

FUSION 2023 REPORT



Terry Ogle and Darin Dunham
General Chairs of Fusion 2023

The 26th International Conference of Information Fusion, FUSION 2023, was held in Charleston, South Carolina, USA from June 27-30, 2023. Despite significant flight delays and cancellations along the East Coast caused by severe summer storms, holiday travel, and a shortage of air traffic controllers in the Northeast, most attendees made it to Charleston to enjoy FUSION 2023. The last U.S.-based ISIF conference was held in Washington, DC, FUSION 2015. In 2019, we proposed Charleston for its meticulously preserved history, walkability, charm, and hospitality. Since 2013, Charleston has been named the No. 1 city in the United States by Travel + Leisure! It has also had one of the fastest-growing airports in the nation for several years.

Charleston, South Carolina, has a documented history of over three centuries and is one of America's most culturally rich and historically significant cities. Founded in 1670 by English colonists, Charleston served as a trade and commerce hub in the colonial era becoming a vital port city as it is today. Charleston had a varied history with a role in the transatlantic slave trade and roles in the American Revolutionary War and Civil War. The city has numerous architectural sites such as antebellum mansions, stately churches, and colorful row houses (i.e., Rainbow Row) that reflect its diverse history. Charleston is known for its cultural heritage from the Gullah Geechee people, African descendants in the South Carolina Lowcountry. Charleston provides a window into the past with its historic sites, museums, and vibrant neighborhoods that tell a story over the centuries.

The Charleston Place Hotel, located in the heart of downtown overlooking the historic City Market, was home to FUSION 2023. Our conference attendees enjoyed over 40,000 square feet of onsite meeting space and four-star accommodations with easy access to world-renowned restaurants, numerous historic sites, the City Market, upscale shopping, and great views along the Charleston Harbor.



Opening Plenary Session with Henrik Christensen

Here are a few comments from the post-event participant survey:

- "The conference felt very relaxed. I had plenty of time to chat with colleagues and explore Charleston. I also loved the 5k. Photos were great."
- "It was well organized. The activities were right next to the hotel such that you could do both the conference and the sightseeing. Probably attended the most events of a Fusion conference."
- "Charleston was a great city to have the conference in."

- “Hard to choose. I got so much new and interesting research input and made many new professional connections. In spectacular surroundings!”
- “Beautiful venue, supportive staff, plenty of food.”
- “Apart from the program, rich in content, the social events were really good and helped a lot to break the ice between people.”

In total, Fusion 2023 had 273 attendees and 24 guests from 23 unique countries. There were 191 paper submissions from 699 contributing authors. Multi-sensor & multi-target tracking, defense & security, and nonlinear filtering & Monte Carlo methods were the top three topic areas for submissions. The program committee consisted of 225 reviewers who submitted 717 paper reviews. Each paper had at least 3 reviews with 3.75 reviews on average. Ultimately, the technical committee, Peter Willett, Marcus Baum, Florian Meyer, Anne-Laure Jousset, and Gustaf Hendeby, did a fantastic job and accepted 155 papers for a 0.81 acceptance rate. The program chairs, Stefano Coraluppi and Ondřej Straka, meticulously arranged 154 conference papers and 3 journal paper presentations into 12 sessions. There were also 9 special sessions included, selected by Murat Efe and Terence van Zyl. Our publication chairs, Felix Govaers and Paolo Braca, ensured that the papers presented were published on IEEE Xplore.



Erik Blasch giving Introduction to Information Fusion at Fusion Boot Camp

Fusion 2023 had 84 student attendees, nearly one-third of the conference attendees. This infusion of new talent and interest speaks volumes about the future of ISIF and information fusion. In organizing this conference, we focused on student engagement and introduced ‘student’ name badge tags to ensure sponsors and industry partners could readily identify students to welcome them to our organization. On the day before the conference, 35 students and professionals participated in the inaugural Fusion Boot Camp, a full day of introduction to information fusion

courses. Sessions included introductions to information fusion by Erik Blasch, estimation techniques led by Dale Blair, and discussions on data association facilitated by Stefano Coraluppi. Following lunch, the afternoon encompassed distributed target tracking with Felix Govaers, fusion and association with attributes/classification with Yaakov Bar-Shalom, distributed inference and information fusion with Pramod Varshney, and high-level fusion presented by Lauro Snidaro and Erik Blasch. A warm shout-out to each speaker for volunteering their time for this amazing event. Following the boot camp, everyone was invited to socialize and network at the IEEE Young Professionals Reception in the Grand Hall.



