

Senior Capstone Projects Project Proposal Form

Computer, Electrical, and Mechanical Engineering
Thomas J. Watson School of Engineering and Applied Science
Binghamton University

1. Project Title Interface between IBM 1440 and IBM 1403 N-1 Printer

2. Organization Name and Address

Center for Technology & Innovation (CT&I)
321 Water Street, Binghamton, NY 13901

3. Contact Names, Phone, Email Address

a) **Sponsor Management Representative:** Susan Sherwood, 723-8600,
director@ctandi.org

b) **Sponsor Technical Representative:** Don Manning, 748-7512,
dmanning8@stny.rr.com

4. High Level Project Description

Design, build and test an adapter that enables an IBM 1440 Processor to operate and print on an IBM 1403-N1, an 1100 line per minute printer.

5. Project Requirements

The project shall develop system designs and specifications implemented in obtainable, modern technology that perform functions of 1960s vintage electronics (e.g. IBM 1446). The team starts with research to develop an understanding of the two interfaces needed, one which accepts data from the 1440, the second that details the controlling a 1403-N1 printer, along with activation and timing the print hammers for the 1403.

After completing the basic research, the scope of functions to be designed, prototyped, and intermediate test program shall be determined jointly by the Watson School and CT&I team members (veteran IBM printer engineers and designers) prior to detailed specifications and design effort.

The team shall select an appropriate control platform, e.g. an FPGA, or an Arduino board or other available platform. Present the detailed design concepts to the CT&I

Senior Capstone Projects – Project Proposal

engineering advisors for their approval, including cost considerations. CT&I will make every effort to fully fund the alternative recommended by the CT&I engineering advisors.

The team shall implement a print hammer driver, which can be derived from existing IBM schematics. Products include schematics, bill of materials plus associated cost for presentation to the engineering team for approval. The bill of materials should list of any other parts that are required, power supplies, cables, connectors, as well as a parts cost estimate.

System block diagram (p. 4) outlines the maximum scope of effort. Design and control of hammer drivers are the highest priority; other functions shall be considered for implementation as student team members' skill sets and schedule permit. The initial project design shall consider simplification to ensure completion within the two-semester timeframe.

A prototype shall be developed and tested. Design documentation, prototype test requirements and plan shall be drafted, reviewed by CT&I engineering advisors, and revised as needed, prior to prototype fabrication and testing. For test purposes, the team could drive and test the printer interface decoupled from the 1440.

6. Project Graphic (at end of document)

- A) Overall system block diagram for 1403-N1 printer functions.
- B) Vintage circuit diagram of 1403-N1 hammer drivers.

7. Manageable Budget \$1000 - \$1200

FPGA development kit or Arduino microprocessors

Circuit fabrication

Required Parts

8. Deliverables and Meetings

8.1 Specifications for review: interfacing, PCB design, prototype test plan

8.2 Program microprocessor to deliver signals to hammer driver cards (5 amp)

8.3 A working prototype.

8.4 Detailed documentation of prototype operation and design, suitable for fabrication of additional units for full scale implementation.

Senior Capstone Projects – Project Proposal

CT&I shall provide documentation of 1440 system and 1403 N-1 printer.

Weekly meetings/conference calls during design phase.

Bi-weekly meetings/conference calls during fabrication phase

Test phase to include participation by CT&I engineering advisors.

Depending on purpose, meetings will be held at either the Watson School or CT&I, 321 Water Street, Binghamton (5 min walk from University Downtown Center), where the IBM 1440 mainframe and 1403-N1 printer are located. Preferred meeting time slot is Wednesday evening, 6-8 PM. Alternates can be arranged.

9. Recommended Team Composition (3-5 students)

Please indicate the desired number of students from each discipline. Note that occasionally Bioengineering or Computer Science students are also available.

