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Project Title:  
Design and development of a world music keyboard capable of playing pitch-continuous music genres

1. What are the research questions?  
Design and development of a world music keyboard capable of playing pitch-continuous music genres  
1. What parameters need to be controlled in a pitch-continuous genre capable music keyboard?  
2. How can these parameters be controlled using software?  
3. How can these parameters be controlled using hardware?  
4. Will these keyboards be acceptable to practicing musicians?

2. Rationale  
Several Indian classical music performers have spent entire lifetimes tweaking saxophones, clarinets, guitars and other western instruments to produce the special nuances that make the genre unique.

Research I have already completed has had some success producing these nuances using software. This project will further explore the musical nuances and their modelling and production using computer hardware and software. Embedding these nuances into hardware will involve advanced practice in the field of computer hardware and software and the use of various tools. Some of the new knowledge will be published and there will be opportunities to explore the commercial potential.

Research work published in Stanford University and MIT Press Journals provide some mathematical and other modelling techniques.

3. Methodology  
Nuances were modelled in software. Microcontrollers, EEE PC Box, music keyboards and a number of electronic components were used to implement these in hardware.
Two commercial keyboards bought using Unitec funding and one bought with my personal funds were opened up and used, in conjunction with the circuit diagrams and other information available on the Internet, to study the actual hardware inside commercial music keyboards.

Another keyboard bought with Unitec funding and my personal keyboard were used in various experiments and demos.

Musicians and music teachers were asked for feedback and improvements made to the software and hardware. Care was taken here to avoid leaking potentially commercially sensitive information.

4. Outcomes / findings

All the research questions have been answered. The parameters can be controlled in both software and hardware and music of high quality can be produced using either or both of these.

A demo of the concept and some hardware in use was given at a Research Seminar of the School of Computing and Information Technology at the end of 2008. I invited the staff from the Research Office to this seminar/demo and Doug McLeod and Stephen Cox attended.

Some of the equipment and consumables purchased and the technical computing knowledge gained in doing this research continue to be used in my teaching and other research projects.

5. Publications and dissemination

A paper was submitted to a February 2009 IASTED conference on a related area but was not accepted due to my having to keep the essential details secret.

I need to discuss with the Research Office and the Dean/HOD and see if we want to exploit the commercial potential or give away the ideas and information, by publishing all the details for others to exploit the commercial potential. I am aware that there is serious commercial potential here.

6. Related comments and two Important Recommendations

I have many more ideas and projects. Our courses and programmes also need to include real technical computing that has a lot of applications and commercial potential in the real world. I applied for the position of HOD and tried to sell this new direction and ideas but my ‘lack of management experience’ stood in the way.

There is so much we can do, not only in the DOC, but also in interdisciplinary and multi-disciplinary areas. Just look at the proliferation of Wii, iPhones, other such small hardware, the advances in robotics, with Microsoft itself going into robotics, the computing in medical and geriatric care, the technology invading our homes, especially smart homes, technology used in sustainability, etc.
**Recommendation 1:** A research centre and lab be established within Unitec for projects applying cutting edge computing technology in a wide range of areas.

Finding my work when they do searches on scholar.google.com, several highly motivated, highly skilled, top students from around the world, including those from the top IITs in India, email me wanting to work with me. If we can find ways of making this happen, and I am given the right support, there are many more real technology projects that can be done.

**Recommendation 2:** Staff with ideas and outputs whose expertise is sought by others be encouraged and provided timely support to engage in high quality projects and not overloaded.