



Data Capture Review Software

Data Capture Review Software Development

ELECOMP Capstone Design Project 2026-2027

Sponsoring Company:

AstroNova, Inc.

600 East Greenwich Ave.

West Warwick, RI 02816

<https://www.astronovainc.com>

Company Overview:

AstroNova is a leading innovator in data visualization solutions. The Company designs, manufactures, distributes and services a broad range of products that acquire, store, analyze, and present data in multiple formats on a variety of media.

The Aerospace segment is a global leader in providing products designed for airborne printing solutions, avionics, and data acquisition including flight deck printing solutions, networking hardware, data acquisition systems and specialized aerospace-grade supplies.

The Product Identification segment provides a wide array of digital, end-to-end product marking and identification solutions, including hardware, software, and supplies for OEMs, commercial printers, and brand owners for printing on paper, labels, paperboard packaging, corrugated boxes, and paper bags.



Technical Director(s):

David Kortick

Product Development Manager
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Senior Software Engineer
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Project Motivation:

AstroNova offers free-of-charge essential data review software to our end users for reviewing data files taken from our various data acquisition platforms. This software is used to visualize the data, make amplitude and timing measurements, add digital filtering and analysis, and export data to various file formats. The software is scheduled for a refresh for improved stability and performance, modernized architecture, better user experience, enhanced compatibility, and improved support.

Anticipated Best Outcome:

The anticipated best outcome would be a functional student-developed prototype that validates the software refresh concept, demonstrates a modern user interface and improved architecture, and provides useful documentation and lessons learned for future professional development.



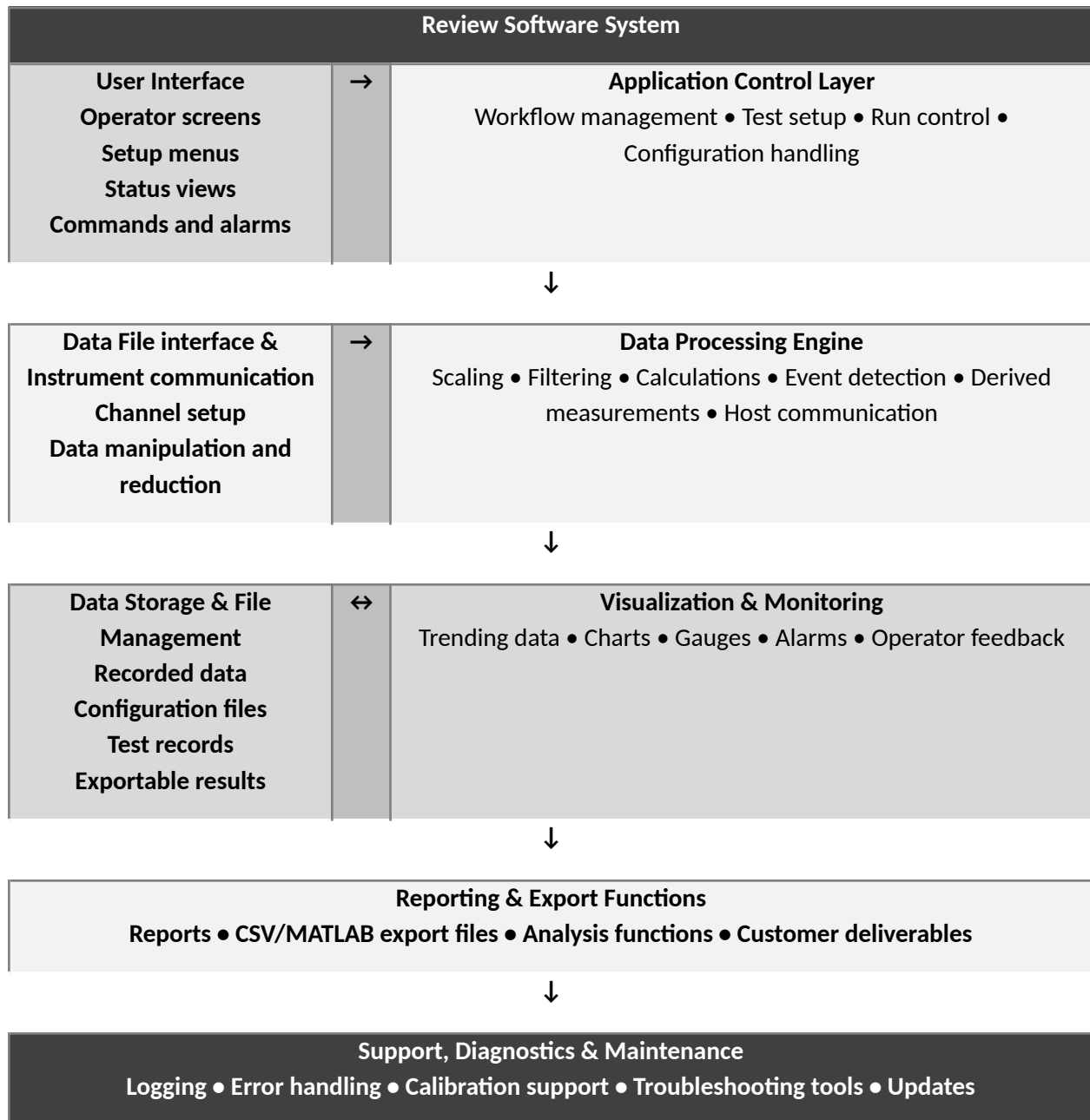
Project Details:

