DISTANT MAESTRO -AN INPUT GENERATED BY SYSTEM

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ABSTRACT

This Research looks at the designing of a Remote based Electromechanical Device Distant Maestro which is driven by an electronic circuitry, interfaced to a computer that will work under software controlled server and it is capable of playing compositions which will be sent by composer remotely with the help of an android application. This mechanism can be implemented by using solenoids, stepper motors, D.C. motors and arduino mega(AM)where solenoids is used for fretting the guitar, stepper motors for plucking the guitar, the A.M. will be controlled by anconnectedcomputer which will be connected to server with internet link. This mechanical assembly is designed such that it acts as a substitute for the human hand and it will also be beneficial for composer and musicians to play a guitar remotely.

Keywords:MechBass, Solenoids, D.C. motors, Actuator, Android SDK, Apache web server.

I.   INTRODUCTION

Traditionally the dominant hand is assigned the task of plucking or strumming the strings. Guitarists typically use one hand to pluck the strings and the other to depress the strings against the fingerboard for the majority of people this entails using the right hand. This is because musical expression (dynamics, tonal expression and color etc.) is largely determined by the plucking hand, whilst the fretting hand is assigned the lesser mechanical task of depressing and gripping the strings. The guitar strings are strung parallel to the fret board.

The world of music has changed .Decades ago, if you were a musician, and you wanted to record an album. You and your band played your asses off in bars and clubs every night. But today,the trend in music production is shifting more and more towards home studio .Great music is being produced all the time from anywhere like basements,offices,bedrooms, etc. by normal folks like you and me without any noise or disturbance and you don't have to spend money in calling the musicians from overseas and by these the cost of transportation of instruments has reduced.

The Proposed system and well documented and integrated android application will be an attempt to get rid of the problem. The composer can compose his music and he can send his compositions from the

app itself The mechanical assembly should be able to replicate the actions of the human hand efficiently over the music composition files that will be received from Distant Maestro(android application) sent by musicianfrom their android application. The server will then compile the composition file and will place new encrypted arduino mega readable file to a web interface so that one can click on the same downloaded file. The androidapplication will treat the downloaded file content as input and will start sending signals to the assembly to play the same composition which is send by composer.

The rest of the paper is structured has follows, methodology and working of device, results and findings of proposed application and lastly conclusion.

A. Literature survey

[1] Musicians have long been interested by automatic musical instruments. From past few years, automatic musical instruments were handcrafted devices which   present a detailed history of such instruments, many of which stored musical information as pins or nails on rotating drums.

In 1970's Pioneers Trimpin [2] and Godfried-Willem Raes [3] employed computer-aided musical composition techniques to drive actuators on musical robotics.

[4]In 2007 Gibson Robot Guitar (GOR) was exclusively made up of Les Paul bodies which is a self-tuning electric guitar exclusively made up of Les Paul bodies. GOR is limited to tune a guitar automatically. The above inspired us to create a compact, practical and remotely operating design which will provide ease to play the guitar on real compositions that designed and played by the musicians with help of best open source android technology.

[5]In 2012 James MCVaycreated TheMechBass for his honors year project at Victoria University of Wellington .It runs on a custom arduino board that controls the plucking and fretting at the four strings from MIDI .These systems include single string plucking and fretting mechanism which can be used in bass guitars only.

II. METHODOLOGY

The distant maestro is an attempt to make a guitarist available from anywhere. Our system can reduce much more cost of various factors such as transportation of guitarists as well as their instruments. The whole application is a combination of mechanical assembly and software which will control every action of the assembly to play a guitar. We have used push action solenoids, stepper motors, arduino mega, android software, compiler web server application to build the distant maestro. The system architecture is shown below in Fig. 1.1
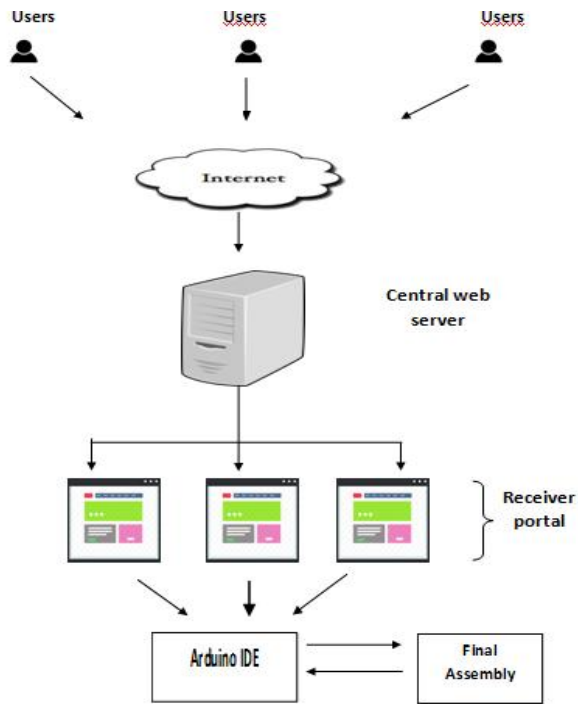
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System Architecture

Figure 1.1 Proposed System Architecture

Android Application

An android application is remote interface for the guitarist to compose his composition. The same can be composed in human readable guitar chord notes for example if we want to play scales as G open, C Major, D Major then the one should open new composition menu and write "G, Cm, Dm" in new composition textbox then will have to provide strumming pattern in next textboxi.e. new pattern textbox as "D, UDUD, UDUD, DU" in this pattern D referred for DOWN and Ureferred for UP. The composition will be ready once he will click on save button. Guitarist can send the same file to server user by publish button.

