INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

ISSN 2278 – 0211 (Online)

Cryptography – Using Guitar Chords and Drum Beats

Rohit
Student, SCOPE, VIT University, Vellore, Tamil Nadu, India

Abstract:
Encrypting texts into music files, using guitar chords – major & minor and drum beats – snare, kick, high hats& crash. As every musical note has a chord which is either major or minor with a unique sound, based on this theory chords used are of root note A,B,C,D,E,F and G.

Keywords: *chords –guitar sound for a particular note. #- sharp (symbol used for denoting sharp chords of music). Snare-part of drum sound with lot of treble.*

1. Introduction

Cryptography is a method of hiding or converting regular texts into a form that requires key to turn it back to the original. This converted file can be transferred over a network without any fear of data theft. The concept of cryptography is based on two functions, which are *Encryption* (encoding a message or data into distinguished form) and *Decryption* which is reverse on the former. There are many pros and cons there in such types of algorithms. Cryptography is an important security feature for sending information over a network. The proposed system can defeat different types of attacks which may come during the transmission of messages over the network.

2. Literature Review

→ Volume 4, No. 4, April 2013 Journal of Global Research in Computer Science used two levels of encryption one using traditional Indian music note and second using our usual keyboard notes. It is difficult for any hacker to break the code unless the conversion order into alphabets is known. Also the 36 alpha numeric characters can be arranged in a minimum of (36!)2 Ways and the 7 music notes in table can be arranged in (7!) 2 ways so that we can generate a table of our choice. This increases the safety of the encrypted message and this arrangement acts as a key for encryption and decryption. So the proposed encryption scheme is safe for encoding any message.

→ Sandip Dutta et.al / International Journal of Engineering and Technology (IJET)-Various musical attributes can be used in modern day cryptography. A better cryptic algorithm is demanded in future, which may generate musical sequence as real world music. Indian classical music and raga can be used in the transitional algorithm, which may mimic a real musical pattern or raga. The generation of random transition table in Sudoku form is left as future work, also exploring the possibility of using the duration of the musical notes for encryption.

→ International Journal of Security and Its Applications Vol.9, No.1 (2015), pp.237-248-The proposed algorithm was implemented in MATLAB. MIDI library functions were used for representation of musical notes. Fuzzy genesis rules were defined depending on the genre used for composition. A pseudo random generator function was used to generate the key matrix. Depending on the characters of the plain text message the candidate notes were fed to the composer. The results of the encryption process were found to be quite satisfactory in terms of aesthetic appeal. The encrypted message in the form of musical piece was found to be more realistic so even after intercepting the communication, the intruder cannot guess the musical piece as a cipher message. The same characters were encrypted into different musical notes depending on the occurrence of the characters in the plain text because of the fact that same character could have been encrypted using one of the several candidate notes. The same text encrypted with the same key produced different musical patterns which was an added feature of the proposed algorithm. The key used in the encryption and decryption is not a simple one-to-one substitution so guessing the key is very hard in practice. The primary goal of enciphering plain text message using musical notes was achieved along with satisfying the second goal as an aesthetic appeal. Complex rules for note density, note duration, note intensity, rhythm and harmony are subject to a specific composition style, which can be adopted by following the styles of well-known composers. These rules then can easily be quantified using fuzzy rules and can be used to encipher messages. Musical cryptography can be seen as a counterpart for audio steganography.

3. Proposed Encryption Scheme

In this approach, the sound of guitar chords is being used to encrypt and also the chord finder i.e. the sound recognizer is used for decrypting.

Algorithm is based on three steps -

- First step: to assign a guitar chord to each letter and symbol for each word in the text.
- Second step: to convert the assigned chords into sound or audible format from texted format.
- Third step: to convert back the audio file by sound recognizer from audio to text format.

Using the following table 1 and Figure 3:

A	**C major**
B	**C minor**
C	**D major**
D	**D minor**
E	**E major**
F	**E minor**
G	**F major**
H	**F minor**
I	**G major**
J	**G minor**
K	**A major**
L	**A minor**
M	**B major**
N	**B minor**
O	**C#**
P	**D#**
Q	**F#**
R	**G#**
S	**A#**
T	**C# minor**
U	**D# minor**
V	**F# minor**
W	**G# minor**
X	**A# minor**
Y	**C7 major**
Z	**C7 minor**
0	**D7 major**
1	**D7 minor**
2	**E7 major**
3	**E7 minor**
4	**F7 major**
5	**F7 minor**
6	**G7 major**
7	**G7 minor**
8	**A7 major**
9	**A7 minor**
.	**High hats**
space	**Kick drum**
?	**Crash**
,	**Snare**

Table 1

As there are no E# (sharp) and B# (sharp) hence it is not used in the algorithm.

Now for converting text we can use the table 1 and procedurally covert into musical files. For example:

Text: ALL IS WELL.

Using table 1 we convert the text as follows:

A	C major
L	A minor
I	G major
S	A#
W	G minor
E	E major
.	High hats

Table 2

After converting this into an audio file, using step two listed before, we can send this file in mp3 format.

