

2015

Automated Magnetic Field Scanning System

George Bakirtzis
Virginia Commonwealth University

Tim Owen
Virginia Commonwealth University

Tara Powell
Virginia Commonwealth University

Follow this and additional works at: <http://scholarscompass.vcu.edu/capstone>

 Part of the [Electrical and Computer Engineering Commons](#)

© The Author(s)

Downloaded from

<http://scholarscompass.vcu.edu/capstone/49>

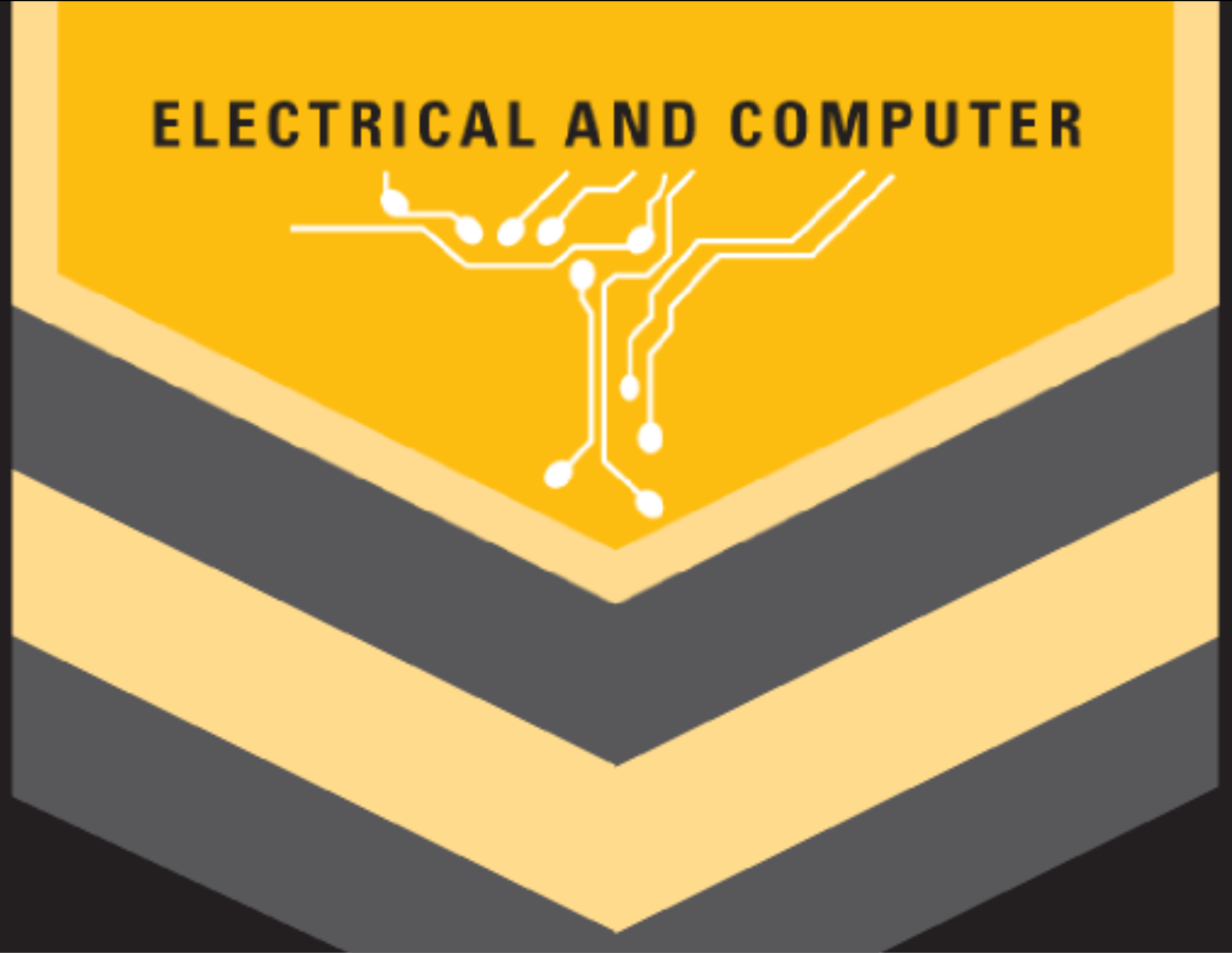
This Poster is brought to you for free and open access by the School of Engineering at VCU Scholars Compass. It has been accepted for inclusion in Capstone Design Expo Posters by an authorized administrator of VCU Scholars Compass. For more information, please contact libcompass@vcu.edu.

