GOMESA PHASE II PROJECT FUNDING

Request for Funding FY2026

Submission ID: #202509301376

PROJECT SUMMARY

1. Title of Project

Gulf Blue MAC Maritime AI & Robotics Operations Center (MAIROC)

2. Location of Project

Gulf & Ship Island Building 2605 13th Street Gulfport, MS 39501

3. Requesting Organization:

University of Southern Mississippi Research Foundation

4. Requesting Agency Representative

a. Name:	Joseph Graben
b. Phone:	2283434900
d. Email:	Joseph.Graben@usm.edu
c. Address:	2605 13th Street
	Gulfport Mississippi

5. Funding Requested:

$4995189

6. Have any other State or Federal funding sources been identified for the project?

No

7. If yes, enter amount and source of additional funds:

$

Source of Additional Funds:

8. Total Project Funds

$4995189

9. Provide Brief Project Description/Overview:

The Gulf Blue Mission Acceleration Connector's Maritime AI & Robotics Operations Center (MAIROC), to be located in the Gulf and Ship Island building in downtown Gulfport, will serve as a public facing demonstration and test facility for managing and monitoring a fleet of maritime robotic platforms and sensors for subsurface, surface, aerial, and space-based data collection and analysis. The center will provide a centralized hub where advanced robotics technologies—such as Unmanned Surface Vehicles (USVs)- including buoys, Autonomous Underwater Vehicles (AUVs), and Remotely Operated Vehicles (ROVs)—can be deployed, tested, supervised, and integrated into maritime operations. The integration of artificial intelligence (AI) elevates the capabilities of the robotic operations components to a new level, transforming them into an "AI-powered ROC."

The MAIROC is to be supported in part by the USM Institute for Advanced Analytics and Security dedicated to the design and application of machine learning, artificial intelligence, and advanced statistical analysis to public interest issues. It is additionally to be affiliated with the USM Maritime AI Innovation Lab and serving as a node for: 1) demonstration and testing of maritime AI application developments, 2) ocean modeling, data integration, and biogeochemical oceanography associated with the USM Ocean Weather Lab (OWX), 3) supporting research, development, and applications of precise geospatial data, remote sensing, and computational tools and models to enhance the understanding of relative sea level rise and its impacts, coastal change over time (wetland loss), and nature-human dynamics in the coastal system for the USM Gulf Coast Geospatial Center, and 4) demonstration node for the USM Coastal CUBEnet, a relocatable environmental and oceanographic tool that provides a four-dimensional ocean cube supporting a comprehensive understanding and predictive modeling of the surface and subsurface environments critical for testing and performance evaluation of uncrewed maritime systems (UMS) .

The MAIROC will be capable of providing operational support services upon request to the Mississippi Department of Marine Resources and other state and federal as well as industry organizations for monitoring and collecting marine data and responding to natural and anthropogenic disasters in the Mississippi Sound and surrounding Gulf waters. Examples include impacts from tropical weather, freshwater inundation, and harmful algae bloom (HAB) events.

It will serve as a tool for research and development efforts supporting the mission needs of federal partners such as NOAA's National Data Buoy Center (NDBC) and NOAA's Office of Marine and Aviation Operations (OMAO) and the Navy in providing a public facing demonstration support facility outside of their restricted federal facilities. It will mirror NDBC's command center located at the Stennis Space Center in Hancock County, MS and the OMAO's robotic operations center (ROC) located in their space inside the Wicker Center for Ocean Enterprise in the Port of Gulfport. It will also support efforts with the Navy Gulf Coast Tech Bridge that include the Naval Surface Warfare Center Panama City Division (NSWC PCD) in Panama City, FL in partnership with the Naval Research Lab (NRL) and the Naval Meteorology and Oceanography Command (CNMOC), both located at the Stennis Space Center, Hancock County, MS. NOAA's Gulf Coast activities include living marine resources management, hurricane research, seafloor mapping, and ocean and atmospheric weather data support. The Navy's activities include data collection and production of oceanographic, hydrographic, bathymetric, geophysical and acoustic products and services that aid in safe navigation and effective mission planning.

Equipped with real-time data visualization, secure communication networks, and advanced mission planning tools, the MAIROC enhances situational awareness for operators, ensuring safe, efficient, and reliable mission execution of both demonstration and training exercises and operational activities. The MAIROC incorporates simulation and testing environments for research, scenario planning, training, and systems validation.

As a capability that will attract and be utilized by state and federal agencies, small business and industry, and academic partners, MAIROC will support partnerships that stimulate diversification and economic growth of Mississippi's knowledge based blue economy. Via these partnerships MAIROC will promote greater coastal resilience and support the mitigation of damage to marine and coastal resources through new innovations and operational support for the monitoring, response, and recovery from natural and anthropogenic disasters. In its public facing role, the MAIROC will support K-20 educational engagements for creating awareness of future blue economy jobs and coastal resilience issues.

10. LIST Project Goals/Objectives:

Goals: The Deepwater Horizon oil spill in 2010 caused severe, multi-year economic harm to Mississippi's Gulf Coast, with significant negative impacts on its tourism and seafood industries. There was an estimated $8.7 billion in total losses to the Gulf Coast economy from 2010-2020, primarily in fishing and recreation, resulting in tens of thousands of lost jobs and declining industry output. MAIROC aims to mitigate such future impacts. The goal of MAIROC is to serve as a capability that attracts and develops partnerships between state and federal agencies, small business and industry, and academic institutions supporting innovations to promote greater coastal resilience and mitigation of damage to marine and coastal resources from environmental stressors like pollution derived from outer continental shelf activities. It will help support the monitoring, response, and recovery from natural and anthropogenic disasters such as hurricanes, oil spills, harmful algae blooms (HABs) and freshwater inundation events.