4. Decrypting Texts

Receiving the audio file, the receiver can decrypt it with an available key for the conversion.
A tool to listen the sound and make out which chord is played is required for this procedure.
With sound recognizer the receiver generates following:
C major- by back tracing table will get alphabet A, similarly

A minor- L
G major- I
A# -S
G minor- A#
E major- W
High hats- .

Table 3

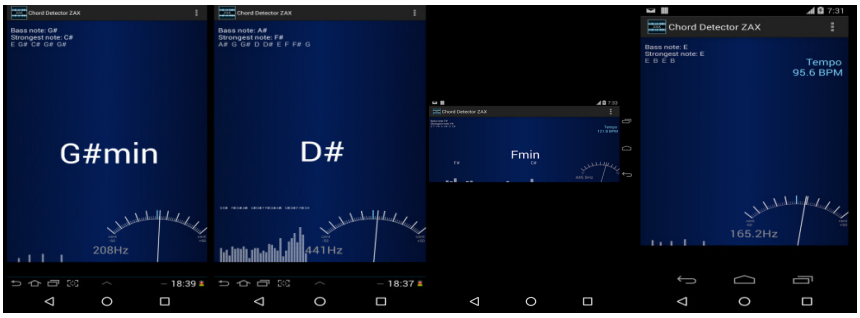

Figure 1

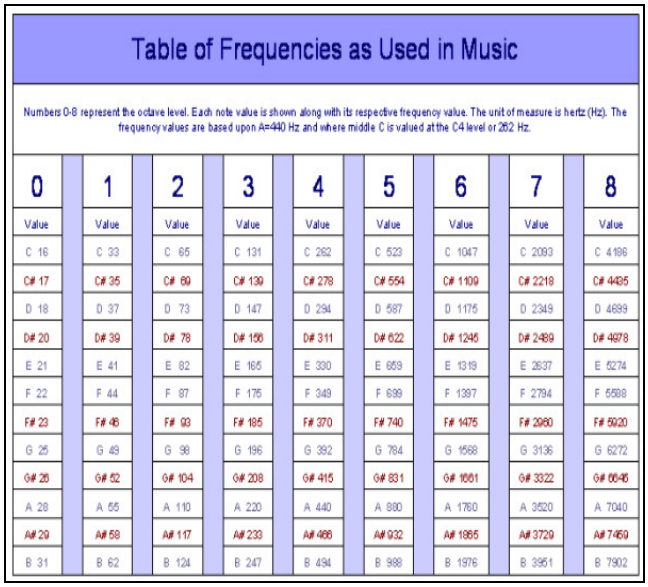

Figure 2

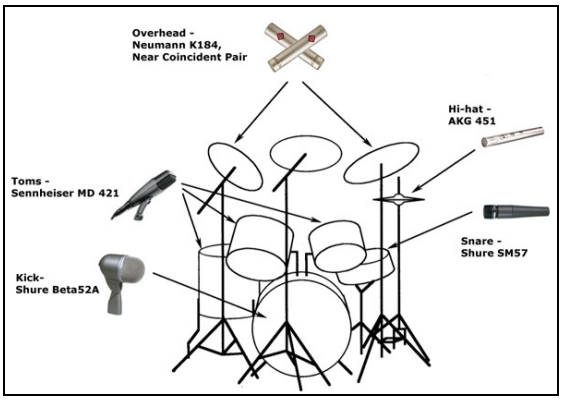

Figure 3

The sound recognizer uses these frequencies to find the played chord. These frequencies are attained by experimental basis and with appropriate result.

5.Conclusion

There is almost no possible way to decrypt the text without the key, hence it is secured algorithm. Also the table 1 could be written in 40! ways. This makes the algorithm more strong and appropriate.
This technique can be used in transferring high level information or even exchange military confidential information.

6. Future Scope

Direct speech to audio file converter can be developed, simplifying the process on encrypter and decryter side.
Also the chord recognizer system could be built more smart to feed the key in the system and automated conversion could happen.

7. References

i. http://learnraagabasics.blogspot.in/2011/01/introduction.html.
ii. http://www.wikihow.com/Learn-Keyboard-Notes.
iii. M. Yamuna, S. Ravi Rohit, Pramod Mazumdar, Avani Gupta, International Journal of Application or Innovation in Engineering & Management, (265 – 268)Volume 2, Issue 3, March 2013.
iv. Volume 4, No. 4, April 2013 Journal of Global Research in Computer Science
v. Sandip Dutta et.al / International Journal of Engineering and Technology (IJET)
vi. International Journal of Security and Its Applications Vol.9, No.1 (2015), pp.237-248
vii. http://ericsams.org/index.php/on-cryptography/333-musical-cryptography
viii. http://www.rroij.com/open-access/cryptography-using-music-notes-100-102.pdf
ix. http://www.enggjournals.com/ijet/docs/IJET13-05-03-381.pdf
x. http://www.sersc.org/journals/IJSIA/vol9_no1_2015/23.pdf
xi. http://math.ucsd.edu/~crypto/Projects/ShantMahserejian/Music.pdf