Team Members: George Bakirtzis
Tim Owen
Tara Powell

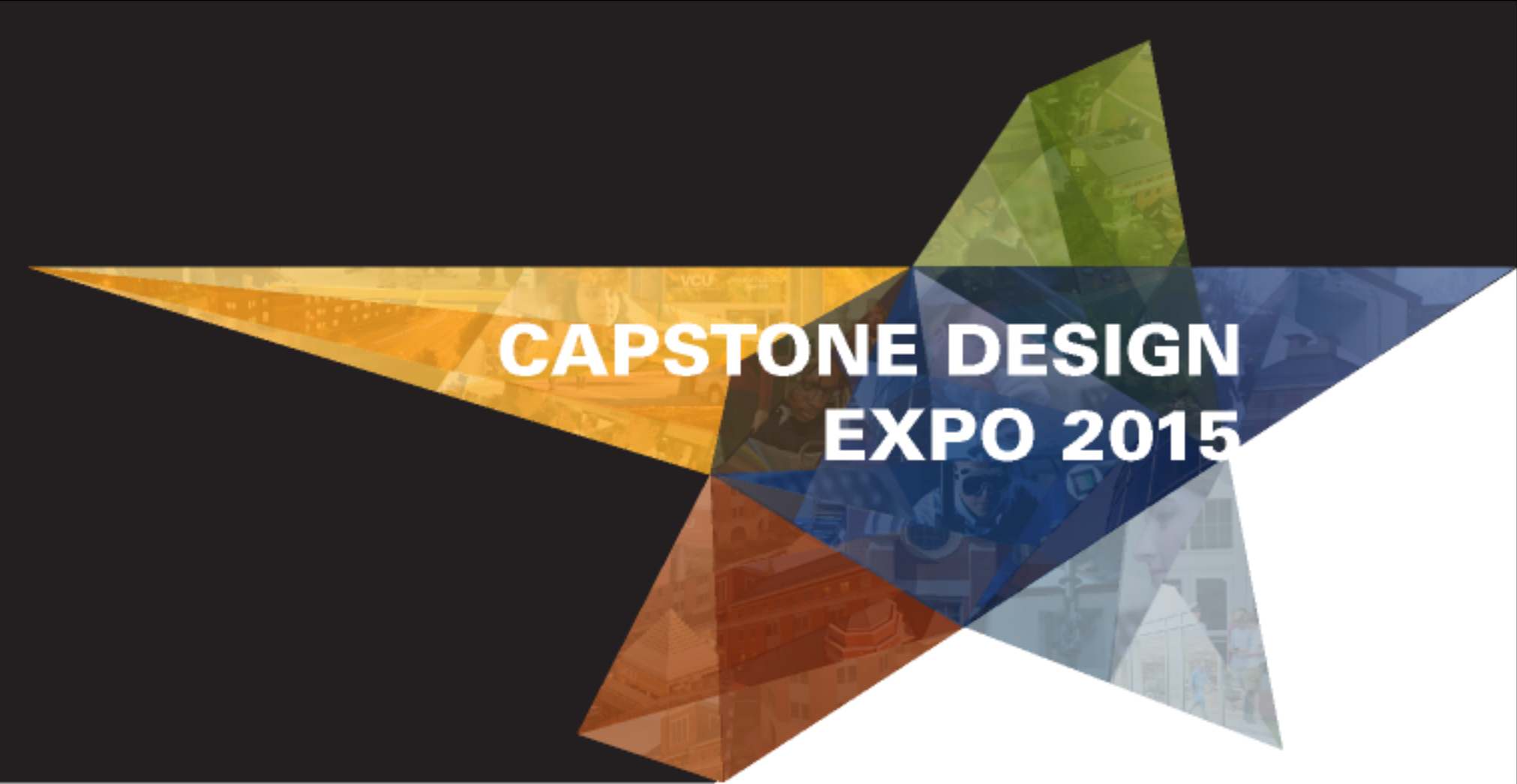
Faculty Advisor: Dr. Afroditi Filippas
Dr. Ümit Özgür