Another goal of MAIROC is to stimulate diversification and economic growth of Mississippi's knowledge based blue economy by assisting the development and growth of innovation driven small businesses and the increased competitiveness through innovation of the region's existing maritime industries. Additionally, it promotes awareness of blue economy career pathways and supports workforce training and education.

Key objectives of the MAIROC include:

Innovation and Research - Serve as a hub for developing, testing, and validating next-generation AI and maritime robotics technologies and associated component systems (e.g. sensors, coms, etc.).

Collaboration - Enable multi-agency and cross-industry cooperation by offering interoperable platforms and shared situational awareness.

Operational Efficiency - Streamline the deployment and control of robotic and other autonomous assets for scientific, commercial, public safety, and defense applications.

Safety and Security - Provide real-time monitoring and redundancy systems to minimize operational risks in challenging marine environments.

Workforce Training and Education – Provide resources and support for post-doctoral, graduate and undergraduate student research and support to K-12 educational activities and general public engagement.

Ultimately, MAIROC acts as a bridge between human operators and robotic and other maritime assets, transforming how maritime missions are executed in domains such as offshore energy, environmental monitoring, defense, logistics, and scientific exploration. It provides a publicly accessible venue where demonstrations and informative presentations may be shown to stimulate public engagement, workforce training, and education.

11. Which of the following authorized uses set forth in the GOMESA Act does this project fall under? Explain SPECIFICALLY and in detail how the project meets the required criteria. Check all that apply - At least one must be checked.

☒ (A) Projects and activities for the purposes of coastal protection, including conservation, coastal restoration, hurricane protection, and infrastructure directly affected by coastal wetland losses

The project will support applied research and development of innovations and their demonstration for assisting in the development and monitoring of living shorelines and other coastal restoration activities in addressing wetland losses. These may include supporting development and testing of new AI enhanced geospatial tools and autonomous systems for use in the design and determining optimal placement of living shorelines as well as their monitoring over time to assess their

performance.

☒ **(B) Mitigation of damage to fish, wildlife, or natural resources.**

The dependence of fisheries on inshore habitats makes them potentially vulnerable to depletion following impacts from environmental stressors. This project could contribute to mitigating damage to fish, wildlife and natural resources by providing operational capabilities that can support the monitoring, response, and recovery from anthropogenic disasters (e.g. Deepwater Horizon) helping mitigate damages. It will also help in monitoring environmental conditions in the Mississippi Sound for providing baseline data of "normal conditions" that can help assess, mitigate, and document the impacts of natural and anthropogenic disasters events such as tropical storms, oil and chemical spills, freshwater inundations, and harmful algae blooms (HAB).

☒ **(C) Implementation of a federally-approved marine, coastal, or conservation management plan**

This project addresses goals outlined in the federally approved "Coast Ecosystem Restoration Council Comprehensive Plan, Restoring the Gulf Coast's Ecosystem and Economy." Specifically, this project addresses Goal 4, Enhance Community Resilience and Goal 5, Restore and Revitalize the Gulf Economy. Declines in resources, environmental challenges and declining jobs not only impact the economy but also the cultural heritage of the maritime industry on the Gulf Coast. The MAIROC will enhance community resilience by leveraging technology and innovation to improve preparedness and response capabilities for various crises, from both natural and anthropogenic disasters. MAIROC in promoting the growth and diversification of the region’s knowledge-based blue economy will help restore and revitalize the Gulf Coast economy.

☒ (D) Mitigation of the impact of Outer Continental Shelf activities through funding of onshore infrastructure projects.

The dependence of fisheries on inshore habitats makes them potentially vulnerable to depletion following impacts from environmental stressors such as pollution derived from outer continental shelf activities. Coastal tourism is also highly susceptible. This project in supporting innovations for data collection, analysis and modeling may contribute to mitigating damage of marine and coastal resources by providing operational capabilities that can support the planning, monitoring, response, and recovery from anthropogenic disasters (e.g. Deepwater Horizon) and help mitigate revenue losses of coastal communities promoting financial stability and economic growth.

12. Project Timetable/Milestones:

Year – 1

Year 1 will be dedicated to standing up the MAIROC inside the Gulf and Ship Island Building.

1st Quarter – Meetings to be held with each of the relevant partners to review expected uses of MAIROC and review equipment needs for hardware and software and other systems for supporting the identified uses. These will include equipment needs for MAIROC itself and additional equipment and upgrades that may be needed at the partner locations to support integrating MAIROC with their systems. These are expected to include upgrades to the USM OWX, the USM CUBEnet, and the USM GCGC. Additionally, from these partner meetings detailed metrics for each of the MAIROC objectives for supporting Innovation and Research, Collaboration, Operational Efficiency, Safety and Security, and Workforce Training and Education will be established.

Milestone – Establishment of detailed metrics of the MAIROC objectives for supporting Innovation and Research, Collaboration, Operational Efficiency, Safety and Security, and Workforce Training and Education.

