SEMI MSIG Positioning, Navigation, and Timing (PNT) PNT23 Proposal Webinar

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November 14, 2023

R&D FUNDING FOR POSITIONING, NAVIGATION & TIMING MEMS & SENSOR SOLUTIONS

Webinar Agenda

- SEMI MSIG Introduction [10 minutes]
- PNT23 RFP Presentation [25 minutes]
- General Q&A [10-25 minutes]

Yes, we will share the webinar slide deck with all registered attendees!

SEMI MEMS & SENSORS INDUSTRY GROUP—MSIG

TIM BROSNIHAN, PhD | Executive Director

PAUL CAREY, PhD | Director

SARAH SHEN | Program Coordinator

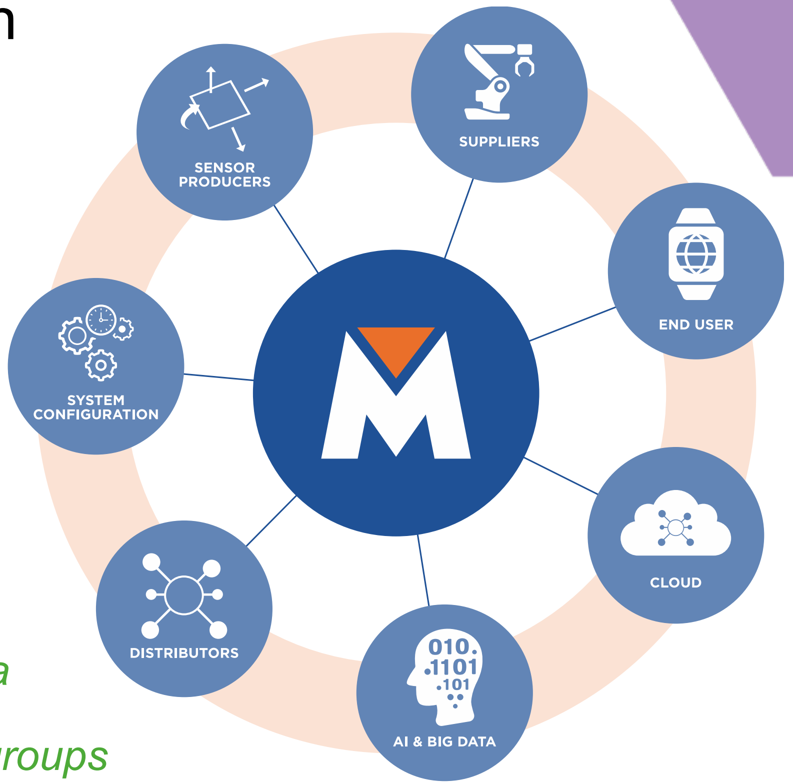
semi | MEMS & SENSORS INDUSTRY GROUP®

SEMI

- **THE** premier global semiconductor trade organization
- 3000+ member companies
- Your gateway to the semiconductor ecosystem

MEMS & Sensors Industry Group—MSIG

- **200+ member companies worldwide**
- **Value Proposition**
  - Education + **Networking**—*Conference + events*
  - Promotional Opportunities—*SEMI blogs, webinars, social media*
  - Collaborative Problem-Solving—*Industry task forces and workgroups*
  - R&D Funds—*$25M 2022–2027 in positioning, navigation, and timing sensors*
  - New Opportunities + Markets—*e.g. Biz Dev in Smart Cities*
- **Get better business results faster!**