Compiler web server application

This is a web portal which can only be accessed by authorized user only. The composition files which pushed by the android application will then compiled with help of PHP code and will be translated to arduino mega understandable *.pde file. The same file will be downloaded once the compilation task is finished by server.

Push and pull actionsolenoid

The solenoids are consisting of a metal rod which is surrounded by a copper coil. Once we provide current to the coil it will act as electro magnet and will push the rod. We are using here are of 5volt push and pull action solenoids. This is an important device which will press the string. One fret will contain 6 solenoids for pressing each string among six strings of guitar. The same can be affixed to the custom made wooden cover as shown in figure 1.2 The distance between the frets in width X height is 4.2 X 3.8 CM so we have arranged the solenoids in such way it will not create traction in among them.

Stepper motor

A stepper motor is a programmable rotational action motor which can be programmed to rotate till a particular angle from 0 degree to 360 degree. The stepper motor will be placed at the end of the bridge. We are using to strum the strings. We have used a conveyer belt which is consisting of a rubber belt with plectrums affixed to inner side of the belt. The belt will convert the rotational motion of the motor in forward and backward pulling motion. The same is shown diagrammatically in
Fig. 1.2

Arduino Mega

The Arduino Mega is a microcontroller board based on the ATmega1280 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. This device is used to control overall assembly. The microcontroller will then read the downloaded file from compiler web server. Then it will start sending signals to the assembly to play the connected guitar.
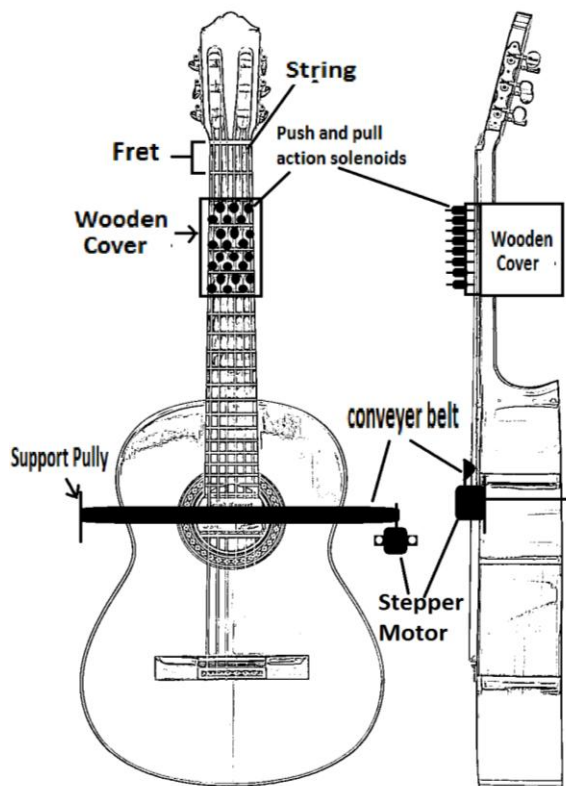
Figure 1.2 Final Assembly

III.RESULTS AND FINDINGS

1) Android application is able to produce input interface – (When user clicks on create new composition it is able to produce new composition text box and new pattern textbox)
2) Android application is able to send the complete composition to server – (When user clicks on publish, it sends same composition to server.)
3) Compiler web server is able to present the received composition file to download – (after authorized user login it shows download link for received composition file.)
4) Compiler web server is able to convert plain composition file to *.pde file,-(When user clicks on download composition file, It converts plain composition file to *.pde file.)
5) Arduino is able to send signals to assembly – (when user will provide *.pde file to arduino IDE and click on upload, it starts sending signals to assembly to play the composition.)

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IV. CONCLUSION

The Electromechanical device and well documented and integrated android application will solve the problem of guitarists as well as it will be helpful to the music recording studios and small bands. This will allow the artists to play their compositions to and from any corner of the world. The assembly of whole application can be available in cheaper rates because of its low cost parts. It ultimately helps community to increase quality of music because of larger number best artists who do not afford to go overseas to explore their talent due to short budget now they can perform from anywhere without performing physically.

The Proposed System uses 6 solenoids per fret it means for 5 fret it will need 24 solenoids. In future ,logic can be build for solenoids In future single solenoid can be used for moving from first fret till last fret.The strumming mechanism contains a conveyer and a stepper motor which cannot pluck a single string. Single string plucking mechanism can be developed to play plucking patterns.

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