FUTURE
OF
CARNATIC
MUSIC
No one can predict the future perfectly. Even famed astrologers are able to tell only the past perfectly. The future is a definite mystery. Having said this, considering the past and the present trends in which carnatic music is developing, we can attempt to make a judicious estimate as to how the future trend will be. The development will be striking in three major fields.

1. the way people listen
2. the way music is archived
3. the way music is taught
4. the way music is created

The web, the home theater etc have changed the way people listen to music. Now almost every home, where music is appreciated, has a dedicated room for listening to music with special acoustic treatment, hi-fi equipment etc.

We now have e-readers, e-commerce, e-banking etc as norm. Very soon, music will be bought and sold only through the net. Already, we have sites that let you download for a fee and sometimes free. But the free downloads come with a lot of glitches. Good quality original music will soon be marketed through the net.

7.1 COMPUTER MUSIC

The term Computer Music is generally applied to producing music from notation or data, using a Computer Sound Card installed in a Computer or a Synthesizer. It thus implies that the music is synthesized or created artificially approximating as closely as possible the tones of musical instruments\(^{157}\). Although the advent of multimedia (simultaneous use of text, pictures and sound on a computer) has led to publication of large number of CD Titles relating to music and the newest entrant – the DVDs, these mostly have music recorded from a performer (though occasionally there may be some synthetic

\(^{157}\) http://carnatic2000.tripod.com/compmus.htm
music in such titles) and are not considered as generating 'Computer Music'. Again artificial music produced using analog devices are not considered as Computer Music, the essential requirement being that the music is generated from digital data.

Western musicians and composers have been extensively using the computer in the field of music for the past decade or so. Computer Music greatly assists composers of Western Music with its emphasis on orchestration and harmony. A composer can immediately listen to his ideas without waiting for it to be played by an orchestra. In India composers of film music which has a high content of orchestration have been using Computers for synthesizing their music for a considerable time now. It is simply amazing what a PC can do to music today. One can practically have a studio at home. A large number of software (some shareware) in wide range of prices is available for composing music using the staff notation.

Mr.T.Narayananurthy (then Deputy Director General in the Dept. of Telecommunications) in 1992 made the first attempts to generate Carnatic music using computers\(^{158}\). In fact he had designed his own operating system and even hardware for the work, at a time when Personal Computer had not become popular. However, he did not bring out a software package for distribution and his efforts remained in the realm of experimentation, though he gave demonstrations in Music Academy, Madras. The reasons for the reluctance to accept computer as a tool to generate Carnatic music are not far to seek. The factors that make it very difficult to synthesize Carnatic music on a computer are:

(a) Although Carnatic music has a large number of full fledged compositions published with notation, the notation system is only skeletal. If one keys in the

\(^{158}\) carnatic2000.tripod.com/compmus.htm
notes alone on a harmonium or an electronic keyboard, in most cases the music would be totally unrecognizable. The notation system does not show the nuances or gamakams which are essential to get the 'raga bhavam' in most of the ragas.

(b) Even though attempts were made nearly a century ago by Sri Subbarama Dikshithar in his Magnum Opus, Sangitha Sampradaya Pradarsini in which he gave symbols for the various gamakams used, and more recent publications by C.S.Ayyar and S.Vidhya use gamakam symbols, these are qualitative descriptions and are inadequate for generating music on the computer which would need a precise quantitative description of the gamakam.

(c) Carnatic music is mainly melodic. A concert may have only a single accompaniment for the main artiste (vocalist or others like gottuvadhyam). Both artistes play the same melody unlike in western music where different instruments may be playing different scores. The computer thus does not greatly help a composer who can easily 'hear' his melody in his mind.

(d) The same composition with the same notation may be sung by artistes of different schools in widely different ways, all acceptable within the raga's framework.

(e) Extemporization is a basic feature of Carnatic music. Although it is the alapana and kalpana swaram which are entirely extempor, artistes do resort to extemporization even in compositions, which is often welcome by listeners.

(f) The score played by percussion accompaniment is varied and personalised. Computerised percussion is often felt monotonous by a Carnatic music listener. Thus on the one hand there are many difficulties in synthesizing Carnatic music and on the other hand the motivation for synthetic music is also lacking.
Sri M. Subramanian has conducted a detailed research into this field and has come up with viable programs already to synthesize carnatic music, though the application is not yet used widely. The future will definitely fine many users and more such programs in the market.

### 7.2 Teaching Carnatic Music

The future will have gurus widely using computer software to assist them in teaching music. ‘Sing & See’ is singing training software that teachers and singers are now using in west to improve their vocal training experience. It shows the singer and teacher visual displays that represent the voice - pitch, loudness, and timbre. This direct visual feedback enhances the spoken feedback that teachers give their students, and allows singers to see patterns in their voices that they might otherwise miss out on hearing. It lets the teacher show the students their voices - giving a powerful explanatory tool and a way to enhance the teaching experience one can offer students. It gives real-time visual feedback, so the student can instantly see what he/she has just sung by looking at the computer display - giving the student precise information on how his/her voice is working and helping him to focus on improving his/her voice. Soon we will see this and similar software being used by carnatic music teachers.

Many teachers are now realising that visual feedback technology can provide an additional tool in their repertoire - a tool that can make explanations easier, can clarify feedback, can provide focus for self-directed learning, and can even help to highlight vocal issues in a non-confrontational way. The students realize their mistakes just by seeing the graphs, requiring only help from the gurus on how to correct these mistakes.
Sing & See Voice Pitch display –
the note is shown clearly by the change of colour on the piano keyboard,
and also by the stave-note display. The history of the sung note is shown by the blue line
trailing the red dot.

7.3 **APPRECIATING CARNATIC MUSIC**

Till date, appreciating carnatic music meant, one had to get a basic knowledge of ragas. But now with softwares such as Rasika etc, this task has been made very easy.

7.3.1 **Rasika**,\(^{159}\) one of the programs in Rasika V2, the software for appprecciating carnatic music package is like a book on Carnatic Music, which also sings to you. One can enhance a person’s appreciation of Carnatic Music with Rasika which produces synthetic music in Veena and Flute tones with all the nuances (gamakams) required for Carnatic Music.

**The salient points of the software are:**

- Concepts clearly explained and grouped into 5 modules. Cogent narrative with suitable audio or audio-visuals where required.
- Rich audio visuals to grasp the intricacies of the Carnatic Music System.