LEARN MORE

MSIG Events

2024 MSIG Program Calendar

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
MSIG GC	**MSIG GC Meeting**			**MSIG GC Meeting**			**MSIG GC Meeting**				**MSIG GC Meeting**	
Federal R&D Program	**PNT GC/TAC**	**PNT GC/TAC**	**PNT GC/TAC**					**TC Executive GC Meeting**		**PNT GC/TAC**		
	PNT22 Quarterly Project Reviews											
	PNT23 Full Proposals Ranked, New Projects Awarded, Annual Program Plan to ARL			**PNT23 Contracting**			**PNT23 Quarterly Project Reviews**					
				PNT24 Gap Analysis			**PNT24 Activities: RFP Announcement, White Paper & Full Ranking, Award Notification, Annual Program Plan to ARL**					
Community Engagement & Promotion			Quarterly Newsletter			Quarterly Newsletter			Quarterly Newsletter			Quarterly Newsletter
	MSIG Webinar	MSIG Webinar			MSIG Webinar	MSIG Webinar	MSIG Webinar			MSIG Webinar		MSIG Webinar
	Monthly Workgroup Meetings: Device, Manufacturing, Reliability, Smart City + MSIG Promotion, Outreach, Blogs and Happy Hours											
Events	SEMICON KOREA Jan 31 – Feb 2 Seoul, Korea		SEMICON CHINA FPDCHINA Mar 20 – 22 Shanghai, China	MEMS & SENSORS TECHNICAL CONGRESS April 10-11 UCLA	SMART CITIES CONNECT SPRING CONFERENCE & EXPO May 8-10 Raleigh, NC SEMICON SOUTHEAST ASIA May 28 - 30 Penang, Malaysia	HILTON HEAD Sonesta Resort 2024 June 2-6 Hilton Head, SC Sensors Converge June 24-26 Santa Clara	SEMICON WEST July 11 - 13 San Francisco, CA		SENSOR CHINA Sept 11-24 Shanghai, China MEMS & SENSORS EXECUTIVE CONGRESS TBD MEMS & IMAGING SENSORS SUMMIT Grenoble, France SEMICON TAIWAN Sept. 4 - 6 Taipei, Taiwan		ASTC MEMS & SENSORS Southeast Asia Nov 11-15 Chicago, IL SEMICON EUROPA November 12 - 15 Munich, Germany	SEMICON JAPAN Dec 11 - 13 Tokyo, Japan

Promotional Opportunities

MSIG MEMBER COMPANY PROMOTION

GOALS

- Promote sensor products, services + applications
- Educate our community on the latest MEMS + sensors technology

- Events
  - Speaking Opportunities
  - Networking
- Webinars
- Blogs
- Articles
- Social Media Posts

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MSIG Webinar Update

Webinar Goals:

- Educate the sensor community (member + non-members)
- Reach a large audience (>100)

MSIG Webinars [Q3 & Q4’23]

1. Dynamic Control of ALD Films for Fast & Efficient MEMS Manufacturing
   - Date: October 11, 2023 (8-9am PDT)
   - Presenter: Matt Weimer, Forge Nano
   - Registered: **259**

2. SEMI MSIG Positioning, Navigation, and Timing (PNT) RFP 2023 Proposal Webinar
   - Date: November 14, 2023 (8-9am PST)
   - Presenter: Paul Carey & Tim Brosnihan, MSIG

3. Microchannel Particle Deposition (MPD), a 3D Micro Printing Technology for MEMS & Sensors
   - Date: December 6, 2023 (8-9am PST)
   - Presenter: Thomas Russell, Mesoline

MPD Webinar Registration

2024 Webinars (planning stage): AMFitzgerald, Kayaku Advanced Materials, Multibeam Corp, Menlo Micro + 27 more from MSEC (polling) want to be contacted

Problem Solving

MSIG COLLABORATIVE PROBLEM-SOLVING

MEMS MANUFACTURING TASK FORCE

MISSION: Develop, document, and present best-known methods for taking MEMS prototypes to volume manufacturing

CURRENT FOCUS: MEMS Manufacturing Readiness Document

MMTF CHAIR
Michelle Bourke
Senior Director
LAM RESEARCH

MEMS DEVICE TASK FORCE

MISSION: Develop technical specifications, industry standards, and best practices for MEMS and Sensor devices and platforms

CURRENT FOCUS: Gas & Environmental Sensors

MDTF CHAIR
Radislav Potyrailo
Principal Scientist
GE GLOBAL RESEARCH

ams
AMFITZGERALD & ASSOCIATES
ANALOG DEVICES
APPLIED MATERIALS
BOSCH
SENSE
CO2Meter
EVG
Fraunhofer ENAS
GE
IDT A Renesas Company
infineon
intel
Lam RESEARCH
maxim integrated
NIST National Institute of Standards and Technology
Nordson SONOSCAN
OKMETIC
ScioSense
SENSIRION
SOREXSENSORS
softMEMS
SPEC SENSORS
SPTS An orbotech Company
ST life.augmented
TDK InvenSense
ULVAC