Student attendees enjoying the Icebreaker after Tutorials

On Tuesday, we hosted 10 tutorials in two sessions, morning and afternoon. The morning session consisted of:

- High-Level Information Fusion Theory meets AIM by Eric Blasch,
- An Introduction to Track-to-Track Fusion and the Distributed Kalman Filter by Felix Govaers,
- Multitarget Tracking and Multisensor Information Fusion: Recently Developed Advanced Algorithms by Yaakov BarShalom,
- Graph-Based Localization, Tracking, and Mapping by Erik Leitinger,
- Estimation and Tracking of Graph Signals by Tirza Routtenberg, and
- Systematic Filter Design for Tracking Maneuvering Targets: Getting Guaranteed Performance Out of Your Sensors by Dale Blair.

Following lunch, the afternoon session included:

- Deep Learning for Multispectral, Multiresolution, and Multisensor Data Fusion by Fahimeh Farahnakian,
- The Basics of Belief Functions and More by Dan Harris,

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- Algorithms for Estimation of Noise Parameters in State Space Models by Ondrej Straka, and
- Quantum Computing and Quantum Physics Inspired algorithms: Introduction and Data Fusion Examples by Martin Ulmke.

There were 137 tutorial registrations, with graph-based localization, estimation of noise parameters, and belief functions being the most popular subjects for Fusion 2023. In all, there were 93 tutorial attendees with 44 students taking both morning and afternoon tutorials. Paul Miceli, David Crouse, and Ali Raz were tutorial chairs for Fusion 2023 and did an outstanding job organizing our tutorials.



Kellyn Rein presented on HUMINT - Context, Meaning, and the Mythical 'Meat Sensor'

Roy Streit, Fusion 2023 Plenary Chair, arranged for three plenary sessions at Fusion 2023. Henrik Christensen, the Qualcomm Chancellor's chair on robot system and a distinguished professor of computer science and engineering at UC San Diego presented 'Multi-Sensory Fusion for Micro-Mobility', a discussion of sensor mixtures used in autonomous vehicles for campus mail delivery. Kellyn Rein, retired from the Research Institute for Communication, Information Processing Ergonomics (FKIE) at Fraunhofer Gesellschaft, presented 'HUMINT – Context, Meaning and the Mythical "Meat Sensor"', a discussion about data collection and processing from human sources. Victoria Rubin presented 'Artificial and Human Intelligence Solutions to Combat Mis- and Disinformation: Examples, Methodologies, Limits', a talk on the spread of disinformation and its effect on decision-making.



Making connections and making memories at the Fusion photobooth

Social interactions were also a focus in planning Fusion 2023. A photo booth was set up in the Grand Hall during the conference which provided a fun opportunity for engagement and a mechanism for social media posts.

The Icebreaker was held outdoors in the Market Street Circle in front of the Charleston Place with live music provided by Garrett Arwood & the Centennials from Nashville, TN. Dale Blair showed off his moves on the dance floor getting everyone excited to attend dance lessons throughout the weeklong conference. During the Icebreaker, attendees had the opportunity to take guided carriage rides through historic downtown Charleston.



Icebreaker participants leaving on a carriage ride around Charleston



Dale Blair giving dance lesson attendees a taste of what's to come at the Icebreaker!

The welcome reception for Fusion 2023 was held at the historic Riviera Theatre directly across King Street from the conference venue. The Riviera is a revitalized Art Deco masterpiece from the 1930's where everything boasted luxury and extravagance. Fusion 2023 participants were transported back in time to a prohibition era speak-easy disguised as a movie theatre with food and drinks, live music, and dancing. The band was led by Nathan Byers who also developed the Fusion 2023 conference website!



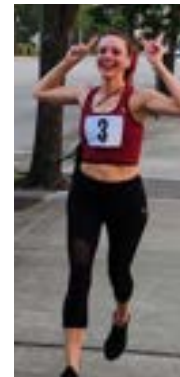
What appears to be the Riviera Theater on the outside was turned into a speakeasy on the inside



Good times at the speakeasy!

This year we had two athletic events – a 5K run and a golf tournament. You may not know that Charleston built America’s first golf course, Harleston Green, and organized the first club, the South Carolina Golf Club, in 1786. Today, Charleston boasts several first-class golf courses, including the Wild Dunes Harbor Course, designed by Tom Fazio, where we held the tournament. The Harbor Golf Course is known for its challenging design and beautiful views, and most of all, water. The inaugural golf tournament was a success, and Paul Miceli took first place.

The FUSION 2023 5K Run challenged our 27 competitors to a grueling climb in the first half. The run took them to the peak of the Cooper River Bridge (a gain of 250 feet with a max grade of 4.8%) and back to the historic Cigar Factory building for breakfast. The run was modeled after the Annual Cooper River Bridge 10k which is the third largest 10K and the fifth largest road race in the United States. Despite the early morning humidity, a beautiful sunrise and fantastic views of the Charleston Harbor created a memorable experience for all. Ryan Beeson (time:18:33 min) and Paul Miceli (time: 19:12 min) finished first and second for the men’s category, and Clara Menzen (time: 27:40 min) and Samantha LeGrand (time: 28:18 min) finished first and second for the women – and 2023 marks the first time the women’s finish has been recognized.