\(^{159}\)carnatic2000.tripod.com/rasika.htm
• Highly interactive - 3 quizzes for testing note / melam /raagam recognition
• Choice of Veena or Flute in 10 different Sruthis in the audio-visuals of Raagam Module (which explains 111 raagams in detail and 80 raagams in terms of Aarohanam and Avarohanam with audio-visuals)
• Tips to distinguish allied raagams
• Convert your PC into a Sruthi Box or Thamboora - Wide range of Sruthis (with fine adjustment in the case of Sruthi Box) and easy to set up
• Convert your PC into a Thaalam Generator - 35+2 Thaalams 1 or 2 kalai or thisram
• Add echo with controllable parameters to enhance the tonal quality.
• A Glossary for technical terms of Carnatic Music.
• Common Index to all the modules.

The Melam module explains how Melams are formed & the math behind it.

In the Raagam module on the raagam page of the software (sample below) by clicking on 'Play' button above the keyboard picture, the arohanam and avarohanam of the raagam are played with the notes appearing on the corresponding keys. Similarly by clicking on the 'Play' button above the second window in the software the typical phrases of the raagam listed in the window are played with the currently playing phrase shown in a different color.
7.3.2 Gayaka: The first full fledged software for playing Carnatic Music by entering the solfa - 'sa ri ga ma' notation. There is no need for the rasika or the shishya or performer to learn the staff notation to compose and play Carnatic Music. We have software developed for this. Now you can enter notation in the Carnatic Style - just copy from any book of Carnatic Music compositions with notation and play it! Choose Veena or Flute from and your own natural Sruthi (a choice of 13 sruthis - from lower octave of 6.5 kattai, usually referred to as 'half kattai', upto 6.5 kattai) and play with thanpura in the background! Special enhancements of the notation enable you to control the smoothness of the transit between the notes and vary the pitch of a note by microtones and enable playing all types of gamakams.

\[\text{carnatic2000.tripod.com/gaayaka6.htm}\]
This is really a boon to students. It is also an invaluable aid to gurus and musicians who want to set the kruthis to notation and check for aksharams and tune. This is how the GAAYAKA screen looks (with a sample of notation entered). If the media player can play streaming mp3 files then one can click anywhere on the picture to hear the music. (Media player is required only to play the music from the web site. With the software there is no need for any other program for playing the music.)

In the software one has many choices - one can change the tempo or sruthi, select a block to be played, choose loop mode for repeated play. One can fine adjust the sruthi (to suit instruments like Flute with aadhara sruthi which may not coincide with the standard sruthis). One can not only play the notation but literally 'play with it'! A special enhancement of the notation enables the connoisseur to control the smoothness of the transit between the notes and vary the pitch of a note by microtones and enable playing all types of gamakams. There is an option to start the music from the cursor position or the start of the file or selection. This is very useful when composing.

The Highlights of GAAYAKA are:

- Use 'sa ri ga ma' notation with minor changes to make it easy for entry.
- Select Melam or choose individual notes to define the scale.
- Use ';' or ',' for pauses or lengthening notes as is the current practice.
- Vary note pitches minutely, control the transit duration between notes and thus produce gamakam.
- Group the notes for continuity or break where required.
- Set desired tempo - note duration from 1/100 to 1 second which can be prolonged with ',' or ';' and which is further adjusted for the Kaalam in the notation.
• Quickly check the number of notes in a block (with automatic calculation of half notes, quarter notes etc.)
• Choice available to highlight the notation being played
• Single key operation F12 for Play, Esc for Stop, F11 to select current line.
• Option to start playing from current cursor position/beginning of the file.
• Select Auto-thaalam, define thaalam and notes per aksharam and generate thaalam automatically with 2 different sounds (one for the beat and other for the count or wave) - useful for practicing lessons.
• Manual thaalam (generated by putting + symbol where required) as in previous versions is also available
• Fine adjust sruthi to practice with instruments like Flute with fixed sruthi.
• Choose either natural scale (normal) or Equally tempered scale Change the melam in the middle of a file - for Raagamalika
• Change the tempo in the middle of a file - for nadai (gathi) change.
• Change the instrument in the middle of the file << New in Version 2
• Convert a block of notation to upper or lower octave quickly using the menu from Edit menu.
• Add words of lyric or other comments for reference.
• Extensive on line help for using the software.
• Tips on notation for gamakams - ready made notation for common gamakams of common raagams - copy and paste them.
• The tips on gamakams also available as .gka files for proper grasp of the concepts. << New in Version 2
• Tool bars for quick entry of notation or access to gamakam codes.
• Sample notation files of Varnams and Krithis. Listen to the krithis and you may think it is recorded music!
• A set of beginners lessons (Sarali, Janta, Dhaattu, Melsthaayi varisais and Geethams) with and without gamakam and a few Varnams with gamakam are provided.
• Using thambura.gka file convert your PC into an electronic thamboora if necessary with a thalameter added!
• Save the composition as text (.gka) file - or as a .wav file if you want to use it in other applications or play it in PC's not having Gaayaka.
• More notation files put up on this website periodically for downloading and playing.

7.3.3 **Sishya**\(^{161}\) is designed for the beginner for practicing Carnatic Music lessons of Sarali Varisai, Janta Varisai, Hechu Sthaayi Varisai, Dhaattu varisai, Geethams and a few Varnams. It provides a clear visual interface highlighting the currently played note(s) in a different color and showing simultaneously the thaalam action (kriya) along with a bell like sound for the thaalam. Sishya can play only lessons supplied. For other lessons Gaayaka can

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be used. All the lessons supplied with Sishya are also available as .gka files for playing in Gaayaka.

**Sishya's salient features are:**

- Clear graphic interface - enabling easy choice of part to be played and looped.
- Load the required lesson using the 'Lessons' menu.
- Music is in the tone of Veena of Flute.
- Use a Sruthi most suitable for student's voice - range 6.5 kattai (A#) to 6 kattai(A).
- Find the most convenient Sruthi for the student's voice.
- Adjustable tempo.
- Hand gestures showing thaalam actions synchronised with the music.
- Thaalam sound available - different sounds for clap and for wave and count.
- Thalam sound volume is adjustable.
- Background Thamboora Sound with adjustable volume.
- Choose a part of the lesson and play it repeatedly using 'loop' facility.
- Sarali Varisais and Geethams are available both with and without gamakam.
- Varnams in 2 kalams
- For lessons without gamakam tempo can be changed at will
- for lessons without gamakam, melam can be changed to enable the student to get mastery of all notes.
- 3 Modes are available for playing - Normal, Avartham repeat once, Half Avartham repeat followed by full Avartham. Two additional modes for the 'repeat' modes are available with low volume when the music is repeated so that the student's intonation will be clear.
- Standard type Help with explanation of the screen and other features.
- The sister program Novice can help in using Sishya for a real novice.
7.4 **E-learning**

E-learning comprises all forms of electronically supported learning and teaching. The information and communication systems, whether networked or not, serve as specific media to implement the learning process. The term will still most likely be utilized to reference out-of-classroom and in-classroom educational experiences via technology, even as advances continue in regard to devices and curriculum.