2nd Quarter – Procurement and installation of the needed equipment will be undertaken. Additionally, within the Gulf and Ship Island Building their will be assembled the “fishbowl”, a glass walled room in which the MAIROC itself will be located. The glass wall design will allow large groups of people to see the MAIROC when being used for public viewing of demonstration projects and exercises as well as for educational presentations such as illustrating the operational activities of NOAA NDBC at the Stennis Space Center in Hancock County, MS. The filming of various documentary and training videos will be initiated for use in educational presentations. A Staffing Plan will be completed to include the equivalent of one full-time employee/contractor and a minimum of 2 postdoctoral/graduate student interns for operational support.

Milestone – Procurement of equipment and materials and contractor support for assembling the “Fishbowl” inside the Gulf and Ship Island Building and needed equipment and upgrades for partner locations to support integrating MAIROC with their systems.

In the 3rd and 4th quarters, outfitting of the MAIROC will be completed and staffing and training and beta testing will be conducted of the various system integrations. Needed adjustments will be made before entering the operational phase in Year 2. Guidelines and procedures for partners to use the MAIROC will be reviewed and finalized. These uses include research, demonstration and testing, operational support, and education and training.

Milestones – 1) Completion of the MAIROC physical space and equipment setup. 2) Staffing and related training completed. 3) Documentary and educational video production started, to include a minimum of 2 videos per quarter beginning the 3rd quarter. And 4) Guidelines and procedures for partners to use the MAIROC finalized and to include a web-portal based request form.

Year – 2

The MAIROC will enter its operational phase for aiding in research, demonstration and testing, operational support, and education and training. Partners' mission needs related to these activities will be reviewed and updated at least once quarterly, as they are satisfied, and as new needs are identified.

In the 4th quarter, a full detailed review will be conducted of the MAIROC's performance in meeting its objectives for supporting Innovation and Research, Collaboration, Operational Efficiency, Safety and Security, and Workforce Training and Education. A full detailed report of the review will be made publicly available via the internet. From the findings of the report, recommendations may be made for improving the MAIROC's performance in meeting its future objectives.

Milestones – 1) MAIROC becomes operational. 2) Detailed report published online by end of 4th quarter of MAIROC's performance in meeting its objectives. 3) Quarterly reports on partners' mission needs reviewed and updated. And 4) Documentary and educational video production continued, to include a minimum of 2 videos per quarter.

Years 3 through 5

Focus will be on incorporating MAIROC into the budgets of research projects it helps support and into program budgets of federal, state, and academic partners operational programs it helps support. Additionally generating fees from small businesses and industry partners for use of MAIROC in testing and demonstration projects. The goal of these efforts will be to make the MAIROC sustainable beyond GOMESA funding.

Milestone: 1) Detailed report published online of MAIROC's performance in meeting its objectives 60 days after the end of the 4th quarter of each year. 2) Quarterly reports on partners' mission needs reviewed and updated. 3) Documentary and educational video production continued, to include a minimum of 2 videos per quarter. And, 4) Operational sustainability by the end of year 5.

13. Project Timing

Deferred/Long-term (3-5 years)

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APPLICATION SUMMARY QUESTIONNAIRE

14. Current status of architectural/engineering plans & specifications for this project (if applicable):

Group 1:

Completed

Group 2:

Paid for

15. In what way does this project meet the goals and objectives of the Department of Marine Resources, which includes enhancing, protecting and conserving the marine interest of Mississippi for present and future generations.?

Mississippi's marine resources have suffered from the impacts of freshwater flooding, hurricanes, harmful algal blooms, and the Deepwater Horizon oil spill. These disasters have reduced the abundance of some key commercial fisheries resources and have reduced jobs in the seafood industry. Between 2004 and 2014, core maritime industries including fresh and frozen seafood processing, fish and seafood merchant wholesalers, and seafood markets saw job declines of 54%, 10%, and 33%, respectively. Although the same report was unable to capture information on the fishing industry, commercial license sales in Mississippi between 2004 and 2014 decreased by 270. Additionally, commercial landings from 2004 to 2014 for Mississippi's key commercial species including shrimp, crab, oyster, red drum, flounder, and spotted sea trout decreased by 7.5 million pounds according to National Marine Fisheries Service Annual Commercial Landings database. Declines in resources, environmental challenges, and declining jobs impact both the economy and the cultural heritage of the maritime industry on the MS Gulf Coast. The MAIROC should prove to be a powerful tool for supporting the Mississippi Department of Marine Resources (MDMR) in advancing its mission to enhance, protect, and conserve the state’s marine interests. The MAIROC will serve as a centralized hub for deploying, managing, and analyzing data from autonomous surface vessels, underwater robots, and other autonomous systems. This capability will enhance MDMR’s ability to monitor, protect, and restore Mississippi’s marine resources while supporting innovation, safety, and community engagement.

Alignment with MDMR Goals
1. Enhance Resource Monitoring and Management

Conduct autonomous surveys of Mississippi’s coastal waters, wetlands, oyster reefs, and estuaries.

Deploy robotic platforms to collect high-resolution data on water quality, salinity, sediment movement, and marine life populations.

Support data-driven management decisions that optimize fisheries, habitat protection, and restoration initiatives.

2. Protect Marine Ecosystems

Detect and track pollution events, such as oil spills, nutrient runoff, or harmful algal blooms, in real time.