Sponsor: Jefferson Laboratory

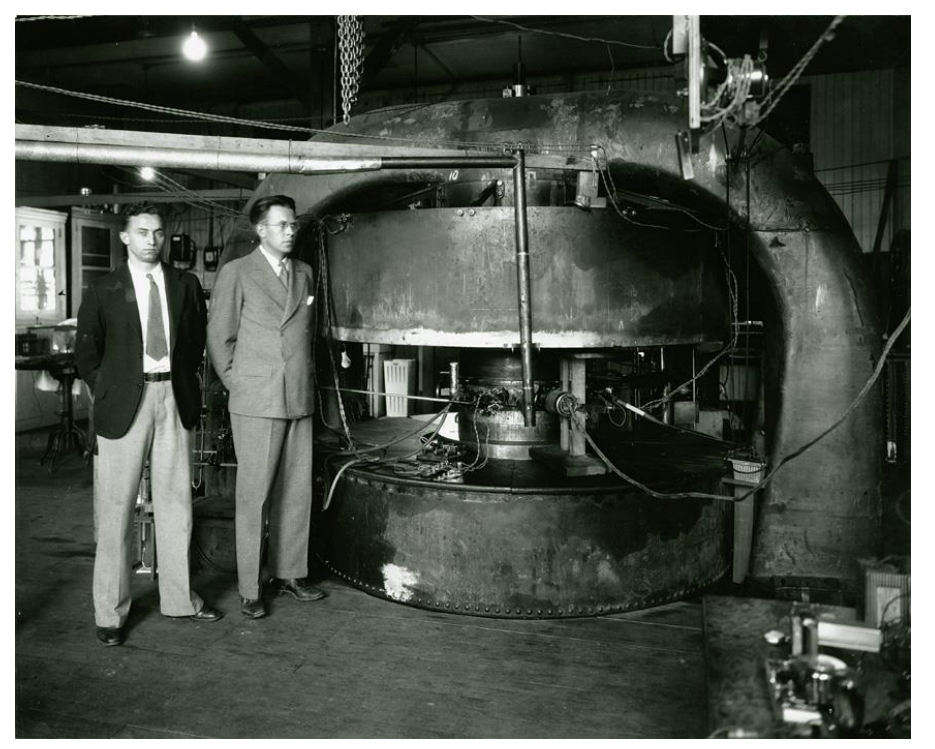
Sponsor Advisor: Kirk Davis



Automated Magnetic Field Scanning System

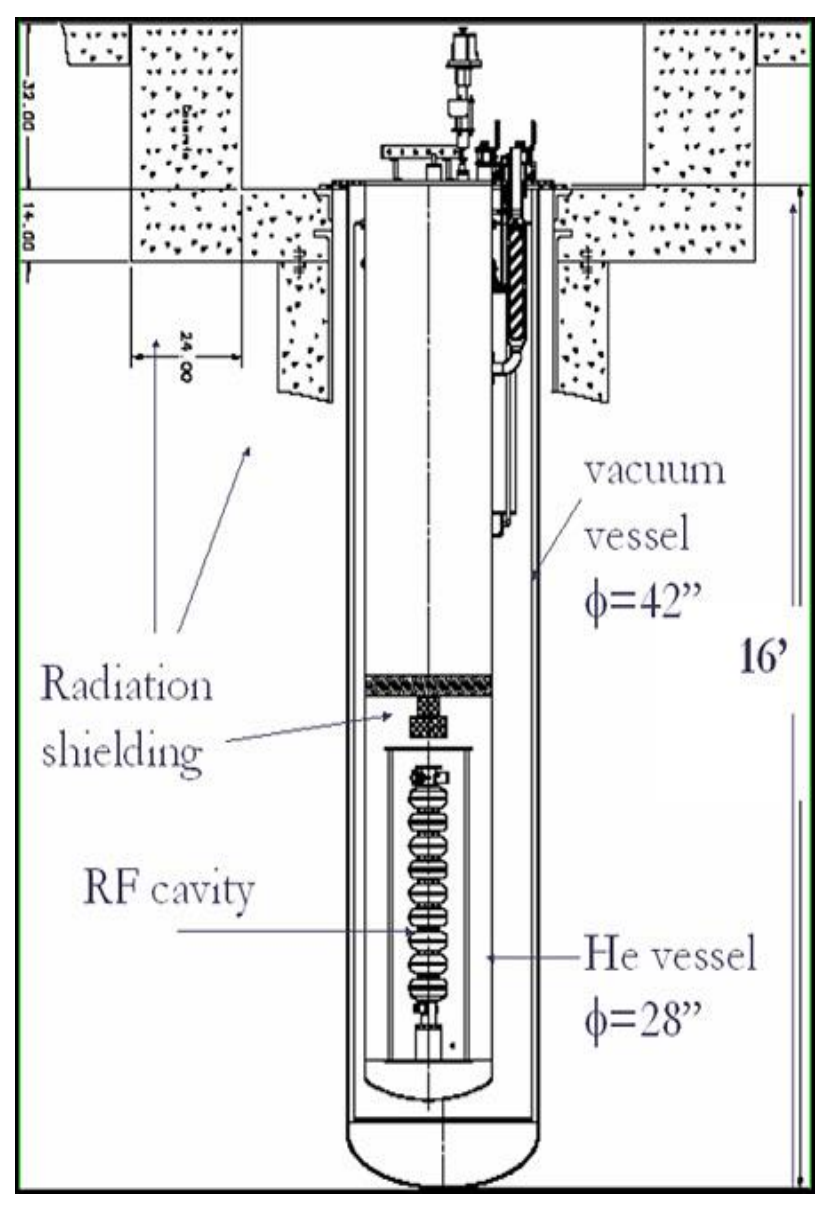


Background



The building that now holds the vertical testing area at Jefferson Laboratory was once occupied by the Space Radiation Effects Laboratory in the 1960's. This laboratory had a cyclotron, which is a type of particle accelerator. As a result of this, the rebar within this particular building is now slightly magnetized.

Jefferson Laboratory tests Superconducting Radiofrequency (SRF) devices within dewar cavities in the vertical testing area. These devices perform poorly under the influence of any magnetic field. Because of this, scientists must find a way to cancel the negative effect caused by the building's magnetic rebar.



