October 1966

Rough Draft
for
A Proposal for a Department of Computer Science
at
Newark College of Engineering

Preamble

In the following we recommend the establishment of a Computer Science Department at Newark College of Engineering. The proposal is in three parts. The first part describes the discipline of computer science; the second part justifies the establishment of a department in this discipline; and the third part discusses the actual implementation of the department.

P. Fox

Computer Science as a Discipline

There is today a substantial and rapidly growing body of knowledge in the computer science area which is distinctly separate in content from that of any of the classical disciplines. It concerns the "art and science of exploiting automatic digital computers, and of creating the technology necessary to understand their use."[1] In this endeavor "it is concerned with information in much the same sense that physics is concerned with energy; it is devoted to the representation, storage, manipulation and presentation of information in an environment permitting automatic information systems. As physics uses energy transforming devices, computer science uses information transforming devices."[2]

The areas of interest to computer scientists include the following:

1. Structure of programming languages
2. Non-numeric programming such as special symbol manipulation languages and treatment of various types of data structures
3. Computational mathematics and numerical analysis
4. Logic
5. Automata theory
6. Simulation
7. System analysis and design
8. Information retrieval

There are other topics as well, often interdisciplinary, which are also properly the interest and concern of the computer scientist.

---

1 Stanford University's Program in Computer Science, Tech. Rep. C526 by George E. Forsythe, June 25, 1966, p. 1

2 "An Undergraduate Program in Computer Science," Communications of the Association for Computing Machinery, September 1965, pp. 543-552

Evidence of computer science as a discipline in its own right is further provided by the number of journals which have been founded in this field during the past fifteen years. These include the Journal of the Association for Computing Machinery, The Computer Journal, the transactions of the special interest group on Electronic Computers in IEEE, many trade journals such as Datamation, and numerous journals on numerical analysis, some of rather greater vintage.

A substantial number of colleges and universities have recently established departments of computer science at both the undergraduate and graduate levels. Recently the National Science Foundation awarded a grant to the Curriculum Committee on Computer Science of the Association for Computing Machinery for further study and development of a recommended undergraduate program for training computer scientists. There seems to be no doubt among curriculum planners that computer science is a separate and worthy area of study.

Justification for the Establishment of a Computer Science Department at N.C.E.

There are two principal needs to be met by the establishment of a computer science department:

1. We have currently a sequence of courses needing a home that are assigned somewhat inappropriately to the Mathematics Department. These are

   M 90 Sophomore Programming Course

   M 190 Introduction to Computer Science

   M 290 Computer Programming Language

   M 291 Logic, Automata and Computers.

   We have further the numerical analysis courses

   M 111 Numerical Analysis I

   M 222 Numerical Analysis II

   which are not out of place in mathematics, and yet which might feel more at home these days in the algorithmic atmosphere of computer science.

A department is needed to coordinate these courses in a separate orderly-sequenced situation of their own. A unifying identity is required.

2. There is a need for us not to lose our students who are interested in computer science. They include many of our very best students. At an increasing rate of inquiry, they are asking us, "Where shall I go for a degree in computer science?"

By meeting these two needs, we should satisfy a set of derivative requirements. We desperately need good graduate students to support our systems programming needs for the computer, and this need will increase markedly with a larger computer. Only by providing good education in an established computer science department can we hope to attract these students.

At present, we try to satisfy the graduate students interested in computer science by a patched-together interdepartmental degree. This has all the usual inefficiencies and awkwardnesses of interdepartmental work, accentuated in our case by the "at least two courses outside the department" requirement for the master's degree. Since the computer science courses are housed in the Mathematics Department, the student takes his computer science as "M" courses and then does not have room for some really important supporting mathematics courses because he must take a course in the electrical or the industrial department to satisfy the requirement. His attention is thus spread in many directions over a few credit hours. We should help him to focus on his true area of interest.

Implementation of the Computer Science Department

The staffing of the department should properly be discussed in detail at another time. This is mainly, but not entirely, due to its difficulties. There should be a preceding discussion of the appropriate relative roles, separate or combined, of Computing Center Director, Computer Science Department Chairman, and so on.

We have on hand at present several instructors already teaching the relevant courses. We should hope to add at least one instructor in the near future and another in some not too remote time.

In many colleges the computer science department contains many individuals with joint appointments, usually in mathematics, electrical engineering, psychology, etc. This arrangement seems to have many advantages and should prove useful for us as well. The principal bonus is the acceleration of introduction of computer applications into other disciplines, together with a general tightening of the interrelations of close academic pursuits.

None of this can occur easily, however, unless there is the core of a separate department of computer science coordinating the courses and the research, giving identity to the endeavors.