Augment enforcement efforts by monitoring fishing activity and marine traffic to ensure compliance with conservation regulations.

Utilize robotics to monitor marine wildlife migration and habitat use with minimal disturbance.

3. Conserve for Future Generations

Employ robotic systems in habitat restoration projects, including seagrass planting and reef deployment.

Provide long-term climate resilience data on sea level rise, erosion, and storm impacts to inform adaptive coastal strategies.

Share real-time environmental data with schools, researchers, and the public to strengthen conservation awareness and

education.

Operational Advantages:

Cost-Effective - Autonomous systems reduce long-term survey and monitoring expenses.

Safe - Robotics minimize risks to personnel during hazardous operations and extreme weather.

Continuous Coverage - Unmanned systems can operate 24/7, covering areas difficult for human crews to reach.

Strategic Benefits for Mississippi:

Science-Based Decision-Making - High-quality, continuous data supports stronger marine policy and program development.

Partnerships & Funding - A robotics center positions Mississippi as a leader in marine technology, fostering collaboration with NOAA, universities, and private industry, while enhancing competitiveness for federal and state funding.

Workforce Development - Training in robotics and marine technologies will prepare a future-ready workforce, strengthening Mississippi's STEM and blue-economy sectors.

Conclusion:
The MAIROC will be a transformative asset for the Mississippi Department of Marine Resources. By integrating cutting-edge robotic technologies into its mission, MDMR will strengthen its ability to enhance, protect, and conserve Mississippi's marine resources for current and future generations. This initiative represents not only a commitment to environmental stewardship but also a forward-looking investment in innovation, resilience, and community engagement.

16. Estimated number of years to completion:

5

17. Estimated Completion Date:

6/30/2031

18. Prioritize if your agency has submitted multiple projects:

Only one submission.

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Submission ID: #202509301376

BUDGET

Category	Total
Salaries	1250000
Travel	
Architecture & Engineering	
Legal	
Consulting	
Construction	
Site Work	
Equipment	1765000
Indirects	412500
Other	1567689
Total	4995189

Attachments

1. usmrf-2026-gomesa.pdf

☒ I hereby certify under penalty of perjury that all information contained in this application packet is true and correct. I have not knowingly or intentionally provided any false information. I understand that a false statement on this application may be grounds for rejection of my application or termination of the award. In addition, a false statement may be punishable under applicable state or federal laws, which may also result in a fine and/or imprisonment.

☒ I certify that the above referenced agency / entity has given me the authority to submit this application.

Name	Phone	Date
Joseph M Graben	2283434900	09/30/2025

PROJECT NAME: Maritime AI and Robotic Operations Center

CONTACT: The University of Southern Mississippi Research Foundation (USMRF)

Kelly Lucas, PhD., Director USMRF

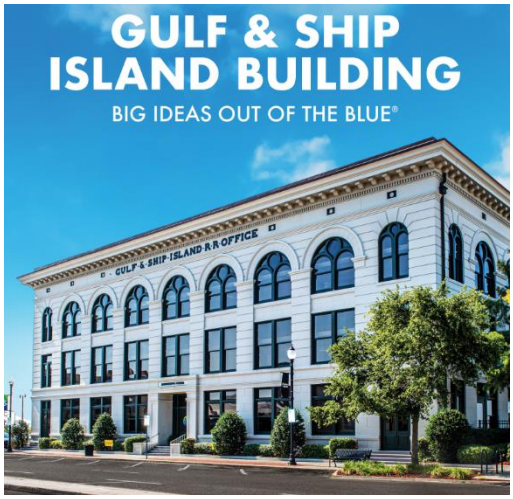
Email to: Kelly.Lucas@usm.edu

PROJECT LOCATION: Gulfport in Harrison County, Mississippi

AMOUNTED REQUESTED: $4,995,189.00

PROJECT PERIOD: July 1, 2026 – June 30, 2031

PROJECT DESCRIPTION:



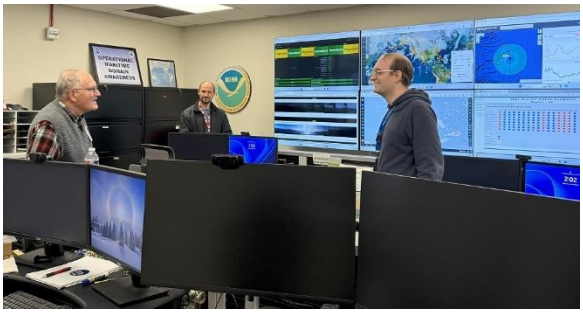
The Gulf Blue Mission Acceleration Connector's Maritime AI & Robotics Operations Center (MAIROC) will be located in the Gulf and Ship Island building in downtown Gulfport, MS, and will serve as a public facing demonstration and test facility for managing and monitoring a fleet of maritime robotic platforms and sensors for subsurface, surface, aerial, and space-based data collection and analysis. The center will provide a centralized hub where advanced robotics technologies—such as Unmanned Surface Vehicles (USVs)- including buoys, Autonomous Underwater Vehicles (AUVs), and Remotely Operated Vehicles (ROVs)—can be deployed, tested, supervised, and integrated into maritime operations. The integration of artificial intelligence (AI) elevates the capabilities of the robotic operations components to a new level, transforming them into an "AI-powered ROC."

