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From: John Chowning, CCRMA

**Proposal for a Master of Arts Degree with a concentration in
Musical Acoustics, Perception, and Synthesis**

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Rationale

There are several reasons that this proposed degree is particularly propitious:

1. to meet an increasing need in the computer/music industries and in the arts and technology communities for the acquisition of knowledge and techniques from a number of disciplines that have reached a high degree of integration at CCRMA,
2. to offset some operating costs through partial tuition recoupment and thereby increase the rate at which CCRMA converges toward its endowment goal,
3. the regular inclusion of skilled engineers in the CCRMA student population would have an indirect but positive effect in that they would provide "real-world" information regarding career opportunities, evolving research areas, etc.

Interest within the computer industry in CCRMA's work is a result of multi-media capabilities becoming an important part of personal computers and workstations. Sound processing is the important complement to computer graphics in multi-media and is an area that is not broadly understood in the industry. There are, therefore, many well-trained engineers working in the area of sound processing who lack the specialized knowledge in the area for which they are responsible. CCRMA is well-positioned to provide that knowledge at a level of sophistication and depth not present in other programs (for example Dartmouth's masters program). A unique attribute of CCRMA's courses and research, of great interest to these industries, is the integration of music perception, music related signal processing and controllers, and synthesis.

This degree would require no additional courses and only a modest increment in computing resources. The two part time staff positions (%50 of teaching/advising position and %20 of an administrative position) required for the program would allow us to consolidate existing part-time positions with a net increase in efficiency. After the initial several years we would evaluate the program and its impact upon the overall CCRMA activity. The desirability of increasing the number of students in the program would be one of the most important considerations.

Description of program

The program is designed for candidates having an undergraduate engineering or science degree or a degree that includes course work in engineering mathematics.

-Number of students- During the first three years of the program we will limit the number of students to a maximum of 5. This number can be easily assimilated and yet provide enough payback to the CCRMA operating costs (indirectly to the CCRMA endowment, currently at approximately \$6million) to justify the effort and costs.

-Course requirements- The program will consist of three quarters for a total of no less than 36 units. The courses include subjects not normally taught in engineering curricula (220a,b,c and 151) or not taught with the particular emphasis toward sound applications (420 and 421). All of the courses listed below are currently being offered at CCRMA as part of the undergraduate and PhD programs.

Three quarter curriculum:

fall		winter		spring	
220a	(4)	220b	(4)	220c	(4)
320	(4)	420	(4)	421	(4)
151	(4)	242	(4)	elective	(4)

Impact on existing programs

Except for the need for additional computers, the facility including classroom space computer network space can accomodate the increase. Office space is a general problem for the CCRMA community as a result of the earthquake damage to the third floor, however five additional students will not greatly affect what is at most an inconvenience. .

Career potential and sources of support

It is our expectation that most applicants for this degree will already be employed by industry or supported through ministries of culture/education. As the degree provides knowledge and skills directly applicable to their work, employment following the degree would appear to be secure. Given a clear understanding that there is no financial aid, it is our expectation that most students

would be supported by their employers in the computer industry, some of which are likely to be CCRMA Industrial Affiliate members, and by grants from foreign governments to support individuals active in forming institutions similar to CCRMA.

Administration of the program

Because of the likely relation of the program to our industrial affiliates program and the fact that all of the courses are CCRMA courses, the administration of the program would be most efficiently realized at CCRMA rather than within the Department of Music. The current staff and faculty would assume responsibility for administration of the program during the first year.

Budget

The budget is based on arriving at a maximum enrollment of 5 students by the third year. Expressed in constant dollars, it assumes CCRMA recoups \$12k of tuition per student. The initial two years will involve set up costs including the purchase of some hardware and the addition of a part time administrative person (the second year) and the advising/teaching staff position to be filled by research associate Perry Cook. He is currently appointed at CCRMA and serving as CCRMA's Industrial Affiliates Liaison. This program will help offset his current CCRMA salary.

	<u>Year 1</u> <u>(2 students enrolled)</u>	<u>Year 2</u> <u>(3 students)</u>	<u>Year 3</u> <u>(5 students)</u>	<u>Year 7</u>
Advising Staff	\$25k	\$25k	\$25k . . .	
Admin. Staff	----	\$10k	\$10k . . .	
Computers	\$ 5k	\$ 5k	\$ 0 . . .	
Maintenance	\$ 3k	\$ 3k	\$ 3k . . .	
Costs	\$33k	\$43k	\$38	
Tuition Revenue (at \$12k / student)	\$24k	\$36k	\$60k . . .	
Net Annual	<-\$9k>	<-\$7k>	\$22	
Cummulative	<-\$9k>	<-\$16k>	\$6 . . . \$18k . . . \$40 . . . \$62 . . . \$84k	

Computer Hardware (one time cost)

Purchase 1 machine for every 2 students. Price of 2 NeXT slabs. Expected life is reasonably 7 years.

Maintenance (annual)

Budgeted for hardware and software

CCRMA Courses

MUSIC 151 PSYCHOPHYSICS AND COGNITIVE PSYCHOLOGY FOR MUSICIANS
(J. CHOWNING, P. COOK, M. MATHEWS, J. PIERCE, R. SHEPARD)
MUSIC 154 INTRODUCTION TO COMPUTER MUSIC (C. CHAFE)
MUSIC 220 a/b/c COMPUTER-GENERATED MUSIC (J. CHOWNING, C. CHAFE)
MUSIC 242 SEMINAR: SPECIAL TOPICS IN COMPUTER MUSIC [By arrangement]
MUSIC 320, 420, 421 SEMINAR IN SIGNAL PROCESSING FOR MUSIC RESEARCH (J. SMITH)
MUSIC 319 SEMINAR: SPECIAL TOPICS IN HEARING AND PERCEPTION (P. COOK)
MUSIC 120 INTRODUCTION TO MUSIC SYNTHESIS AND PROGRAMMING USING MIDI-BASED SYSTEMS
(C. CHAFE)
MUSIC 192 THEORY AND PRACTICE OF RECORDING (J. KADIS)