Software Refresh Goals:

- Improved stability and performance — faster load times, smoother data handling, and better responsiveness.
- Modernized architecture — cleaner code structure, easier maintenance, better modularity, and less dependency on legacy components.
- Better user experience — a more intuitive interface, simplified workflows, improved navigation, and reduced training burden.
- Enhanced compatibility — better support for current Windows environments, modern drivers, newer hardware, and future operating system updates.
- Easier feature development — new capabilities could be added faster and with less risk because the software foundation would be cleaner.
- Reduced long-term risk — lowering reliance on aging code, obsolete libraries, or hard-to-support legacy development environments.
- Improved support and troubleshooting — better logging, diagnostics, error handling, and possibly remote/support-friendly tools.



Block Diagram:





Hardware/Electrical Tasks:

- Learn to use various AstroNova data acquisition systems including:
 - Input types and specifications
 - Wiring connections and pinouts
 - Configuration of signal conditioning amplifier front ends
 - Configuration of data acquisition parameters
- Interact with data acquisition systems to create relevant data files
- Determine appropriate sensors and input connectivity
- Devise test cases for using the appropriate hardware interfaces

Firmware/Software/Computer Tasks:

Requirements and discovery

- Review the current workflow and user needs.
- Identify key screens, features, and areas for improvement.
- Define what the prototype must demonstrate.

Software architecture

- Design a modular structure for the application.
- Separate the user interface, data acquisition, processing, storage, reporting, and diagnostics functions.
- Define how each software layer communicates with the others.

User interface development

- Create updated operator screens with focus on ease of use.
- Build setup menus, status displays, command controls, alarm views, and navigation.
- Develop communications with test equipment for data transfer.



Data processing

- Implement scaling, filtering, calculations, event detection, and derived measurement logic.
- Ensure data is processed reliably and consistently.

Data storage and file management

- Save test configurations, recorded data, and test results.
- Support organized file naming, retrieval, export, and backup-friendly formats.

Data visualization

- Display fixed and customized views of the waveform data.
- Display data trends, charts, gauges and alarms.

Reporting and export

- Generate test reports.
- Export data to common formats such as MATLAB, CSV or Excel-compatible files.
- Provide clear user-facing output.