The MAIROC is to be supported in part by the USM Institute for Advanced Analytics and Security dedicated to the design and application of machine learning, artificial intelligence, and advanced statistical analysis to public interest issues. It is additionally to be affiliated with the USM Maritime AI Innovation Lab and serving as a node for:

1. Demonstration and testing of maritime AI application developments,
2. Ocean modeling, data integration, and biogeochemical oceanography associated with the USM Ocean Weather Lab (OWX),
3. Supporting research, development, and applications of precise geospatial data, remote sensing, and computational tools and models to enhance the understanding of relative sea level rise and its impacts, coastal change over time (wetland loss), and nature-human dynamics in the coastal system for the USM Gulf Coast Geospatial Center (GCGC), and
4. Demonstration node for the USM Coastal CUBEnet, a relocatable environmental and oceanographic tool that provides a four-dimensional ocean cube supporting a comprehensive understanding and predictive modeling of the surface and subsurface environments critical for testing and performance evaluation of uncrewed maritime systems (UMS).

The MAIROC will be capable of providing operational support services upon request to the Mississippi Department of Marine Resources and other state and federal as well as industry organizations for

monitoring and collecting marine data and responding to natural and anthropogenic disasters in the Mississippi Sound and surrounding Gulf waters. Examples include impacts from tropical weather, freshwater inundation, and harmful algae bloom (HAB) events.



It will serve as a tool for research and development efforts supporting the mission needs of federal partners such as NOAA's National Data Buoy Center (NDBC) and NOAA's Office of Marine and Aviation Operations (OMAO) and the Navy in providing a public facing demonstration support facility outside of their restricted federal facilities. It will mirror NDBC's data buoy command center (shown on the right) located at the Stennis Space Center in Hancock County, MS and OMAO's robotic operations center (ROC) located in their space inside the Wicker Center for Ocean Enterprise in the Port of Gulfport. It will also support efforts with the Navy Gulf Coast Tech Bridge that include the Naval Surface Warfare Center Panama City Division (NSWC PCD) in Panama City, FL in partnership with the Naval Research Lab (NRL) and the Naval Meteorology and Oceanography Command (CNMOC), both located at the Stennis Space Center in Hancock County, MS.

NOAA's Gulf Coast activities include living marine resources management, hurricane research, seafloor mapping, and ocean and atmospheric weather data support. The Navy's activities include data collection and production of oceanographic, hydrographic, bathymetric, geophysical and acoustic products, and services that aid in safe navigation and effective mission planning.

Equipped with real-time data visualization, secure communication networks, and advanced mission planning tools, the MAIROC enhances situational awareness for operators, ensuring safe, efficient, and reliable mission execution of both demonstration and training exercises and operational activities. The MAIROC incorporates simulation and testing environments for research, scenario planning, training, and systems validation.

As a capability that will attract and be utilized by state and federal agencies, small business and industry, and academic partners, MAIROC will support partnerships that stimulate diversification and economic growth of Mississippi's knowledge based blue economy. Via these partnerships MAIROC will promote greater coastal resilience and support the mitigation of damage to marine and coastal resources through new innovations and operational support for the monitoring, response, and recovery from natural and anthropogenic disasters. In its public facing role, the MAIROC will help support K-20 educational engagements for creating awareness of future blue economy jobs and coastal resilience issues.

Project Goals/Objectives

Goals: The Deepwater Horizon oil spill in 2010 caused severe, multi-year economic harm to Mississippi's Gulf Coast, with significant negative impacts on its tourism and seafood industries. There was an estimated $8.7 billion in total losses to the Gulf Coast economy from 2010-2020, primarily in fishing and recreation, resulting in tens of thousands of lost jobs and declining industry output. MAIROC aims to mitigate such future impacts. The goal of MAIROC is to serve as a capability that attracts and develops partnerships between state and federal agencies, small business and industry, and academic institutions supporting innovations to promote greater coastal resilience and mitigation of damage to marine and

coastal resources from environmental stressors like pollution derived from outer continental shelf activities. It will help support the monitoring, response, and recovery from natural and anthropogenic disasters such as hurricanes, oil spills, harmful algae blooms (HABs) and freshwater inundation events. It will accomplish this by supporting applied research and innovations for:

1. Monitoring Technologies - These provide early detection, situational awareness, and data for decision-making and include:

Remote Sensing & Earth Observation

- Satellites (e.g., NASA, ESA, NOAA satellites for weather, ocean color, thermal anomalies).
- High Frequency Radar (HFR) for surface current monitoring.
- Optical and hyperspectral imaging for HAB detection.
- Unmanned Aerial Systems (UASs) for aerial surveys of damaged areas, oil slicks, and flood extent.
- Unmanned surface and underwater vehicles (USVs/AUVs) for water sampling and mapping.
- In-situ Sensors & IoT Networks
- Buoys and floats (e.g., Argo floats, NOAA buoys) for ocean currents, temperature, salinity, dissolved oxygen.
- Smart sensors for oil hydrocarbons, toxins, pH, turbidity.
- HAB-specific sensors (e.g., Imaging FlowCytobot for phytoplankton ID).
- Modeling & Forecasting Tools
- Numerical weather prediction models (e.g., HWRF for hurricanes).
- Ocean circulation and spill trajectory models.
- HAB forecasting systems integrating remote sensing + biology + hydrodynamics.