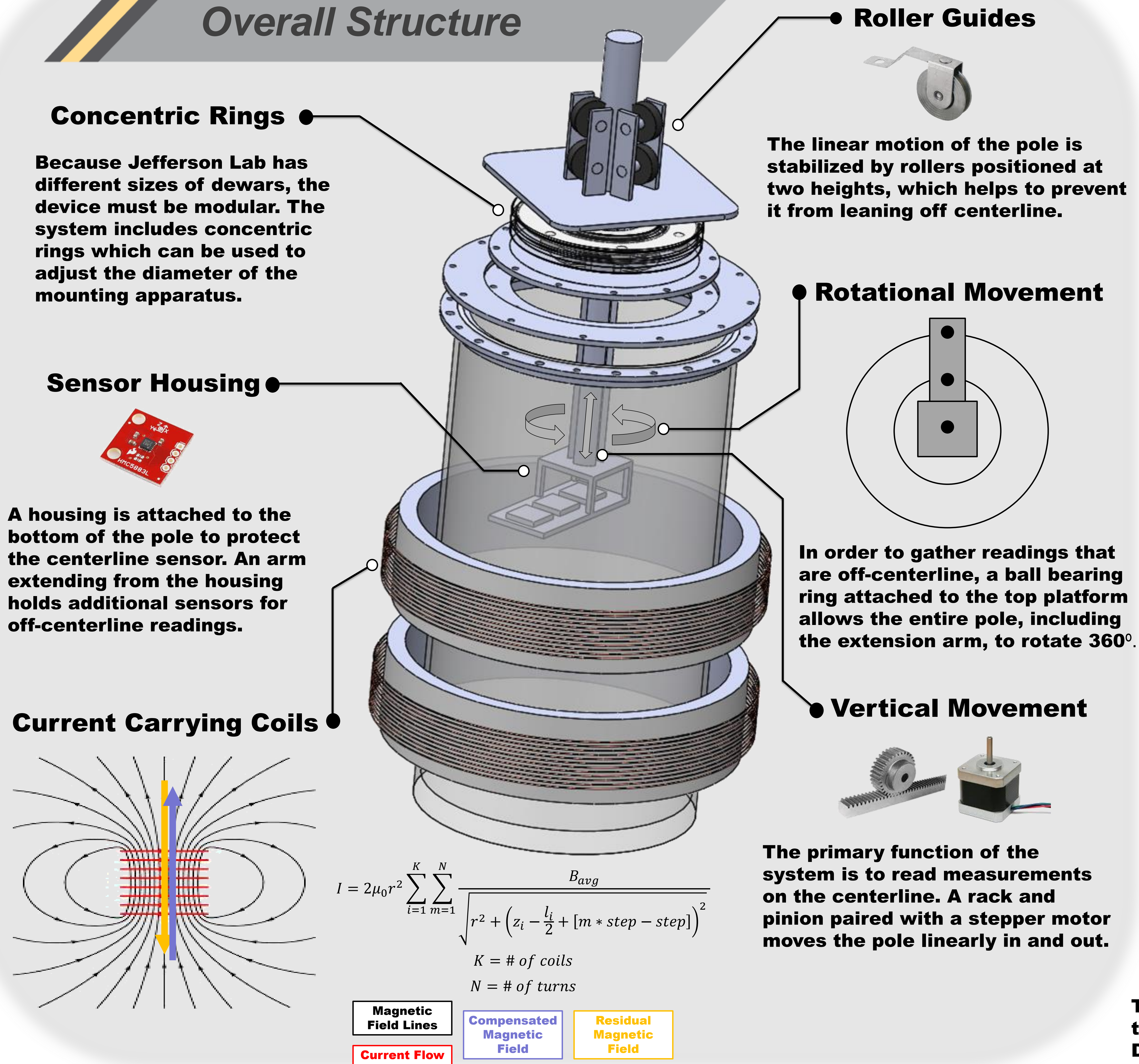
To achieve this, a set of coils are wrapped around the testing cavities. When current is driven through the coils, a magnetic field is created that opposes the magnetic field from the building, thus neutralizing it. To optimize this method, an accurate reading of the uncompensated magnetic field must be taken. This data is used to create a field that will exactly negate the building's magnetic field.

An SRF cavity within a liquid helium dewar is shown in the image at the left.