Help Spread the Word!

semi | MEMS & SENSORS INDUSTRY GROUP®

- Joining and participating in Industry Groups is important:
  - Build your network
  - Fix problems together
  - Good exposure for you and your company
  - Leads to new personal, professional and business opportunities
  - Amplifies your voice (within industry and to Government)

LEARN MORE

Participate! Participate! Participate!

Back to Today's Webinar

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SEMI MSIG RFP PNT 2023 (PNT23)

MEMS & SENSORS INDUSTRY GROUP®

SEMI MSIG PNT R&D Funding Program Update

Phase 1 (2020-2022): 10 Projects

- $6.1M ($15.2M with Cost Share)

Phase 2 (2022-2027)

- $25M program
- PNT22:
  - RFP: May 2022
  - Project Awards Announced: January 2023
  - 9 new PNT projects – see chart

SEMI-MSIG PNT22 Projects: Budgets and Timelines

<table>
<tr><th rowspan="2">Item</th><th rowspan="2">Lead Institution</th><th rowspan="2">SEMI/ARL Share ($)</th><th rowspan="2">Total Budget ($)</th><th>2022</th><th colspan="4">2023</th><th colspan="4">2024</th><th>2025</th></tr>
<tr><th>Q4</th><th>Q1</th><th>Q2</th><th>Q3</th><th>Q4</th><th>Q1</th><th>Q2</th><th>Q3</th><th>Q4</th><th>Q4</th></tr>
<tr><td>1</td><td>PARC</td><td>$ 649,076</td><td>$ 1,298,152</td><td></td><td></td><td colspan="5">Photonic Integrated UV Lasers for Next Generation PNT Systems</td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>Honeywell (IMU)</td><td>$ 330,254</td><td>$ 724,242</td><td></td><td></td><td colspan="4">In-Field IMU Calibration: Differentiable Filters for Navigation Systems</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>Honeywell (3D Package)</td><td>$ 329,539</td><td>$ 685,256</td><td></td><td></td><td colspan="5">Universal 3D Package for MEMS Gyroscopes and Accelerometers</td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>Nexus Photonics</td><td>$ 560,041</td><td>$1,374,672</td><td></td><td></td><td colspan="4">GOALE: General Opto-Atomic Laser Engine</td><td></td><td></td><td></td><td></td></tr>
<tr><td>5</td><td>ColdQuanta (Infleqtion)</td><td>$ 375,000</td><td>$ 750,000</td><td></td><td></td><td colspan="5">Photonically Integrated Vacuum Optical Technologies (PIVOT)</td><td></td><td></td><td></td></tr>
<tr><td>6</td><td>Georgia Tech</td><td>$ 650,176</td><td>$2,029,599</td><td></td><td colspan="5">Piezo-Capacitive Nano-Gap 4H SiCOI MEMS Platform for Ultra-High-Performance Inertial Sensors and Timing Resonators</td><td></td><td></td><td></td><td></td></tr>
<tr><td>7</td><td>GE Research</td><td>$ 550,000</td><td>$1,885,998</td><td></td><td></td><td colspan="5">Low-Cost Navigation-grade MEMS Fabrication Platform to Enable PNT Innovations</td><td></td><td></td><td></td></tr>
<tr><td>8</td><td>Teledyne Scientific</td><td>$ 574,450</td><td>$ 959,101</td><td></td><td></td><td colspan="8">NAVIGATION GRADE INTEGRATED INERTIAL SENSOR MODULE</td></tr>
<tr><td>9</td><td>Purdue</td><td>$ 347,780</td><td>$ 740,595</td><td></td><td></td><td colspan="5">An Optomechanical Z-Axis Accelerometer</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>$ 4,366,317</td><td>$ 10,447,615</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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Funding Area: Positioning, Navigation, and Timing (PNT) Sensors