Mechanical Engr:

1

Electrical Engr:

2

Computer Engr:

1- 2

10. Citizenship Requirements (if any) No restrictions or requirements

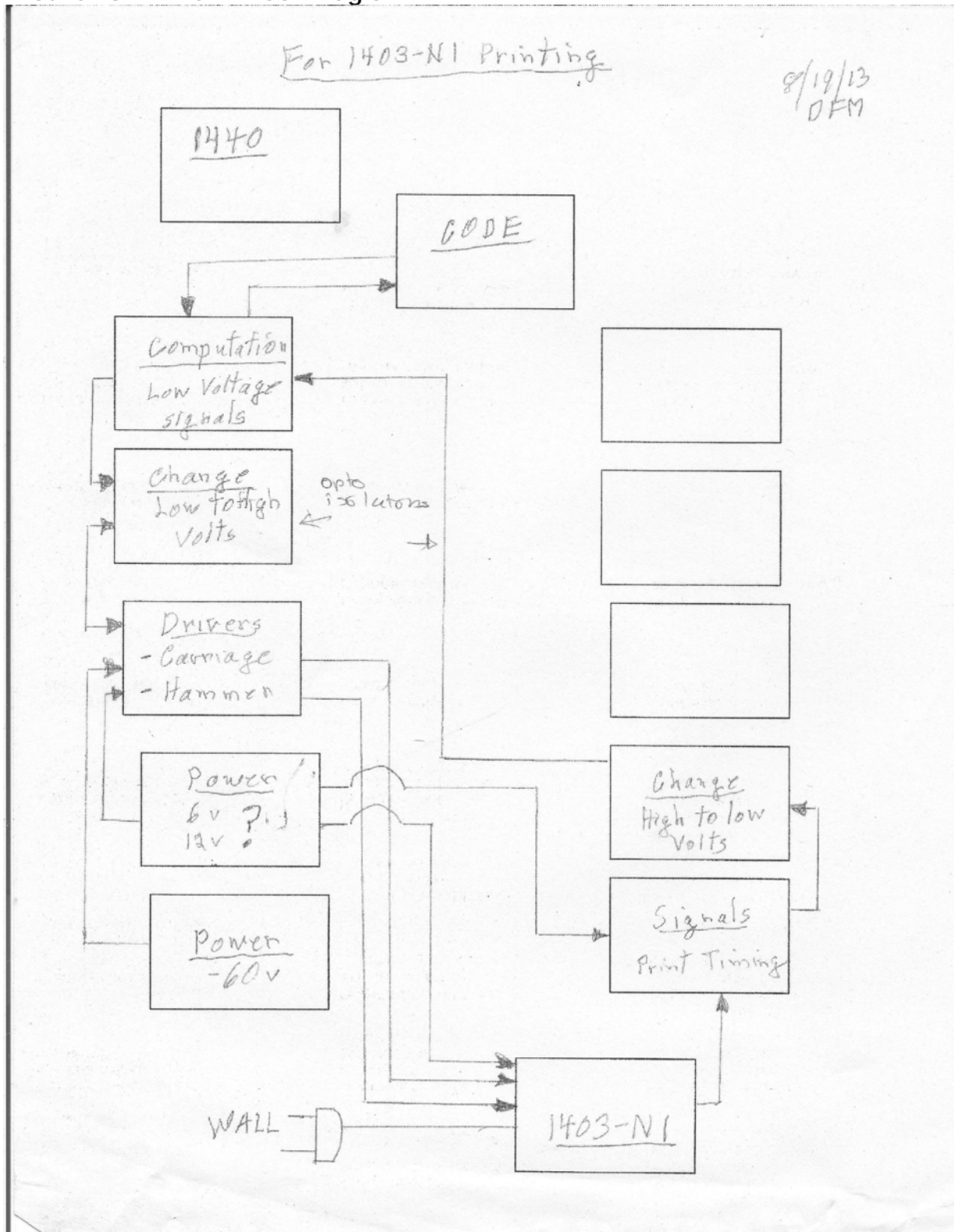
11. Team Members (optional)

CT&I engineering advisors include:

Gary DeBlieck	gdeblieck@aol.com
Bill Green	wgreen@stny.rr.com
Don Manning	dmanning@stny.rr.com
Don McCarty	mccartyde@sunybroome.edu
Fred Petras	fpetr@aol.com
Tom Schappe	tschappe@juno.com
Don Seraphim	donjean2step@stny.rr.com
Jack Westermann	jwesterman@stny.rr.com

Senior Capstone Projects – Project Proposal

PROJECT GRAPHIC A Block Diagram



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PROJECT GRAPHIC B Vintage Circuit Diagram