E-learning is essentially the computer and network-enabled transfer of skills and knowledge. E-learning applications and processes include Web-based learning, computer-based learning, virtual classroom opportunities and digital collaboration. Content is delivered via the Internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM. It can be self-paced or instructor-led and includes media in the form of text, image, animation, streaming video and audio.
The early stages in E-learning in carnatic music started with the guru & shishyaa in their respective homes having a session with the help of a web camera and microphones. Now, many e-tutoring sites which till now were teaching normal school curriculum have started developing special programs to incorporate music into their range.

Even as the world is moving fast towards the Net Age, e-learning of Carnatic music has taken a corporate avatar. Noted vocalist Neyveli Santhanagopalan started teaching Carnatic music through the Net in 2006, thanks to Indiamusicinfo.com, an online music company floated in 2000. The company had launched a web-based interactive Carnatic music-learning programme for aspiring musicians across the globe. The curriculum was designed in such a way to facilitate a learner to become performing artiste of quality. It covered the basics. It also contained some advanced portions. It was a totally interactive program.

E-learning could prove successful for a learner as the teacher was available 24 by 7. In the conventional Gurukulum system, a student had to wait in anticipation for the teacher to teach. In the e-learning, the process was reversed. Here, students appear on the screen and goad a teacher into teaching.

Music is a mystic art. Even silence is supposed to be music. This was adhered to by great vidhwans. Hence, both the technical and mystical aspects were taught to students. This is possible in the e-learning as well. Anything about a raga is readily available. Discussion forums are available. Moreover, the learning will be an interactive one with feedback in the form of video and audio. The students can simply record their voice singing in real time with their tone, inflection and meaning and send it as feedback for the guru to listen. The guru will provide informative feedback to learners on how they could improve their singing.
Can one teach music over the Internet? How? Can one teach with Youtube? Nirvana? Piczo? Audacity? Billboard? Newsfeeds? Can one teach in a way that is engaging for the learner? What does it mean to be a learner-centered teacher of music in a technology-mediated context? To find out how Learning music in an online environment, a video in Youtube is helpful. This video is a knowledge mobilization outcome that is part of a collaborative inquiry in which Andrew Mercer (the teacher profiled in the video) and Andrea Rose, School of Music, Memorial University are participating. [http://focus-on-e.nuvvo.com/lesson/1124-teaching-music-online](http://focus-on-e.nuvvo.com/lesson/1124-teaching-music-online)

### 7.5 X4LMUSIC: e-learning for music and music technology:

The project aims to develop standards-based e-learning objects utilizing and repurposing materials available via the Grove Online reference work, MIDI, digital video and audio clips, content available through an existing relationship with Soundcraft, plus materials to become available on the Arts and Creative Industries Hub of the RDN.

**Aims and Objectives:**

1. 1) Development of e-learning expertise and knowledge base of subject specialists and LRC staff in the two Colleges involved
2. 2) Design and Production of pilot standards-based e-learning resources
3. 3) Analysis and evaluation of teaching and learning strategies in relation to the learning objects produced
4. 4) Trial packaging and mounting of learning objects into VLEs at each college
5. 5) Series of observational and self-reflective reports on experiences
6. 6) Development of best practice document reflecting findings from this project

This project has now ended.
7.5.1 **Another E-Learning Project:** Ludwig Pesch of Dhvani also has tried this E-teaching in carnatic music. As an organization dedicated to the preservation, dissemination and education of art forms of India, Dhvani interacts with educators, artists and artisans around the world. Ludwig Pesch studied European music at Friedburg Music College (Germany) and South Indian (Karnatic) music at Kalakshetra College of Fine Arts (Chennai, India). As a scholar and guest lecturer, Ludwig has worked with musicians, students and young children and has introduced Carnatic music in the context of special education and rehabilitation projects in Germany.

7.6 **Skype**

This medium is being used widely now to teach various tutorials. Some net saavy teachers are already using this to teach carnatic music. But the future will see this medium being used as the norm rather than a novelty. The very simple software which people now use to communicate worldwide, which is cheaper than telephone calls will find itself part of carnatic music teaching shortly.

7.7 **Musical Instruments**

With the advent of synthesized sound, the instruments that can be used in carnatic music have grown exponentially. One doesn’t have to master the instrument and improvise to suit carnatic style like Kadri Gopalanath or Srinivas had to do with Saxaphone or mandolin. At the touch of a button, the keyed in music can be made to sound as coming from any instrument of our choice. The future is really unbelievably vast for the musical instruments that can be used.

In 1998 Sri M.Subramanian released 2 programs which ran under Windows operating system and produced synthetic music through the sound card in the tones of Veena and Flute. The first program was basically the earlier DOS based program but producing music in the tones of Veena and Flute while the second one was entirely new. It enabled generation of synthetic music by entering
notation in the traditional 'sa ri ga ma' style. With the advent of CDRom drives a program to explain the Carnatic music system can be produced on a CDRom with recorded music including vocal music, but synthetic music programs have the advantage of being played from the hard disk with quicker access to the different modules and also enable generation of the same music in different instruments and sruthis.

Carnatic music without gamakams is like a river without water. Until the end of 2001, there were no MIDI files with gamakams. It is now possible to synthesize carnatic music with gamakams on the computer. It is also possible to automatically synthesize Manodharma Sangeetham. Artificial Intelligence techniques make it possible for this synthesised Manodharma Sangeetham to be different every time it is synthesized - just like any human performer. Synthesized carnatic music with beautiful gamakams will soon be available on the web and on CDs, DVDs etc.

During the past few decades, non-traditional instruments such as the accordion, clarinet (A.K.C. Natarajan), guitar (Prasanna), harmonium, mandolin (Srinivasan), keyboard, saxophone (Kadri Gopalnath) and the tabla have been successfully introduced in carnatic music. Some instruments like the veena have had new avathars, with the fixing of frets with wax having been done away, a sruthi box & an amplifier-speaker combination placed inside the kodam & dandi etc. There are many more instruments, old and new, that can be used in carnatic music. Such use can only help carnatic music become a lot more appealing and popular.

Does orchestra environment have a future in carnatic music? We have seen western instruments entering the carnatic music arena, violin, mandolin, guitar etc. Are there chances for the cranatic music accompaniments growing, a full orchestra will be the ultimate? Orchestra is not alien to carnatic music.
Current carnatic music has been shrunk from its original form considerably. The current styles in vogue are suitable for only a particular range of life situations. The original carnatic music of sangam and post-sangam era covered the whole gamut. There was also music grammar for music rendered in the context of various sports. The latter category needs a very rousing rendering of music and only orchestral rendering can provide that aura. Thyagaraja has composed operas. In Tamil music also we have operas in Silapathikaram etc. Orchestral music will definitely add depth to this.