Learn more: https://discover.semi.org/rd-program.html

Positioning, Navigation, and Timing Phase 2 R&D Program

- **Program Management**
  - **SEMI MEMS and Sensors Industry Group (MSIG)**
  - **Army Research Laboratory (ARL)**
- **Phase 2 (2022-2027)**
  - **Funding:**
    - SEMI/ARL: $25M program
    - Cost share requirement (%): ≥50%
  - **PNT23 Thrust Areas:**
    1. Novel Materials, Fabrication, Packaging, and Testing Techniques for Low-SWaP Inertial and PNT Sensors
    2. Advanced Active and Passive Integrated Photonics for Low-SWaP Atomic Clocks, Quantum Systems, and PNT Sensors
    3. Advancements Towards Low-SWaP-C, GPS-Free PNT Technologies
  - **PNT23 Activities:**
    - Gap Analysis Workshop: May 2023 (at MIT in conjunction with MSTC)
    - September 2023: funding approved
    - RFP: October 2023
    - Proposal Webinar: November 14, 2023 (this webinar)
    - White papers due: November 28, 2023 (5pm PST))

****SWaP = Size, Weight, and Power* (reducing the overall dimensions and weight of a device while increasing its efficiency)

PNT23 Information

- **Objective:** advance the **US PNT supply chain** for both manufacturing and future development opportunities
- **Project Teams:** collaboration among organizations is **encouraged** (companies, start-ups, universities, research institutes)
- **Deliverables:** Concept demonstrations (demos) as part of the deliverables are highly encouraged
- **Awards:**
  - Range: $200K – $750K
  - Cost Share: additional matching cost share (in-kind, monetary) from award recipient(s)

PNT RFP 2023 Important Dates (note: subject to change)

Gap Analysis Workshop (MIT Campus) **May 22, 2023**

MSIG Funding Confirmation **September 29, 2023**

RFP issued
SEMI Members: **October 26, 2023**
Non-Members: **November 2, 2023**

RFP Webinar **November 14, 2023**

White Papers Due **November 28, 2023**

White Paper Notification/ Full Proposal Request **December 15, 2023**

Full Proposals Due **January 26, 2024**

Award Notification **March 7, 2024**

PNT23 - What's New This Year?

- **More Testing - Thrust Area #1:**
  - PNT22: Novel Materials, Fabrication, and Packaging Techniques for Low-SWaP Inertial and PNT Sensors
  - PNT23: Novel Materials, Fabrication, Packaging, and **Testing** Techniques for Low-SWaP Inertial and PNT Sensors
- **Multi-phase Projects:**
  - Multi-phase project proposals can be submitted
    - Current project phase durations have ranged from 9-18 months.
    - Can submit more than two phases, but only first phase is considered funded
  - Subsequent phases are considered as unfunded options:
    - Unfunded options are not guaranteed:
      - Approval Process: may be approved by the MSIG PNT Review Committee and ARL during the first phase without the need to write another full proposal!
      - The committee might request a modified statement of work of unfunded options based on results and feedback from the first phase.
    - Unfunded option budget range: each phase should be in the same $200-$750K range as one phase projects.
  - The same cost share (at least 50%) rules apply to multi-phase project proposals.

What Happens Next?

- **11/28/23:** White Paper Proposals collected at msig-rfp@semi.org (5PM PST)
- **11/29/23-12/14/23:** Proposals Read and Ranked by:
  - SEMI MSIG PNT Technical Council (SEMI & non-SEMI employees)
  - SEMI MSIG PNT Governing Council (non-SEMI employees)
  - DARPA & ARL subject matter experts (SME's)
- **12/15/23:** Proposal Finalists Notified
- **1/26/24:** Final Full Proposals Due
- **1/27-3/6/24:** Final Proposals Read and Ranked by:
  - SEMI MSIG PNT Technical Council (SEMI & non-SEMI employees)
  - SEMI MSIG PNT Governing Council (non-SEMI employees)
  - DARPA & ARL subject matter experts (SME's)
- **3/7/24:** Proposal Award Notification