27 Runners participated in the 5K Fusion Run over Cooper River Bridge

- 1st Place Male - Ryan Beeson
- 1st Place Female - Clara Menzen

The Fusion 2023 gala dinner was held in the Grand Ballroom of The Charleston Place. Lawrence Stone of Metron opened the event with a presentation on ‘Finding Lost Gold Cities in Ecuador’. Larry’s presentation was a perfect complement for this conference, as finding and preserving lost shipwrecks off the coast of Charleston is near and dear to the heart of the local residents.



Lawrence Stone presented the “Lost City of Gold”

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The Golden Gala Dinner - Featuring the Emerald Empire Band and 25 Years of Fusion Presentation

The décor for Fusion 2023 was that of antiqued gold artwork and decorations with a celebration of the 25 years of ISIF conferences. The handmade table centerpieces for the banquet were each an example of fusion in gilded gold art – representing the Charleston pineapple fountain, the ISIF logo, and the state flag of South Carolina. During dinner, Dale Blair and Yaakov Bar Shalom presented the ISIF society awards, and Sjanic Zoran and Sam Shapero, presented the Fusion 2023 conference awards.

At Fusion 2023, attendees were presented with a diverse array of excursion options to enrich their conference experience. One such adventure allowed participants to delve into naval history with a visit to the USS Yorktown, a storied aircraft carrier with a rich legacy dating back to World War II. On a captain's guided tour, attendees gained exclusive access to areas typically off-limits to the public, exploring the original captain's quarters, the anchor room, and even climbing aboard a B-25 bomber. This excursion provided a captivating glimpse into the daily life of sailors at sea, spanning pivotal moments in history from World War II to the recovery of the Apollo 8 space capsule. Along with a scenic water taxi ride, the excursion also offered great views of the harbor, dolphins, and a harborside lunch.



On the flight deck of the USS Yorktown

Alternatively, participants seeking a journey through the annals of Southern heritage embarked on an excursion to the Boone Hall Plantation, a historic estate steeped in centuries of tradition. Founded in 1681, the plantation's majestic live oak-lined entrance served as a picturesque backdrop for guided tours of the grounds, including the plantation house, slave quarters, garden, and butterfly pavilion. Afterward, attendees savored a Southern family-style lunch.

The final excursion for Fusion 2023 was a historic walk-through downtown Charleston. Starting at the historic Cigar Factory on East Bay Street, home to the Clemson Design Center in Charleston (CDC.C) - a unique collection of design and preservation programs. We learned about Clemson's preservation programs with Charleston's foremost experts in architectural conservation, architectural history, landscape preservation, and urban/preservation planning. Then we visited the Aiken-Rhett House – the city's most intact antebellum urban complex with slave quarters and a work yard. After a southern farm-to-table style brunch, we walked to some amazing places hidden around downtown Charleston. We wrapped up our day at the Preservation Society of Charleston store on King Street to pick up some unique treasures of Charleston to share on our return home!



Architectural history at the Aiken-Rhett House

Sponsorship is an important part of any conference and Fusion 2023 was no exception. In total, we raised \$32,500 in sponsorships for Fusion 2023. To show our appreciation, we put a lot of emphasis on sponsor and student engagement during the conference. Sponsors were strongly encouraged to set up exhibits and engage students and professionals. Lockheed Martin graciously donated as a Gold level sponsor of Fusion 2023, Mitsubishi Electric as a Bronze level sponsor, Metron as Silver level, and finally, Information Fusion Technologies (IFT), MathWorks, Systems & Technology Research (STR), and Clemson University each as Exhibitor level sponsors. Fusion 2023 would not have been as successful without our sponsors!

We will leave you with some pictures of the committee... See you next year in Italy for Fusion 2024!



The Grand Hall was constantly buzzing with coffee and participants visiting sponsor booths

As we close out Fusion 2023, our treasurer, Phil West, will no doubt be responding to tax and audit questions, but in the end, we managed to make a small profit. Thank you to everyone for coming and making Fusion 2023 a great success! We would also like to thank the ISIF Board of Director's for the opportunity to host Fusion 2023 in Charleston, SC. A special thank you to everyone on the organizing committee - this would not have been possible without you. And last, but not least, a note of gratitude to Clemson University for all the help in pulling off this amazing event off! Finally, it isn't a party until something gets broken – Peter Lovassy, we hope you have fully repaired.

