro Unmanned Ground Vehicle

This experimental robot built by SKA utilizes a custom tank-style drivetrain. It can tow or mount 300 lbs. of payload and traverse pavement, snow, mud, dirt, and more. This modular machine can be quickly modified to perform a diverse array of tasks.

- To ensure further reliability, SKA's RuckTro unmanned ground vehicles are engineered to be resistant to moisture, heat, vibration, and debris. It can operate autonomously, remote-controlled, or manned.
- The vehicles can drive upside-down with accessories and sensors removed, increasing its probability of mission success in scenarios when top-mounted equipment is not required.
- Among other SKA-developed subsystems, including its drivetrain, batteries, power distribution harness, sensor enclosures and autonomy software, RuckTro features an ultra-compact power converter and distribution module.

Case Study: Solar Field Construction System

SKA Robotics contributed systems engineering and perception engineering expertise to a program designed to automate the construction of multi-square mile solar fields using multiple types of robots and fleet management for the Sarcos Technology and Robotics Corporation.

- On the systems engineering side, SKA maintained requirements, synthesized physical architectures, came up with a functional architecture for the system, and developed action diagrams for all states and modes of the various subsystems.
- On the perception engineering side, SKA assisted in developing algorithms for the classification and localization of solar panels across a range of lighting conditions using multiple sensing and data processing modalities.

What opportunities can we explore together?

Case Study: Robotic Catamaran

Our client wanted a boat that could autonomously collect water samples in the Gulf.

- SKA designed and fabricated the hulls and drive systems for the craft.
- The craft is 10 feet (3m) long and made from stainless steel, aluminum, fiberglass, and Kevlar. They accommodate multiple payloads, including an 175 lb (80kg) mass spectrometer.
- Partially flooded brushless drive systems allow the craft to zip along the water while eliminating the need for seals.
- These platforms have been used to take water samples in the United States, Europe, and the Middle East.

Case Study: AI-Based Perimeter Defense System

SKA Robotics assisted in the creation of an AI-based facial tracking system for defending the perimeter on nuclear power plants.

- The system was able to track multiple human faces simultaneously and put bounding boxes on the eyes with a high level of confidence at 30 frames-per-second.
- We demonstrated the system at a tradeshow in Q4 2024 with over 6,000 attendees and never found a limit on how many targets could be tracked at once