Consider joining the PNT Technical and/or Governing Councils

SEMI MSIG PNT GC & TAC Committee Information

- **PNT Technical Advisory Council (TAC):**
  - Must be a SEMI member, no additional fee to join
  - Reading and judging PNT white paper and full proposals
  - Make funding recommendations
  - Invited to all PNT quarterly project reviews
  - Example current members:
    - Teledyne, GE, SoftMEMS, PNI Sensor
- **PNT Governing Council (GC):**
  - Must be a SEMI member, $5k/Yr additional fee to join
  - Reading and judging PNT white paper and full proposals
  - Attend the annual high-level SEMI/DoD strategy meeting
  - Final PNT proposal arbiters:
    - Review TAC funding and project recommendations
    - Make final decision on which projects receive funding
  - Invited to all PNT quarterly project reviews
  - Example current members:
    - NXP, ADI, GE, Teledyne, Northrop Grumman

Interested in joining the PNT TAC or GC?

Email pcarey@SEMI.org or Scan QR Code

PNT23 Thrust Area Topics

In recent decades, both the U.S. military and civilians have relied on global positioning system (GPS) satellites to provide accurate PNT data. However, GPS is not always available and is vulnerable to jamming and spoofing. ARL DEV/COM has been investigating and developing technologies that enable low size, weight, power, and cost (SWaP-C) PNT solutions for operation in GPS-contested or –denied environments. The PNT23 R&D work will build on the MSIG PNT Program and focus on the following 3 thrust areas:

- **Thrust Area 1:** Novel Materials, Fabrication, Packaging, and Testing Techniques for Low-SWaP Inertial and PNT Sensors
- **Thrust Area 2:** Advanced Active and Passive Integrated Photonics for Low-SWaP Atomic Clocks, Quantum Systems, and PNT Sensors
- **Thrust Area 3:** Advancements Towards Low-SWaP-C, GPS-Free PNT Technologies

Thrust Area 1:

Novel Materials, Fabrication, Packaging, and Testing Techniques for Low-SWaP Inertial and PNT Sensors

Novel Materials, Fabrication, Packaging, and Testing Techniques for Low-SWaP Inertial and PNT Sensors

The purpose of this solicitation is to fund a recipient, a single team, or multiple recipients and teams to conduct an R&D effort to develop and demonstrate novel microfabrication process modules to enable low-SWaP-C inertial and PNT sensors.

Examples:

- Lower cost, lower power, and more universal testing kit (e.g. lower SWaP-C or chip-scale locking amplifiers or other test equipment)
- Broadly accessible state-of-the-art testing facility and service
- Techniques and process equipment for *in-situ* surface oxide removal and deposition of anti-stiction and anti-dielectric-charging coatings for MEMS PNT devices
- High-aspect-ratio etching (“Bosch”-like) processes for silicon carbide (SiC) and fused quartz inertial sensors
- High-Q, low-loss piezoelectric materials (e.g. AlN, PZT) compatible with silicon inertial sensor production processes; high-Q, low-loss piezoelectric composites and electrode materials;
- Atomic layer deposition/etching to enhance PNT sensor performance
- Wafer-level vacuum packaging for rapid PNT sensor prototyping and enhanced performance
- Heterogeneous integration of photonic components (i.e. multi-chip photonic modules)
- Through-package photonic interconnects.

*SWaP-C = Size, Weight, and Power AND Cost (*reducing the overall dimensions, weight, and cost of a device while increasing its efficiency)

Novel Materials, Fabrication, Packaging, and Testing Techniques for Low-SWaP Inertial and PNT Sensors

Gap Analysis Summary: Thrust Area 1			
Item	**Testing**	**New Materials**	**Packaging challenges**
1	Performance metrics	Fused Silica, 3D (high Q): Conductor (metal layer), electrode integration, wafer level glass blowing, repeatability, new equipment, process for glass blowing	Miniaturized stress isolation solution
2	Platform dependent (size, application)	Piezoelectric (ALD): PZT, AlScN, limited in thickness, integrate with other materials	3D packaging
3	No standard test protocol/facility	Non-metallic electrode	Packaging materials (low stress die attach, stable)
4	post-fab trimming	Physical Trimming	Measurement stress, compensation/correction
5	self-test	Anti-stiction coating for high temperature: Low g accelerometer, Anti-charging	Vibration
6	test cost reduction, test method		
7	accelerated life test		
8	Machine Learning		