2. Response Technologies - These help contain damage, coordinate actions, and ensure safety.

Decision-Support Systems

- Geographic Information Systems (GIS) for real-time mapping of disasters.
- AI/ML-driven predictive analytics for risk assessment.
- Emergency management dashboards integrating multi-source data.

Communications & Coordination

- Satellite phones, mesh networks, and resilient 5G systems for disaster zones.
- Social media analytics for situational awareness and public alerts.

Response Equipment

- Autonomous drones/robots for hazardous cleanup or delivering aid.
- Mobile labs for on-site toxin or water-quality testing (HABs, chemical spills).

3. Recovery & Resilience Technologies - These support rebuilding, long-term adaptation, and ecosystem restoration.

Ecosystem Restoration Tools

- Bioremediation (microbes to degrade oil or toxins).
- Artificial reefs and oyster restoration for coastal resilience.
- Seagrass and mangrove restoration using drones and seed dispersal tech.

Infrastructure & Energy

- Resilient microgrids (solar + battery + smart control) for post-disaster power.
- Flood-resilient building materials and smart infrastructure monitoring sensors.

Data & Risk Management

- Big-data platforms integrating disaster archives for trend analysis.
- Digital twins of coastal/ocean ecosystems for scenario planning.
- Community Engagement & Education
- Mobile apps for community reporting of HABs, spills, or damage.

Key objectives of the MAIROC include:

Innovation and Research - Serve as a hub for developing, testing, and validating next-generation AI and maritime robotics technologies and associated component systems (e.g. sensors, coms, etc.).

Collaboration - Enable multi-agency and cross-industry cooperation by offering interoperable platforms and shared situational awareness.

Operational Efficiency - Streamline the deployment and control of robotic and other autonomous assets for scientific, commercial, public safety, and defense applications.

Safety and Security - Provide real-time monitoring and redundancy systems to minimize operational risks in challenging marine environments.

Workforce Training and Education – Provide resources and support for post-doctoral, graduate and undergraduate student research and support to K-12 educational activities and general public engagement.

Ultimately, MAIROC acts as a bridge between human operators and robotic and other maritime assets, transforming how maritime missions are executed in domains such as offshore energy, environmental monitoring, defense, logistics, and scientific exploration. It provides a publicly accessible venue where demonstrations and informative presentations may be shown to stimulate public engagement, workforce training, and education.

Meeting the authorized uses set forth in the GOMESA

(A) Projects and activities for the purposes of coastal protection, including conservation, coastal restoration, hurricane protection, and infrastructure directly affected by coastal wetland losses

The project will support applied research and development of innovations and their demonstration for assisting in the development and monitoring of living shorelines and other coastal restoration activities in addressing wetland losses. These may include supporting development and testing of new AI enhanced geospatial tools and autonomous systems for use in the design and determining optimal placement of living shorelines as well as their monitoring over time to assess their performance.

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The dependence of fisheries on inshore habitats makes them potentially vulnerable to depletion following impacts from environmental stressors. This project could contribute to mitigating damage to fish, wildlife and natural resources by providing operational capabilities that can support the monitoring, response, and recovery from anthropogenic disasters (e.g. Deepwater Horizon) helping mitigate damages. It will also help in monitoring environmental conditions in the Mississippi Sound for providing baseline data of "normal conditions" that can help assess, mitigate, and document the impacts of natural and anthropogenic disasters events such as tropical storms, oil and chemical spills, freshwater inundations, and harmful algae blooms (HAB).

(C) Implementation of a federally-approved marine, coastal, or conservation management plan.

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Milestone – Procurement of equipment and materials and contractor support for assembling the "Fishbowl" inside the Gulf and Ship Island Building and needed equipment and upgrades for partner locations to support integrating MAIROC with their systems.

3rd and 4th quarters - Outfitting of the MAIROC will be completed and staffing and training and beta testing will be conducted of the various system integrations. Needed adjustments will be made before entering the operational phase in Year 2. Guidelines and procedures for partners to use the MAIROC will be reviewed and finalized. These uses include research, demonstration and testing, operational support, and education and training.

Milestones – 1) Completion of the MAIROC physical space and equipment setup. **2)** Staffing and related training completed. **3)** Documentary and educational video production started, to include a minimum of 2 videos per quarter beginning the 3rd quarter. And **4)** Guidelines and procedures for partners to use the MAIROC finalized and to include a web-portal based request form.

Year – 2

In Year 2 the MAIROC will enter its operational phase for aiding in research, demonstration and testing, operational support, and education and training. Partners' mission needs related to these activities will be reviewed and updated at least once quarterly, as they are satisfied, and as new needs are identified.

In the 4th quarter, a full detailed review will be conducted of the MAIROC's performance in meeting its objectives for supporting Innovation and Research, Collaboration, Operational Efficiency, Safety and Security, and Workforce Training and Education. A full detailed report of the review will be made publicly available via the internet. From the findings of the report, recommendations may be made for improving the MAIROC's performance in meeting its future objectives.

Milestones – 1) MAIROC becomes operational. **2)** Detailed report published online by end of 4th quarter of MAIROC's performance in meeting its objectives. **3)** Quarterly reports on partners' mission needs reviewed and updated. And **4)** Documentary and educational video production continued, to include a minimum of 2 videos per quarter.