7.8 **Electronic Musical Instruments:**

Mridanga Talam, the electronic Mridangam & Manjira is an innovative choice for all professionals & budding Carnatic artists. Mridanga Talam Digital with its natural Mridangam & Manjira tone delivers an ambience similar to that of a live stage performance. It has over 200 talams, SMPS & digital balance. Regular practice with it helps you perform better by building confidence and negating the fear within.

Recent innovations include attempts to explore possibilities of electronic instruments and the use of computerized data bases. In spite of the confirmed fact that the human element guiding the se presentations is of vital importance, attempts to present varied patterns of percussions of several variety of colors, tone, timbre, and volume representing percussions has been recognized. Even patterns of Dole, Sammela, Chande, Chowdike, etc. can be produced along with the patterns of the Mridangam, Ghatam, Khanjari, and Morsing, etc.

Percussions of the future may incorporate most of these electronic gadgets, computerized floppies to provide a wider variety of laya vinyasa. While Western drums in use are being matched with Indian drums, the practice of intricate laya combinations is being further attempted. The sophisticated Nadai Bheda and Solkattoo combination of varied gaits, tempos, and speed are all used
profusely in the experiments that are going on. In fact, the sounds produced by these instruments are precise and perfect when played individually by artistes themselves. The future of percussion appears exhilarating in the world scenario.

While the scholars, academians, and practitioners in the classical arena may hold onto the tradition and innovation, a need for a refreshing new concept of rhythm and tempo is gradually being seen.

7.9 **ROBOTIC MUSIC**

We now have robots doing various chores. Scientists have come up with robots that can think and feel, though these inventions are in the very early stages of development. But the day is not far when we can get the robots to make music given some basic parameters.

7.10 **KARAOKE**

Karaoke is now very popular, but it is mostly used in film songs. The future definitely has carnatic musicians using this technology to perform on stage, doing away with expensive pakkavadyams. Artists will be able to perform more easily.

Carnatic music has innumerable ragas technically, but we see only a small percentage being used in performances till date. The use of computers and robotic technology will help many such ragas being used in compositions and performances.

7.11 **STREAMING MUSIC IN RAGA.COM, YOUTUBE, AUDIO BLOGS**

Digital storage costs are low, so a company can afford to make its whole inventory available online, giving customers as much choice as possible. It has thus become economically viable to offer products that very few people are interested in. Consumers' growing awareness of their increased choice results in
a closer association between listening tastes and social identity, and the creation of thousands of niche markets.

Another effect of the Internet arises with online communities like YouTube and MySpace. MySpace has made social networking with other musicians easier, and greatly facilitates the distribution of one's music. YouTube also has a large community of both amateur and professional musicians who post videos and comments. Professional musicians also use YouTube as a free publisher of promotional material. YouTube users, for example, no longer only download and listen to MP3s, but also actively create their own. There has been a shift from a traditional consumer role to what they call a "prosumer" role, a consumer who both creates and consumes. Manifestations of this in music include the production of mashes, remixes, and music videos by fans.

7.12 Musical Cognition and Perception

One of the major areas of computer applications to music is in Musical Cognition and Musical Perception. Enormous amount work has been done in this field in the west and very little in Indian music. While many of the conclusions of the work on western music may be fully or partially valid in the Indian context it is necessary to repeat them with Indian listeners and Indian musical idioms. The ease with which different tones of known frequencies and harmonic content can be produced with a computer makes it an ideal tool for such analyses. Sufficient number of listeners has to be included for these studies as the results are subjective and there is considerable variation among individuals.

Some of the areas for research in musical cognition/perception could be:

a) Pitch perception of notes (voice and different instruments),

b) perception in different environment such as accompanied thannpura, other accompaniments, loudness and noise:
It has already been established that pitch and frequency are not the same, the former being the sensation produced in the listener and the later a physical quantity. Notes with the same frequency can be felt to have different pitches in different situations.

### 7.13 **Computational Music**

Many minds, many generations contributed in the evolution of music. Plurality of contemporary musical expressions in India reflects this journey of evolution. India has diverse and wide-ranging categories of musical expressions from dhrupad-khayal to Thumari and Tappa on the one hand and Bhajans-quawwali to film-music on the other. Contemporary Indian music is a confluence of influences from variety of musical aspirations, socio-political necessities, growth of science and technology and so on and so forth. Today, as a next-step-forward, advances in computers and new media technology, opened up new avenues for music making.

Dr. Vinod Vidwans, a professor of New Media, Creativity and Innovation, Pune, India has developed a Computational Theory of Indian Classical Music. To validate the theory he has developed a software system which generates a Bandish (a musical composition) in a given Raga and renders it in a traditional style. The creatively intelligent software system generates Bandish on its own without any human assistance. He has tested the software with number of Ragas such as Hamsadhwani, Dhanashri, Malkauns, Maru Bihag, Kalavati, Desha, Bilaskhani Todi, and Bhairavi and so on from both, Hindusthani as well as Carnatic music. The creative software system uses principles of artificial intelligence (AI). The system is an innovative application of Information Technology (IT).
7.14 **Computational Theory of Indian Music**

Dr. Vinod Vidwans has extensively studied the ancient treatises on Indian music such as Naradi Shiksha, Natya Shastra of Bharata, and Sangeet Ratnakar of Sharanga Deva which provide common foundations for Hindustani as well as Carnatic music. Inspired by these treatises, he then developed a theoretical framework for generating Indian Classical Music on computers which took about twenty years. These efforts provide foundations for computational theory of Indian Classical Music. The theory and consequential creative expert system addresses many of the outstanding issues related to Shrutis (microtones), characterization of Ragas (Indian melodic modes), classification of Ragas, Chalan or Pakad (catch-phrase) of Raga, Raga-rendering, Vadi-Samvadi notes of a Raga and composition of a Bandish. Main motivation of this effort is to analyze these issues and understand the science and logic behind the traditional Indian Music.

He has encoded generic rules of Indian classical music in the software. The software is capable of generating appropriate alaaps, taans and swara-vistar following these rules. You provide Aroha (ascending order of notes) and Avaroha (descending order of notes) along with Vadi (a dominant) and Samvadi (a sub-dominant) notes of the Raga to the software and it generates a Bandish at the click. It also generates a text file giving the details of the composition so that you can document the textual description of the rendering for future reference and analysis. It can be a useful tool to learn music and understand these rules with the help of a text file.

7.15 **Innovative Application of Information Technology**

The creatively intelligent expert system is an innovative application of Information Technology (IT) since it makes IT as a robust tool to explore
fathomless depths of the domain of Indian classical music. It is an attempt to make it relevant for research in Indian cultural themes.

