Team X's Senior Project: COMPUTER INTERFACED GAUSS-METER

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GOAL : GAUSS METER MODEL X01

Gauss meter model X01 is the hand-held device designed to meet the needs of magnetic industry to measure magnetic fields accurately, provided high-end functionality and performance in an affordable laptop instrument. Magnet testing and sorting have never been easier. Additional features including calculating magnetic field intensity versus time and displaying magnetic field direction on a Graphical User Interface on Computer.

INTRODUCTION/BACKGROUND

Magnetic fields are invisible to the naked eye but yet there is a need to detect magnetic fields for applications in manufacturing industry and research. Applications include testing of electromagnetic machinery like electric motors to see if it works correctly, or to detect magnetic field properties like mapping landscapes. A gaussmeter can use hall effect sensors that utilize the hall effect to detect perpendicular magnetic field intensity. The hall effect causes a voltage to be developed between two terminals on a conductor if there is a perpendicular magnetic field and a current going through the conductor. There are a range of capabilities that are present in the market for gaussmeters. A gaussmeter can be simple enough to just tell users the magnetic field intensity as a scalar or it can have many advanced features including computer linking, 3-D sensing, and measurement of AC magnetic fields.

TEAM ORG. AND CONTACT

Steven Lo- Sensor and Sensor Interface, Testing
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Hung Vu- Power Circuitry, Enclosure, Graphical User Interfacing between hardware and computer
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Christine Dao- Microcontroller Programming
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Alan Lai- Graphical User Interface Coding
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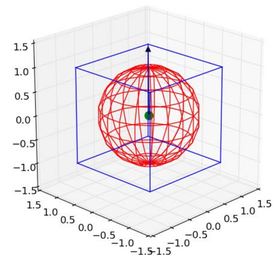
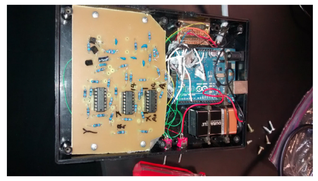
COMPONENTS
GRAPHICAL USER INTERFACE



The graphical user interface (GUI) is the software on the computer that will display important data of magnetic fields for ease of use. The GUI is in Python code, and will show important data like magnetic field intensity and direction on the screen for people to see. It will also allow people to see how the magnetic field intensity will change will time on a graph. Also in progress is a three-dimensional vector representation of the detected magnetic field.

ARDUINO MICROCONTROLLER



The Arduino Uno microcontroller is used to process the analog voltage from the hall effect sensor into a digital form that computers can use. It will also be used to output the digital value of the voltage to the computer for the GUI.

THE HALL EFFECT
SENSOR/SENSOR CIRCUIT

The Hall Effect sensor that our gaussmeter is using is called the Honeywell SS49E Hall Effect Sensor. This hall effect sensor outputs an analog voltage that depends on the sensed magnetic field intensity that is perpendicular to the sensor face. The sensor circuit uses difference op amps for better precision.

INNOVATION & BUSINESS OPPORTUNITY

Usability of the sensor due to a convenient and sleek enclosure.
Portable probe sensor allows for readings of both large and small magnetic fields.
Seamless interfacing between micro-controller and user interface gives data perfect for research and testing

MORE INFORMATION:

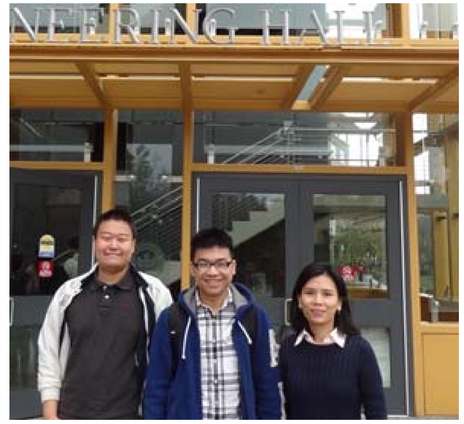
Our group website is available for reference:

Website: https://sites.google.com/a/uci.edu/uci-eecs-senior-design-project-gaussmeter/home

SCHEDULE & MILESTONES

Week 1	Obtain all physical components necessary to begin building (Hall Effect Sensor, board, microcontroller)
Week 2	Build sensor interface circuitry
Week 3	Build enclosure and power circuitry, begin GUI design and microcontroller design
Week 4	Develop microcontroller code for getting sensor data and outputting to computer
Week 5	Test functionality and accuracy data for microcontroller with sensor interface
Week 6	Solder components to PCB and connect wires
Week 7	Develop GUI and interface with microcontroller
Week 8	Demonstrate working interface with sensor, microcontroller, GUI
Week 9	Collect test data about entire system like power consumption, accuracy and dynamic response
Week 10	Present a demonstration of working prototype and oral presentation to industry panel
Week 10	Write final project report

GROUP PHOTO



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