Years 3 through 5

Focus will be on incorporating MAIROC into the budgets of research projects it helps support and into program budgets of federal, state, and academic partners operational programs it helps support. Additionally, the MAIROC will generate fees from small businesses and industry partners for use of MAIROC in testing and demonstration projects. The goal of all these efforts will be to make the MAIROC sustainable beyond GOMESA funding by the end of Year 5.

Milestones: 1) Detailed report published online of MAIROC's performance in meeting its objectives 60 days after the end of the 4th quarter of each year. **2)** Quarterly reports on partners' mission needs reviewed and updated. **3)** Documentary and educational video production continued, to include a minimum of 2 videos per quarter. And, **4)** Operational sustainability by the end of year 5.

Supporting the goals and objectives of the Department of Marine Resources, for enhancing, protecting, and conserving the marine interest of Mississippi for present and future generations.

Mississippi's marine resources have suffered from the impacts of freshwater flooding, hurricanes, harmful algal blooms, and the Deepwater Horizon oil spill. These disasters have reduced the abundance of some key commercial fisheries resources and have reduced jobs in the seafood industry. Between 2004 and 2014, core maritime industries including fresh and frozen seafood processing, fish and seafood merchant wholesalers, and seafood markets saw job declines of 54%, 10%, and 33%, respectively. Although the same report was unable to capture information on the fishing industry, commercial license sales in Mississippi between 2004 and 2014 decreased by 270. Additionally, commercial landings from 2004 to 2014 for Mississippi's key commercial species including shrimp, crab, oyster, red drum, flounder, and spotted sea trout decreased by 7.5 million pounds according to National Marine Fisheries Service Annual Commercial Landings database. Declines in resources, environmental challenges, and declining

jobs impact both the economy and the cultural heritage of the maritime industry on the MS Gulf Coast. The MAIROC should prove to be a powerful tool for supporting the Mississippi Department of Marine Resources (MDMR) in advancing its mission to enhance, protect, and conserve the state's marine interests. The MAIROC will serve as a centralized hub for deploying, managing, and analyzing data from autonomous surface vessels, underwater robots, and other autonomous systems. This capability will enhance MDMR's ability to monitor, protect, and restore Mississippi's marine resources while supporting innovation, safety, and community engagement.

MIAROC's alignment with MDMR Goals:

1. Enhance Resource Monitoring and Management

Conduct autonomous surveys of Mississippi's coastal waters, wetlands, oyster reefs, and estuaries.

Deploy robotic platforms to collect high-resolution data on water quality, salinity, sediment movement, and marine life populations.

Support data-driven management decisions that optimize fisheries, habitat protection, and restoration initiatives.

2. Protect Marine Ecosystems

Detect and track pollution events, such as oil spills, nutrient runoff, or harmful algal blooms, in real time.

Utilize robotics to monitor marine wildlife migration and habitat use with minimal disturbance.

3. Conserve for Future Generations

Employ robotic systems in habitat restoration projects, including seagrass planting and reef deployment.

Provide long-term climate resilience data on sea level rise, erosion, and storm impacts to inform adaptive coastal strategies.

Share real-time environmental data with schools, researchers, and the public to strengthen conservation awareness and education.

Operational Advantages:

- Cost-Effective - Autonomous systems reduce long-term survey and monitoring expenses.
- Safe - Robotics minimize risks to personnel during hazardous operations and extreme weather.
- Continuous Coverage - Unmanned systems can operate 24/7, covering areas difficult for human crews to reach.

Strategic Benefits for Mississippi:

- Science-Based Decision-Making - High-quality, continuous data supports stronger marine policy and program development.
- Partnerships & Funding - A robotics center positions Mississippi as a leader in marine technology, fostering collaboration with NOAA, universities, and private industry, while enhancing competitiveness for federal and state funding.
- Workforce Development - Training in robotics and marine technologies will prepare a future-ready workforce, strengthening Mississippi's STEM and blue-economy sectors.

Conclusion:

The MAIROC will be a transformative asset for the Mississippi Department of Marine Resources. By integrating cutting-edge robotic technologies into its mission, MDMR will strengthen its ability to enhance, protect, and conserve Mississippi's marine resources for current and future generations. This initiative represents not only a commitment to environmental stewardship but also a forward-looking investment in innovation, resilience, and community engagement.