Error handling and diagnostics

- Add logging, fault messages, status indicators, and troubleshooting information.
- Make it easier to identify communication, configuration, or runtime problems.

Testing and validation

- Create test cases for each software module.
- Verify workflows, data accuracy, error handling, and usability.
- Document known limitations and recommended next steps.



Documentation and handoff

- Prepare setup instructions, user notes, code documentation, architecture diagrams, and lessons learned.
- Provide a clear path for future professional development.

Composition of Team:

2 Computer Engineers (with some electrical engineering skills and knowledge, as specified below)

Skills Required:

Electrical Engineering Skills Required:

- Knowledge of analog-to-digital sampling theory
- Knowledge of signal conditioning
- Knowledge of digital filtering (e.g. IIR, FIR, topologies, etc.)
- Knowledge of sensors
- Knowledge of waveform generators and other lab instrumentation

Computer Engineering Skills Required:

- Software development with experience in creating user interfaces (e.g. Microsoft Visual Studio)
- Strong knowledge of C++, C#/.NET
- Familiarity with debugging methods
- Familiarity with software repositories and tools (e.g. Git, Bitbucket)



AI Usage:

The AI Use Policy for this project is defined in Appendix A at the end of this proposal. Technical Directors: complete the checklist in Appendix A to indicate which AI uses are permitted on this project. Any item left unchecked is not allowed.

Anticipated Best Outcome's Impact on Company's Business, and Economic Impact

The updated review software will be an important addition to AstroNova's offerings to our customers. The increased capability, flexibility and ease-of-use will streamline the viewing and sharing of files collected from AstroNova data acquisition systems. The software adds value to our platforms and results in more use and increased sales.

Broader Implications of the Best Outcome on the Company's Industry:

For the broader industry, the best outcome would demonstrate a practical path for modernizing software platforms while improving usability, maintainability, data integration, and long-term supportability. It could also help build a pipeline of future software engineers familiar with real-world instrumentation, automation, and measurement-system requirements.



Appendix A: AI Use Policy – Data Capture Review Software Development

Allowed

- Students may use AI tools for
 - ☒ brainstorming support
 - ☒ concept development
 - ☐ literature and publicly available documentation review
 - ☒ software development (**Only AstroNova approved tools, models and accounts**)
 - ☒ debugging (**Only AstroNova approved tools, models and accounts**)
 - ☒ data analysis
 - ☒ test development
 - ☒ non-proprietary paragraph editing
 - ☒ non-proprietary single-slide formatting
 - ☒ preparation of project deliverables
 - ☐ note taking or transcription of meetings
 - ☐ Others: _____

Not Allowed

- Using AI in violation of university policies, applicable laws, or course-specific rules identified by capstone instruction team and project-specific rules identified by the technical directors.
- Entering proprietary, confidential, personally identifiable, security-sensitive, or otherwise restricted information into an AI system without authorization.
- Submitting AI-assisted work without understanding, reviewing, verifying, and appropriately disclosing its use.



- Submitting entire documents or presentations to an AI system for editing or formatting.
- Any unchecked items from the allowed list above.

Requirements

- If any use is allowed, AI tools may only be used to enhance, but not replace, students' technical reasoning, engineering judgment, and understanding. Students must be able to explain, justify, and defend all submitted designs, code, analyses, test results, documentation, and conclusions.
- During the first two weeks of the project, the student team shall work with the Technical Directors to: identify any proprietary or confidential information that may be involved in the project; determine what information may or may not be shared with AI systems; identify the AI tools, models, accounts, and configurations approved for project use; and document any project-specific restrictions or approval requirements.
- Students shall transparently document the uses of AI using the URI CYPHER AI Usage Marking guidelines (<https://web.uri.edu/cypher/ai-marking/>). A workshop is planned for September to familiarize students with these guidelines.
- Students retain full professional responsibility for all design decisions, analyses, implementations, testing, documentation, presentations, and final deliverables, regardless of whether AI tools contributed to the work.