The software is capable of generating novel musical phrases appropriate for a specific raga while rendering, therefore it is useful for experienced musicians to use it as a supplementary tool for Riyaz (practice). The software can be useful for researchers in musicology for testing existing theoretical concepts in Indian music.

For a common listener, the software can be a handy device to generate a new composition every time you want to listen to a specific Raga. If you like the composition, you can save it and listen to it again and again. The system keeps generating new compositions without repeating them. Presently, the system generates compositions in an artificially created instrument which produces flute-like sound and artificial sound of Tanpura. The composition is played in Teentala using sampled Tabla beats.

7.16 **ARTIFICIAL INTELLIGENCE & MUSIC**

Artificial Intelligence is an interdisciplinary field of knowledge which tries to mimic human behavior through machine. Taking inputs from computer science, mechanical engineering, psychology, philosophy, linguistics and neuro-biology it tries to build models of human behavior. This system tries to mimic creative intelligence of Indian music. However, soon it was realized that one should go beyond and should not restrict to imitating existing Indian music. So it was decided to build a model of creative musical intelligence for Indian music that is independent of any existing styles or Gharanas of Indian music.

Expert system is supposed to possess the knowledge of an expert in the domain. Therefore, the principles, concepts and conventional knowledge base of Indian music have been encoded in this system in the form of generic rules to generate music. It’s a rule based system. It does not have any database. In fact, on the
other hand it generates the required musical data following the rules. This is the strength of Artificial Intelligence.

**7.17 MUSIC AS PART OF GENERAL EDUCATION**

The incorporation of music training from preschool to post secondary education is common in North America and Europe. It is slowly catching up in India and some schools have started using carnatic music instead of western music. Involvement in music is thought to teach basic skills such as concentration, counting, listening, and cooperation while also promoting understanding of language, improving the ability to recall information, and creating an environment more conducive to learning in other areas.

In elementary schools, children often learn to play instruments, sing in small choirs, and learn about the history of music. In secondary schools students may have the opportunity to perform some type of musical ensembles, such as choirs, marching bands, concert bands, jazz bands, or orchestras, and in some school systems, music classes may be available. Some students also take private music lessons with a teacher. Amateur musicians typically take lessons to learn musical rudiments and beginner- to intermediate-level musical techniques.

At the university level, students in most arts and humanities programs can receive credit for taking music courses, which typically take the form of an overview course on the history of music, or a music appreciation course that focuses on listening to music and learning about different musical styles. In addition, most universities have some type of musical ensembles that non-music students are able to participate in, such as choirs, bands or orchestras. The study of music is increasingly common.
7.18 MUSIC THERAPY

Music therapy is an interpersonal process in which the therapist uses music and all of its facets—physical, emotional, mental, social, aesthetic, and spiritual—to help clients to improve or maintain their health. In some instances, the client's needs are addressed directly through music; in others they are addressed through the relationships that develop between the client and therapist. Music therapy is used with individuals of all ages and with a variety of conditions, including: psychiatric disorders, medical problems, physical handicaps, sensory impairments, developmental disabilities, substance abuse, communication disorders, interpersonal problems, and aging. It is also used to: improve learning, build self-esteem, reduce stress, support physical exercise, and facilitate a host of other health-related activities.

Dr. Balamuralikrishna has used music therapy successfully for many ailments. There is proof that some particular ragas evoke specific emotions in people and this is used in therapy. Also, some research is being conducted on music therapy using the 72 melakartha ragas, in combination with the 27 astrological nakshatrams. The use of a change in the rhythm to treat hypertension using rhythm instruments also has been found successful.

There are farmers all over the country who use Indian classical music on their plants to get better yield. The wide use of music to calm mentally challenged and the autistic persons is proof that music therapy is gaining grounds. The future will see a separate system of medicine in music therapy.

7.19 ARCHIVING MUSIC FOR POSTERITY

It has already been concluded from the questionnaire and interpretation in the last chapter that external hard disc drive is the best external storage device recommended by professionals for storing carnatic music files for posterity.
Now, we need to decide on the type of external drive that is optimal for this function.

When the computer starts running out of storage space, one has to consider buying an external storage device, more so an external hard drive. But choosing the best storage device can be a real big task.

![External Storage Device](image)

All our computers and laptops come equipped with an inbuilt hard drive. It is on this hard drive that the operating system, programs and files of the user are stored. Over a period of time, the system may soon begin to run out of space. However, we are not in a position to delete the data currently on the system, or add new data. This is when we have to consider buying an external storage device. There can be another circumstance, which can necessitate the need of an external hard drive. In case there is some important data, which one wants to ensure is backed up, in case of loss of it from the system, then one will have to opt for an external hard drive.

### 7.20 **Best External Storage Devices**

When one decides to buy an external storage device, the first thing to consider is to opt for a storage device, which will be compatible with multiple operating systems. At the same time, they should be stable, which will ensure the data is safe. The next point to consider is storage space. It is always best to opt for a device which has maximum storage space.
We should remember, once we have run out of space on the system, we will not really want the same thing to happen with the hard drive as well. At the same time durability of the system have to be considered as well, as the chances of the hard drive been transported more often cannot be ruled out.

**Seagate FreeAgent GoFlex Pro** is one of the best external storage drive, which has storage capacity of 500 GB. The most important advantage of this storage device is that it works perfectly well with the Mac operating system, as well as with the Windows operating system. It has a three year warranty and comes with backup software. What sets this external storage device apart from the other storage devices is the fact that one can pick from different cables and not have to work one’s way around with the preset menu of ports. It has the USB 2.0 port.

**HP Portable Hard Drive** has 1 TB of storage capacity. With the kind of storage capacity, it has to offer, one will not have to worry about the storage space running out, even if one backups all the data. It has USB 3.0 port, which are the fastest transfer ports, currently. In case, one wonders if one will be able to use the USB 3.0 port on the system it is backward compatible with USB 2.0 as well. The backup software of this hard drive is rather easy to work around with.

**Transcend StoreHet 25 Mobile** has a three layered chassis protection is also one of the cheap hard drives available. Transfer the data from the hard drive to the computer or vice versa is very fast. Most people find the one touch backup rather simple to use. It comes with a two year warranty, which may be less as compared to the other hard drives available. The military grade rugged exterior is what attracts a lot of people to this hard drive, which ensures that their data is
safe, in case of a fall. It has a USB 2.0 port and is compatible with Windows operating system, Mac operating system and also Linux.

**Hitachi Simple Tough** is a tough external storage device, which will withstand a fall from 10 ft as well. It has an in built USB cable and comes with 3 year warranty. The storage capacity is 500 GB. It is compatible only with Windows OS & Mac is and cannot be used with Linux OS. It does not have FireWire port.