Thrust Area 2:

Advanced Active and Passive Integrated Photonics for Low-SWaP Atomic Clocks, Quantum Systems, and PNT Sensors

Advanced Active and Passive Integrated Photonics for Low-SWaP Atomic Clocks, Quantum Systems, and PNT Sensors

The purpose of this solicitation is to fund a recipient, a single team, or multiple recipients and teams to conduct an R&D effort to develop and demonstrate advanced lasers and integrated photonic systems compatible with low-SWaP-C atomic clocks and PNT sensors.

Theory and modeling, material growth and characterization, laser fabrication, system design, and manufacturability should be considered for the following areas of interest:

- Two lasers with different wavelengths on the same PIC chip, which are suitable for atomic spectroscopy / clock measurements
- Improved manufacturability of passive PICs that can support two dissimilar wavelengths
- High quality photonic wire bonding capability
- Heterogenous integration of dissimilar active material/devices on the same PIC
- Low-SWaP, narrow-linewidth lasers for microwave and optical atomic clocks
- Active/passive photonic integrated circuits (PICs) and PIC elements (including phase modulators, switches, detectors, isolators, etc) for cold atom clocks and inertial sensors
- Photonic and RF low-loss and low-noise interfaces, low-loss, on/off-chip, or PIC-to-PIC coupling techniques

Advanced Active and Passive Integrated Photonics for Low-SWaP Atomic Clocks, Quantum Systems, and PNT Sensors

Gap Analysis Workshop (5/22/23): Summary of Recommendations

Gap Analysis Summary: Thrust Area 2

Item	Passive Photonics	Active Photonics	Early Stage Challenges	Fundamental Late-Stage Non-Differentiating Areas
1	Interfacing I/O to PICs	Feedback insensitive lasers	Monlithic integration	Fabrication to testing
2	Optical Isolators	High-speed tuning of PIC-based lasers		Manufacturability testing
3	Large area out-couplers	Multiple wavelength lasers on a single PIC		General integration of packaging techniques
4	PIC Integrated micro-optics	Integrated or Integratable optical amps		Environmental qualification and life-testing of PIC based laser systems
5	General approaches to Stray Light Mitigation	Manufacturable chip-scale frequency combs		
6		Detectors		
7		High finess optical cavities		
8		High efficiency frequency converter		
9		Modulators (reliable lithium niobate fab)		

Thrust Area 3:

Advancements Towards Low-SWaP, GPS-Free PNT Technologies

Thrust Area 3 Topic Summary

Advancements Towards Low-SWaP, GPS-Free PNT Technologies

The purpose of this solicitation is to fund a recipient, a single team, or multiple recipients and teams to conduct an R&D effort to develop and demonstrate low-SWaP GPS-Free PNT sensors.

Possible topics include, but are not limited to:

- Establishing PDKs and MPW runs for MEMS foundry operation
- Sensor fusion systems for resilient GPS-free PNT
- Gravity sensors: technology that measures gravity at a level that would allow navigating with a gravity map
- Applying machine learning to navigation sensor/system calibration
- Ultra-low-SWaP oscillators targeting < 50 mW
- Novel inertial sensor designs
- Photonic integrated circuits (PICs)
- Enabling technology for low-SWaP, integrated PNT systems
- 5G/6G components and systems