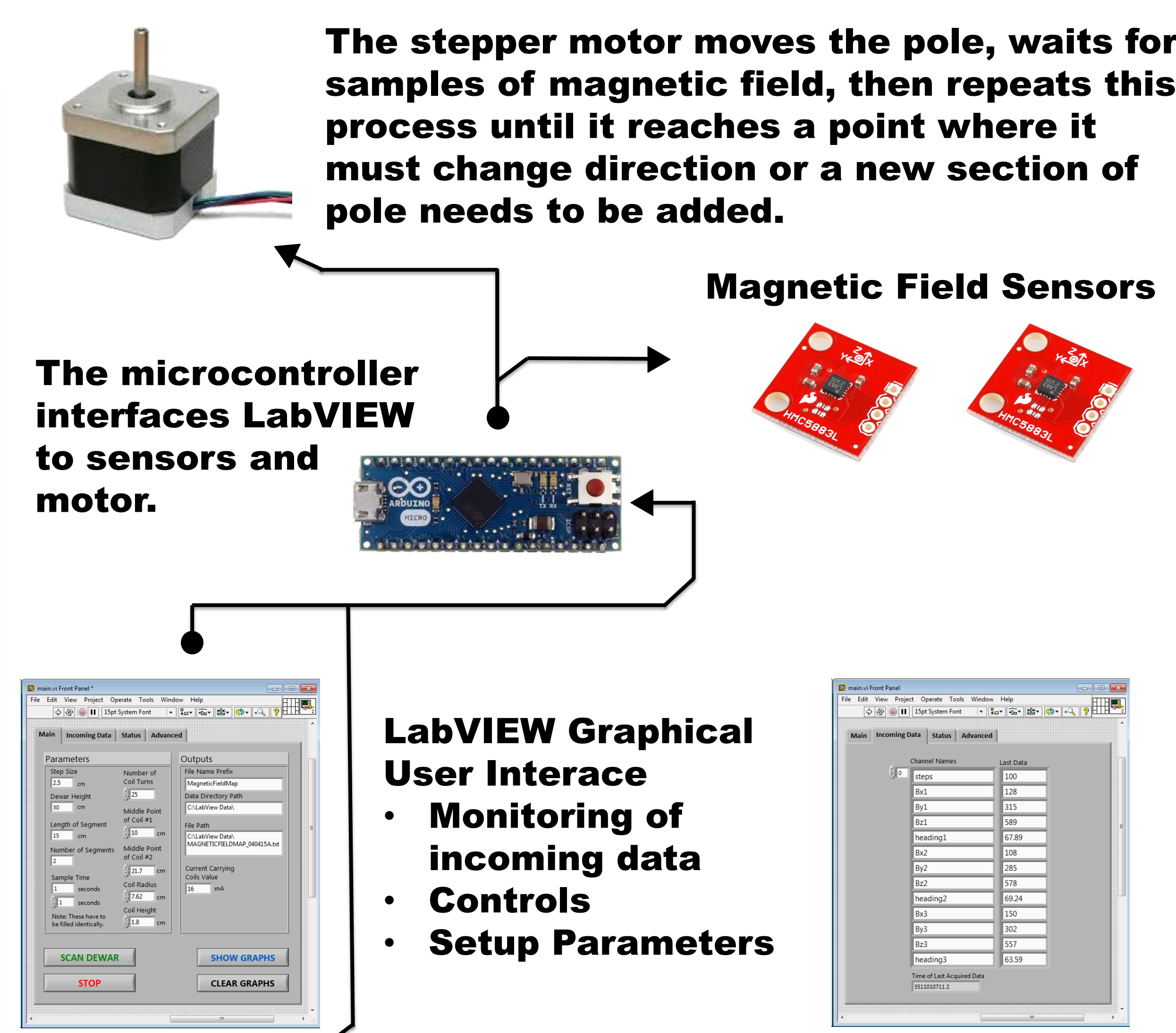
Objective

Our team developed an automated system which accurately measures and records magnetic field data from within the dewars at Jefferson Laboratory. This device serves the purpose of optimizing an existing system of current carrying coils which are used for cancellation of residual magnetic fields. This process will ensure that the initial conditions for testing of the Superconducting Radiofrequency devices are free of unwanted magnetic fields that could cause unreliable testing data.