![Hitachi Simple Tough](image)

The best external storage device will depend on the particular needs. No matter how much one buys, one always needs more. No matter how many gigabytes one starts with, one is ultimately going to have only a few mega bytes left. The solution is to buy more space in the form of an external hard drive. The ideal way is to go for the roomiest drive of them all, which is a 2 Terabyte external hard drive!

Besides the primary feature of size storage space offered, one must check out the RPM speed of the drive, which determines the rate at which data transfer occurs. Higher the RPM speed, faster is the drive at transferring data. One must look for a high buffer cache size as it allows the drive to temporarily store data, when data transfer is in progress, improving overall data transmission speed. Other than these features, the most important thing is the type of interface it is equipped with for data transfers. The fastest interface right now is eSATA, followed by Firewire and USB 2.0. The new USB 3.0 interface will surpass the eSATA in terms of speed. If one plans to use the drive as a server backup, one must look for built in RAID system compatibility and security tools.

All of the major hard drive manufacturers, including Seagate, Western Digital
and Iomega have 2 TB external hard drives, as their high end line of products. Western Digital WD Elements 2 TB USB 2.0 Desktop, Seagate FreeAgent GoFlex Desk (2TB), Iomega eGo 2 TB USB 2.0 Desktop and LaCie 2big Quadra are some of the best 2TB external hard drives that are available in the market right now. It is tough to choose between them really as almost all offer comparable features.
Carnatic Music owes its origin to Vedas. The recitation of Vedas led to the basic notes. Many minds, many generations contributed in the evolution of this carnatic music. It is considered as one of the oldest & most scientific system of music in the World with its complex, perfectly systematized raga, tala & gamaka techniques, giving greater importance to creativity & enormous scope for solo performances.

Electronic media are that utilize electronics or electromechanical energy for the end user (audience) to access the content. The primary electronic media sources familiar to the general public are better known as Video recordings, audio recordings, multimedia presentations, slide presentations, CD – ROM and Online Content. Discussions & exchange of ideas are possible on the net through blogs, discussion forums, e-mails, mailing lists etc where people from any where in the world can participate. Sharing of materials have become possible through streaming audio & video content & uploads & downloads of files on the net.

The points enumerated above are just a few samples of what electronic media is currently offering to the development of carnatic music &performing arts. But the actual scope is much more and amazing looking at the inventions in store and its day-to-day growth. Effective utilization of these would greatly enhance the quality of our Performing Arts and, would no doubt take us to international standards.

Till microphone was discovered and later audio recording was made possible, the propagation of music was only through hearing, learning and again passing on to others by hearing. The Vedas, Puranas and other educational information also was propagated in the same way –this system was called “Sruthi” in Sanskrit and “Sevi Vazhy Kalvi” in Tamil. This was the only way of propagation known then, and as this was not a perfect way, a lot of problems arose. If a
particular student was not good, he/she could learn it wrong and hence propagate it wrong. And because of this, gurus were very possessive of their music, and were willing to teach only to such students who, according to them will be loyal and also good enough so that the quality doesn’t suffer during propagation.

Without audio recording, one was not able to hear oneself. This meant that self criticism and improvement was not possible at the level that is possible now with the help of recording technology. One had to depend on others for getting critical assessment of oneself. Also one was not able to listen to musicians from a different era. One just had to be satisfied with praise/comments/criticism by others who heard them & wrote about it – which again is very subjective.

As far the concerts were concerned, only musicians who could really throw their voices were popular. The very soft nuances went unappreciated because except people in the first row, no one could hear them. Accompaniments also had to be loud – Flute, Mridangam, Nadaswaram, Thavil etc. Soft instruments like violin etc were hardly heard.

And since there was no PA system, only the affluent could hear great music - organized for the patrons - Kings, Zamindars etc. All this changed when the ‘Microphone’ came into use. First the concerts shifted place. Now ordinary folk could hear it due to the P.A system. The temples became obvious places to organize the concerts. Sangitha Sabhas also started organizing music concerts to popularize music.

With the invention of recording, music started entering films. People like GNB, MSS, etc started acting in movies. The main criteria for actors were being able to sing. Once, magnetic recording came into force, play back singing and music scoring also entered films. Also AIR started recording concerts and
broadcasting them - live or recorded. This meant the common man could hear good music in the luxury of home.

HMV - the first recording company to record carnatic music went a step further with 78 Rpm records, then EP, LP etc. Now, a man could buy these records so that he can not only hear it in the luxury of home, but in the luxury of his own leisure time. The open reel brought in quality HI-FI music. Cassette tape brought in portability and cost effectiveness. Now one could own many cassettes - music of many great masters and learn from them.

Multi-track recording came into vogue as an influence of film industry. This helped Carnatic music a great deal - a mistake by the vocalist or the accompanist can be corrected easily without disturbing other portions. Also, a multi-faceted vidhwan could record the vocal first & accompany himself on another track. This led to audio editing – a very novel, unique idea in carnatic music. Musical knowledge is a must in carnatic music editing because it is a continuous concert and only a musician will understand the perfect places to cut and splice so that the listener is not aware that a joint has been made.

All this helped the student of carnatic music in a big way. He was able to hear different types of music and choose the best from each type. The purity of a single school of music being passed on to shisya to shisya was finally lost. One could learn through the cassettes, songs belonging to any school of music and mix and match them in concerts.

But this also brought a better propagation. There is no dilution of quality due to a poor shisya. And many older masters could record their music for posterity. Blank audios tapes and a small tape recorder also helped in teaching. A teacher could record a class in progress and the students could use it again and again to perfect rather than the teacher spending precious time with the student to help
him perfect it. The emergence of the computer as a multi-media environment (text, images, videos, and sound), music educators have benefited tremendously from the new technologies. We have barely scratched the surface of the possibilities. Also many connoisseurs used this to record their favourite maestro’s concert live or in AIR so that they can enjoy it time and again at leisure.

It has been found by the research and analysis conducted by this researcher that electronic media has had a great positive impact on carnatic music. Also, if one considers the pace of its development & propagation, electronic media has speeded up the process. Also that introduction of carnatic music in films has taken the music to a much larger audience than before – the captive film fans.

The teaching profession has also been immensely helped. The physical effort that was put in by gurus during repeated classes are now a thing of the past and the students use the media only as an aid and the gurus have not been replaced.

Improved Audio Recording techniques and Acoustics have helped people enjoy good music and we find that if given good music in a well treated hall, there is no dearth of audience. Halls like the Music Academy in Chennai, Chowdiah Hall in Bangalore and NCPA in Bombay etc are not the rarities anymore. Many halls have now adopted good acoustics & professional recording equipment.

