

Sensor Systems Development

To support research at Notre Dame, the Center for Research Computing offers design, engineering, and consultation services in the areas of **embedded systems, sensors, and robotics**.

The burgeoning growth of low cost miniaturized sensor systems has led to many new data capture avenues, from drones as scientific sensor-platforms, through Internet of Things (IoT) sensor networks, to low cost open source community driven laboratory equipment. While full stack off-the-shelf solutions are increasingly available, these can be expensive or simply too closed source to allow for the customisation and reproducibility scientific rigor may require. Our scientists and engineers will work with you to source or develop in-house full stack solutions from custom endpoint sensory devices creation, through data logging, error correction, analytics, archive, and publication.

Services



Design, prototyping, and deployment of embedded sensory solutions

Once your custom needs are defined, our in-house experts can take you through the design, prototyping, manufacturing, and deployment of appropriate solutions. This can involve as much or as little customisation or work with external vendors and manufacturers as your budget and research parameters require.



Data management

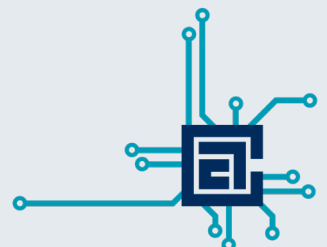
We offer many management options, from data logging hardware solutions, to data processing pipeline development, data archive resources and use, and, where appropriate, data publication.

Consultation

Not sure where to start? We would be happy to sit down with you to discuss your research goals and help you find the best solution.

CONTACT

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Areas of Expertise

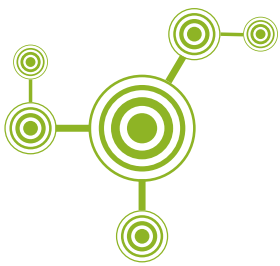


Drones

A major driver of sensor miniaturising is the increasing uptake of drones as data capture platforms. CRC staff can work with you to navigate regulations, help you find a suitable off the shelf sensor and aircraft, or if you wish or need, build you a complete custom data capture platform. We also offer FAA licensed drone piloting services.

Data Logging Platforms

A simple device to store data sample values can be all that's needed to move a system from the laboratory to a field environment. The CRC can save your graduate students the time of building such a system themselves, and not only free them up to actually do their science, but also help them manage their data using domain best practices from the very start.



IoT Networks

Industrial markets have driven the development of novel low power, long range, and low data rate networks that might be customised for various distances from feet (Bluetooth, Zigbee) through to miles (LoRaWAN, Sigfox). Consult our engineers for any questions or for help with selecting the most appropriate data transmission technology for your research and sourcing the solution from concept to deployment.

Edge and Fog Computing

A key component to utilising IoT networks is transmitting only relevant information, and key to efficiency in some research tasks is being notified only of anomalies. Using efficient algorithms (increasingly based on neural networks), low watt, but powerful, data processing nodes can be placed in the field near data capture point (edge), and/or data can be streamed directly to cloud analytics resources that are dispersed within the network between the sensors, cloud services, and data archives (fog). By distributing appropriate data processing stages closer to the source, near and real-time analytics can be achieved for lower costs (through reduced data transmission requirements) and/or the deluge of data and resulting strained processing resource bottlenecks can be removed (through distribution of load and intelligent pre-emptive triage of data). Have a need for Edge or Fog Computing? We can help source or design a solution.



Research Software Development

We will work closely with our CRC software developers on any front-end or data analysis applications that may be part of your total solution.