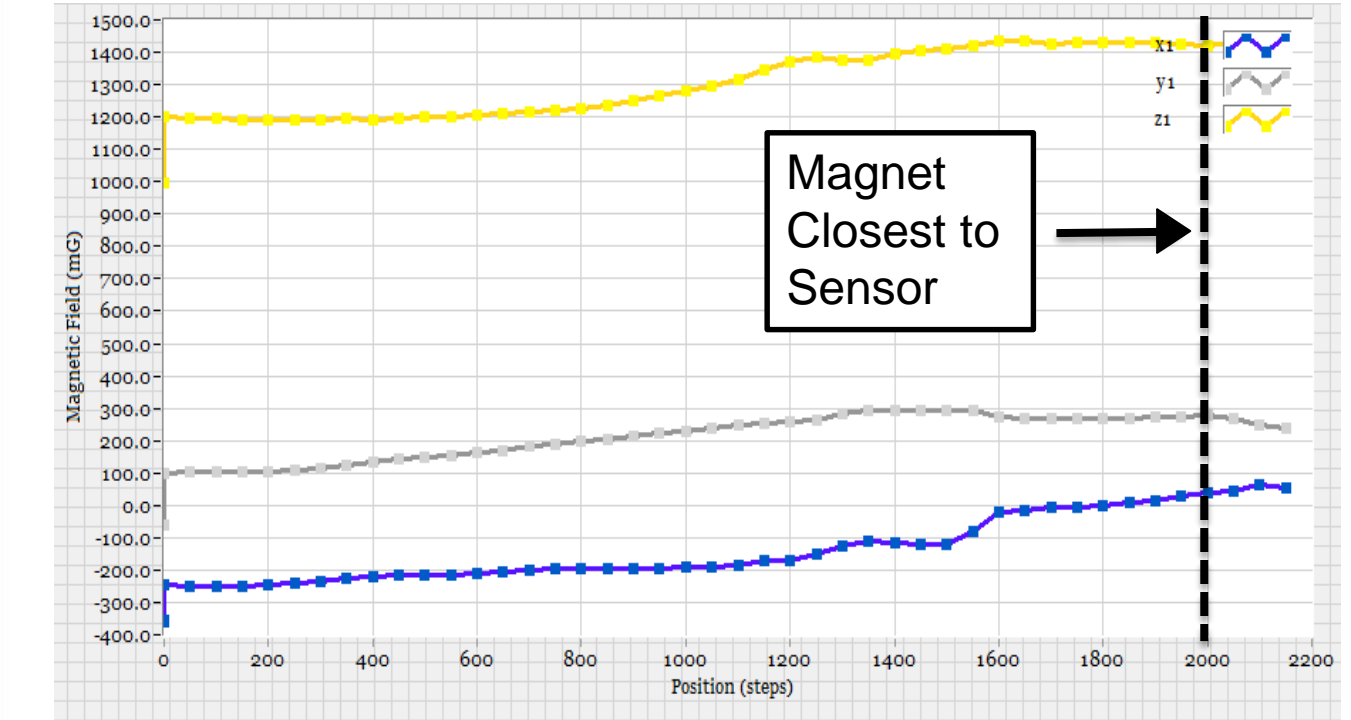
Overall Structure



Control System



Magnetic Field vs. Position



- Outputs:**
- Real-time Graph
 - Log File of the Samples
 - Compensating Current Value

Acknowledgements

The team would like to acknowledge and extend a special thank you to the Jefferson Laboratory, and specifically Mr. Kirk Davis, Dr. Ed Daly, Ms. Christiana Wilson, and Mr. Jim Henry.