The performing musicians also have felt the good effects of the media. Their music is heard more easily, making them more popular. They record their performances so as to be able to critically improve themselves. And though people are able to hear them through various media, since the learned listener knows that every new performance will have something new, unique, even if the kruthis are the same, for a good musician, there will always be a good audience for a live concert.
There is a fear that carnatic music will lose its popularity in future. But this is a myth. Carnatic music has adapted to the changing times beautifully. Like during the popularity of buddhism, lighter simpler songs came to be the norm, when films became the major medium for entertainment, it adapted itself to light filmy songs with a strong classical base, like the shorter songs that became famous to fit into 78 rpm records, carnatic music will adapt to the future and flourish.

The young artists will be introduced to the public through YouTube. The old masters will be introduced to the listeners through music streaming through the internet. To conclude, Electronic Media has had a very good and healthy influence in the development of Carnatic Music.

8.1 Some Suggestions

Over the years, Carnatic music scholars as well as critics have written about the declining interest among the younger generation in learning and appreciating Carnatic music. They express with sadness that Carnatic music is associated with senior citizens while young people are more interested in cinema music.

Even disinterested listeners will agree that Carnatic music is complex and intricate, and reflective of the wealth of Indian heritage. Indeed, if one were to judge only from the number of artists below 35 currently performing in the Carnatic music circuit, it appears as if that Carnatic music is making resurgence among young people. However, if one were to judge by the number of attendees at most performances, there is little interest among the young. During the December music season, except in the case of a few concerts performed by name-brand artists, there are less than 20 rasikas sitting in the auditorium. Most of the “afternoon slot” musicians perform with utmost sincerity and dedication and are often far more refreshing in their performances than their more famous...
counterparts. With competing events and a declining fan base, it is noble of these artists to give champion performances to a dim crowd of less than twenty rasikas.

If we really want to preserve Carnatic music, we must make efforts to keep it relevant\textsuperscript{162}. The definition of art is constantly changing and with each new generation of listeners, music evolves within the interests of the prevailing culture. Unless Carnatic music is culturally relevant – either as an entertainment or as a medium of cultural identity - today’s youth will bypass it for more modern forms of expression. But the reality is that Carnatic music, because of the multiple languages in which the compositions are set and the religious context in which they are composed, creates distance, undermining its relevance. Like the youth in the West, Indian youngsters are also likely to listen to music that speaks to their lives.

When the music is not appealing to them, obviously they would not show any interest. To make Carnatic music interesting, some suggest that perhaps we must reintroduce Carnatic music to our youngsters through the more-interesting medium of cinema music; others consider such a suggestion insulting to the great art.

There are several steps we can take to both introduce Carnatic music to new audiences and make it relevant to the younger generation. One suggestion is, introduce the music at an early age and as part of a school’s curriculum. The learning opportunity should be available to everyone and not just to those who can afford private music lessons or to those who were born in select communities. Unlike in India, in the West, classical music-related subjects are included within the educational curriculum of schools. In U.S. schools, children,

\textsuperscript{162} Dr. Ram Sriram
regardless of their religious affinities, community memberships, or economic status, take classical music as one of their elective subjects. Since every school has bands or orchestras, the classroom learning of music is also translated into an opportunity to exhibit one’s musical learning.

A second suggestion is, highlight the benefits of learning and listening to Carnatic music. In the West, school administrators and parents believe that learning classical music enhances a child’s ability in several areas, such as learning math or in developing analytical skills. They also observe other behavioral benefits. Numerous studies conducted by behavioral scientists have shown that students who learn music are less likely to use tobacco or alcohol and develop greater interpersonal skills. These students are also more persevering and tend to take more effort in learning other subjects. The effort that they expend in learning music makes the students subconsciously recognize the value of sustained effort and what it takes to be truly successful in any endeavor.

While parents and school administrators may recognize the benefits of classical music, children are less likely to comprehend such benefits. To kids, how interesting the learning process is, is more important than the philosophical or other subliminal messages the music learning brings to their lives. Hence, teaching Carnatic music should also be made interesting. It should go beyond learning sarali varisai, Geetham, Varnam, and Kritis. The classroom teaching (whether at a school or during private lessons), should include an occasional visit to a live concert in the company of the teacher. A teacher can engage the students further by asking them to write a critique about a concert that they attended. To kindle students’ interest even further, the teacher can require them to read reviews, listen to recordings of great masters, and learn about the lives of great musicians. After all, in the Internet age, there is a wealth of music and information available to all of us.
Another angle that both teachers and parents can focus to get the children to appreciate classical music is, promote the improvisational aspect of the music. This is something that few art forms permit and that Carnatic music does extremely well. As the child is learning the basics, at each stage, make them identify and appreciate the changes that are evolving (e.g. how swaras are combined to make different ragas to how lyrics fit within a thala’s cyclical structure). These exercises makes a game out of the learning process and takes away the obligation of memorizing or singing something that they do not care about in a language that they do not understand. The objective is to demystify Carnatic music without compromising its richness or complexity. It is a delicate dance.

We must also use common media like television and film to demonstrate the relevance of Carnatic music. We should actually encourage the use of film music as one more basic learning tool to explain the intricacies of Carnatic music. Film music is immediately accessible and a great way to introduce a child to the concept of ragas and emotions. It is also a demonstrative way to explain how Carnatic music is the essential framework for all kinds of music. Rather than diluting the richness of the music, these efforts will only enrich the learning process. Of course, by changing how Carnatic music is taught, learnt and listened to, there is no assurance that a student or a listener will immediately recognize the greatness of the music and its relevance to their lives. Like all good things, we can be rest assured that with age, the seed that we plant in our youngsters will eventually germinate and they will learn to appreciate the things that don’t appeal to their immediate/visceral sensibilities.

Finally, the rasika population will widen only if Carnatic music becomes more inclusive. Either because of perceptions or facts, Carnatic music has long been viewed as the domain of the elitists in our society. This perception should be changed. Music is universal and it is a source of happiness for all human beings.
If it is to withstand the test of time, it must be an accessible art form. Like the efforts of the Alwars and Nayanmars during the era of Buddhist influence, when, through simple lyrics and community participation, they brought everyone together, we should use Carnatic music as a unifier of young and old and communities of all stripes\(^{163}\).
APPENDICES
# Appendix I