Thrust Area 3 Topic Summary

Advancements Towards Low-SWaP, GPS-Free PNT Technologies

Gap Analysis Workshop (5/22/23): Summary of Discussion/Recommendations

Gap Analysis Summary: Thrust Area 3

Item	Opportunities	Description/Comments
1	New Materials	in addition to SiC
2	New fab techniques	better etching, etching of new materials, deposition methods for better uniformity
3	Packaging Technology for MEMS and systems to support SWaP-C	
4	Component and system level funding for optical technologies	Integrated or Integratable optical amps
5	Timing: high performance resonators and oscillators	Manufacturable chip-scale frequency combs
6	Software: M/L, equivariant filters	Detectors
7	Sampling methodology studies	High finess optical cavities
8	Vision systems for navigators	methods for establishing ground truth with landmarks, how to get pre-mapped data, lower power vision systems, combo/fusion systems [radar & camera, IMU & vision]
9	GPS alternatives	other satellite systems, ultra-wideband, RF, beacon references
10	Multifuntional use-material	CMOS MEMS, ferroelectrics, ALD materials, PZT, AlN, AlScN
11	Funding foundry MPW runs	
12	Testing: development	cheaper testing hardware, benchmarking study to document MEMS test methods
13	Prototype assembly and testing houses	

Proposal Do's and Don'ts

Do's:

- ✓ Project results should benefit the PNT ecosystem, not just one company
- ✓ Collaborative projects preferred (many companies is better than one)
- ✓ Address thrust area topics and pain points identified in the gap analysis workshop
- ✓ Technology must be dual use (military AND commercial)
  - This is SEMI funding after all!
- ✓ Cost sharing must be 50% or greater
  - SEMI PNT program average 58%

Don'ts:

- X Propose work that is not dual use
- X Propose entirely foreign-based projects

Diversity Statement

- At SEMI, we support efforts to build diverse and inclusive project teams and workforces
- We believe diversity and inclusion efforts foster greater innovation in the microelectronics industry
- Diverse project teams, including women and other under-represented groups, bring a more diverse problem-solving set of lived experiences

Therefore:

- Proposers are asked to **operationalize** DEI by creating diverse and inclusive teams which recognize, appreciate, and use of the talents and skills of employees from all backgrounds.
- The projects selection committee will consider team composition, with regard to diversity, when evaluating proposals.

Industry Awareness

- SEMI recognizes industry awareness is another key items to advancing the PNT ecosystem.
- This consortium-based funding **<u>requires</u>** participants to conduct industry awareness activities such as a short promotional video targeting high school students.

White Paper Requirements

- Length: Not to exceed 5 pages, total
- Contents:
  - Title, Team (email of PI), Cost, and Cost Share (Executive statement)
  - Proposed Idea
    - Define the problem being addressed and how the proposed idea would solve the challenge
    - Discuss the current state of the art (SOA) and the advancement the proposed idea has over SOA and its relevance to advancing or demonstrating PNT technology
    - Identify how it will move the needle on the US PNT electronics ecosystem.
    - Outline path to commercialization, application spaces for the innovation
  - High level budget (what you're spending your money on, cost share details)
  - Timeline
  - Background/experience of the R&D team

- Submit papers electronically (msig-rfp@semi.org) by 5:00 PM PST Tuesday, November 28, 2023

Award Requirements

- Company/team must have **significant US presence** in the form R&D activities or manufacturing
- Primary company leading the proposal must be a US-owned company (Can be waived if the development is critical to US manufacturing capability for select cases)
- **Company/team must be committed to volume manufacturing and provision to the US PNT industry on a right-of-first acceptance basis.** (Applied research conducted by universities does not need to meet this requirement but a pathway to commercialization and or licensing must be envisioned and described)
- **The company/team**, including universities, **must provide a matching share** of the development cost in cash and in-kind contributions (e.g., labor and materials), 50% or more is required
- **Companies** which are selected for an award, including all partners and/or subcontractors, **must subsequently join SEMI** at the appropriate membership level.
- Companies and organizations which are selected for an award **must agree to terms and conditions** set forth in the SEMI-MSIG Development Agreement before receiving any portion of the award.
- Operationalize DEI in your project and participate in Industry Awareness with a promotional video

Proposer Resources

MSIG website:

https://www.msig.org

SEMI membership information:

https://www.semi.org/en/connect/semi-membership-levels

Email for RFP questions:

msig-rfp@semi.org

Scan the QR Codes above with your cellphone to immediately send an email or open a URL

Questions?

R&D FUNDING FOR POSITIONING, NAVIGATION & TIMING MEMS & SENSOR SOLUTIONS

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For more information: Contact SEMI MSIG

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Backup

THANK YOU