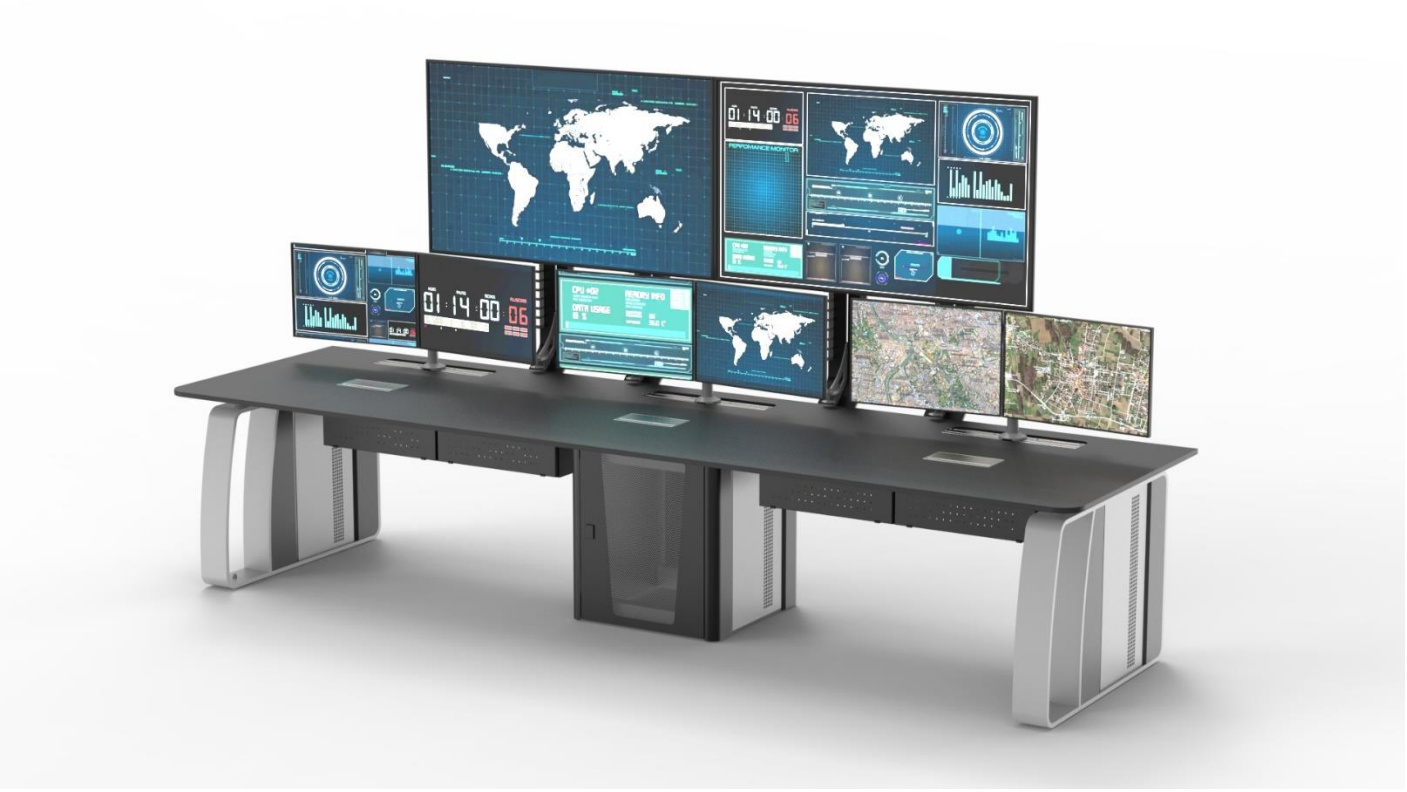
Budget:

Category	Year - 1	Year - 2	Year - 3	Year - 4	Year - 5	Total
Personnel (Salary and Fringe)	$ 250,000.00	$ 250,000.00	$ 250,000.00	$ 250,000.00	$ 250,000.00	$ 1,250,000.00
Commodities	$ 75,000.00	$ 10,000.00	$ 10,000.00	$ 5,000.00	$ -	$ 100,000.00
Contractual	$ 250,000.00	$ 250,000.00	$ 250,000.00	$ 250,000.00	$ 250,000.00	$ 1,250,000.00
Travel						$ -
Equipment	$ 1,750,000.00	$ 15,000.00				$ 1,765,000.00
Communications						
Cellular communications	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 10,000.00
Satellite communications	$ 18,000.00	$ 18,000.00	$ 18,000.00	$ 18,000.00	$ 18,000.00	$ 90,000.00
Rent	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 10,000.00	$ 50,000.00
Tution	$ 12,250.00	$ 12,862.50	$ 13,505.63	$ 14,180.91	$ 14,889.95	$ 67,689.00
Total Direct	$ 2,367,250.00	$ 567,862.50	$ 553,505.63	$ 549,180.91	$ 544,889.95	$ 4,582,689.00
Indirect 15% de minimis rate o	$ 90,750.00	$ 81,000.00	$ 81,000.00	$ 80,250.00	$ 79,500.00	$ 412,500.00
Total Cost	**$ 2,458,000.00**	**$ 648,862.50**	**$ 634,505.63**	**$ 629,430.91**	**$ 624,389.95**	**$ 4,995,189.00**

Budget Justification

Personnel includes time for researchers, staff, a part-time program coordinator, graduate students, and paid internships. Commodities include computer supplies such as monitors, audio, and cables. Contractual includes third party services for video production editing, project management support, and contracted labor for assembling the MAIROC "Fishbowl" room and installing computer equipment. Equipment needed for this project includes uncrewed systems (surface and subsurface) and sensors for data collection and enhancement of the USM CUBEnet for demonstration projects and testing and equipment upgrades to the USM OWX. Also glass partitions for assembling the MAIROC "Fishbowl" room inside the Gulf and Ship Island Building, secured server, and video wall and workstations as illustrated on the following page. Rents for this project are for space in the Gulf and Ship Island Building which USMRF rents from Mississippi Power. The indirect cost applied to this project is the federally authorized 15% de minimis rate on Modified Total Direct Costs (MTDC) per 2 CFR 200, available to non-federal entities that do not have a federally-approved negotiated indirect cost rate (NICRA).

Illustration of the Maritime AI & Robotics Operations Center (MAIROC) video wall and workstations to be located on the 2nd floor in the Gulf and Ship Island Building. Glass partitions will be used to create a “Fishbowl” room that allows for people outside to see in to watch demonstrations and presentations.



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