Rasikas’ Questionnaire

<table>
<thead>
<tr>
<th>S.No</th>
<th>Questions</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Have you heard mike less vocal concerts in olden days?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Was it for a small audience?</td>
<td></td>
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<tr>
<td>3</td>
<td>Was it in a closed hall?</td>
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<tr>
<td>4</td>
<td>Were the artistes seated on a raised dais?</td>
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<tr>
<td>5</td>
<td>Were the audience seated on the floor?</td>
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<tr>
<td>6</td>
<td>Was the distance between the artist &amp; 1st row audience more than 10ft?</td>
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<tr>
<td>7</td>
<td>Was the mridangam too loud?</td>
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<tr>
<td>8</td>
<td>Was the soft upa pakkavadyam like morching heard?</td>
<td></td>
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<tr>
<td>9</td>
<td>Were you able to make out the nuances in the music of the vocalist?</td>
<td></td>
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<tr>
<td>10</td>
<td>Were you able to hear the nuances in the music of the instrumentalists?</td>
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<tr>
<td>11</td>
<td>Have you heard an instrumental concert without Mike?</td>
<td></td>
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<tr>
<td>12</td>
<td>Were all the conditions similar with regards to mike &amp; mike less concerts?</td>
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<tr>
<td>13</td>
<td>Have you heard the same artists with mike?</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Was it in a closed hall?</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>If so, was it in an acoustically treated hall?</td>
<td></td>
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<tr>
<td>16</td>
<td>If open, was it a music concert, uninterrupted by temple/wedding sounds?</td>
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<tr>
<td>17</td>
<td>Were good quality mikes &amp; PA systems used?</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Did you like the sound quality produced?</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Were you able to make out the nuances better?</td>
<td></td>
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<tr>
<td>20</td>
<td>Were softer instruments heard without being drowned by louder ones?</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Do you feel mikes &amp; good PA systems have improved listening quality?</td>
<td></td>
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<tr>
<td>22</td>
<td>Have you heard the same artists in an LP/EP/AIR/ TV?</td>
<td></td>
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<tr>
<td>23</td>
<td>Do you feel the studio quality recording adds to the listening quality?</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Do you feel the artists’ musical quality is enhanced with electronic media?</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Do you feel manodharma is hindered in studio recording?</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Do you feel short concerts cannot show the true quality of a musician?</td>
<td></td>
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<tr>
<td>27</td>
<td>Do you feel cassettes &amp; CDs in a home theatre can replace live concerts?</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Do you feel electronic aids result in unnatural tones &amp; balance of sound?</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Do you feel electronic media is a boon for Carnatic music?</td>
<td></td>
</tr>
</tbody>
</table>
## APPENDIX II

### Audio Engineer’s Questionnaire

<table>
<thead>
<tr>
<th>S.No</th>
<th>Questions</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you recommend using contact mikes for veena, violin etc?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Do you think that the sound quality is comparable to the non-contact ordinary mikes?</td>
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</tr>
<tr>
<td>3</td>
<td>Do you feel that the acoustic quality of the resonator is wasted?</td>
<td></td>
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<tr>
<td>4</td>
<td>Does the contact pickup over a resonator give better audio quality than the pickup over a solid body?</td>
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<tr>
<td>5</td>
<td>Are the latest improved pickups solving the ‘tinny sound’ problem associated with contact mikes?</td>
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<tr>
<td>6</td>
<td>Considering the average user, are the PA systems of good quality that we can get a reasonably distortion free output?</td>
<td></td>
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<tr>
<td>7</td>
<td>Do you feel that the digital recording is the best form, where archiving for posterity is concerned?</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>What do you think is the best medium for preservation in archives? a) Hard Disk b) CD/MP3 diskettes c) Magnetic Tapes d) Others (Specify)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Do you feel the electronic media has had a lot of positive effects on Carnatic music development, much more than its negative effects?</td>
<td></td>
</tr>
</tbody>
</table>

## APPENDIX III

### Gurus’ Questionnaire

<table>
<thead>
<tr>
<th>S.No</th>
<th>Questions</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you use recorders for teaching music?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Do you record the complete class?</td>
<td></td>
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<tr>
<td>3</td>
<td>Do you record the song you are teaching sung just once by you?</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>If you do not tape the whole class, do you tape portions when the student finds it difficult to follow?</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Do you ask the student to record his/her rendition &amp; compare with yours?</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>If so, are they able to pin point their mistakes &amp; correct themselves?</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Do you use this procedure in class or as homework?</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Do you ask them to sing to a taped pakkavadyam or vice versa?</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>If you get a software which compares the teacher’s voice &amp; student’s voice graphically as a teaching aid, will you use it?</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Any other point you want to say – whether electronic media has helped carnatic music’s development</td>
<td></td>
</tr>
</tbody>
</table>
## APPENDIX IV

Performing Musicians’ Questionnaire

<table>
<thead>
<tr>
<th>S.No</th>
<th>Questions</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Have you performed without microphones?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Have you performed in a similar venue with microphones?</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Do you feel concerts using mics were better in quality?</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>If yes, do you feel this is because every one could hear you irrespective of where they were seated?</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Do you feel the sound engineer balanced the output of each artist so that no one’s music was drowned or inaudible?</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>If no to Q3, do you feel that every one in the audience heard you well?</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Do you feel the pakkavadhyams’ sounds were controlled by the artists so that a balanced concert was heard by the audience?</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>If you felt that mikeless concert was better, was it because of the poor quality of PA system?</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>If you felt that mikeless concert was better, was it because the sound man was not good enough?</td>
<td></td>
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<tr>
<td>10</td>
<td>Do you use an electronic tanpura?</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Do you feel the quality is good enough given the portability?</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Do you record your concerts and listen to them later?</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Has this helped you to improve yourself?</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Do you feel that the shorter concerts today are because music is available in the comfort of home too?</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Do you feel that there is still an audience for live concerts?</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Do you feel that in future your music will be propagated more by CDs and MP3s than live concerts?</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Do you feel that free downloads from the internet has helped learning carnatic music?</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Do you think that the better quality of acoustics in concert halls these days contribute to the good quality of music output?</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Do you feel the internet has helped popularise your music?</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Finally, do you think microphone, speakers, recorders, CDs, Cassettes etc have helped the growth of carnatic music?</td>
<td></td>
</tr>
</tbody>
</table>
## APPENDIX V

### Film Experts’ Questionnaire

<table>
<thead>
<tr>
<th>S.No</th>
<th>Questions</th>
<th>Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you use carnatic music based ragas in your films?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Do you use pure ragas?</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Do you lighten the carnatic ragas to fit the mood of the film?</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Do you feel that the audience enjoy carnatic raga based songs?</td>
<td></td>
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<tr>
<td>5</td>
<td>Have you used a lighter version of carnatic kruthis in your films?</td>
<td></td>
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<tr>
<td>6</td>
<td>Do you use extreme background scoring for carnatic based songs?</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Do you feel that audience are able to enjoy carnatic music better after listening to popular carnatic music based film songs?</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Compared to the early days of cinema, is the use of carnatic music in films declining?</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Do you feel that the singer has to have a foundation in carnatic music to sing carnatic music based film songs well?</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Do you feel the cinema media has had a lot of positive effects on Carnatic music development?</td>
<td></td>
</tr>
</tbody>
</table>

The following data was also printed in all the Questionnaires. But most did not fill up fully.

Name:
Age:
Address
Phone:
Email:

Any other Comments:
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