

# Self Tuning Stringed Instrument

#### Aims:

To design and build a stringed instrument capable of tuning itself

#### **Specifications:**

- maintain functionality
- maintain aesthetics
- require minimal user input
- accuracy comparable to or better than manual tuning

#### Methodology:

The design was based conventional six a around stringed solid body electric guitar. The task was divided up into two distinct modules; The mechanical system, and the control system. This the task to allowed be simplified and took advantage the group members' expertise.

## String:

The frequency of the string vibration is dependant on the string length, density and tension

### Pickup: The vibration of the

string is converted to an electronic signal using a coil wrapped around a magnet

Filters:

square-wave

signal is

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#### Results:

Under normal playing conditions, the system was able to simultaneously tune each string with an accuracy of +/- 5% of a semitone, within 10 seconds

#### **Future Work:**

- adapt system to cater for alternate tunings
- ◆develop a system to automatically resonate strings
- apply to different stringed instruments

## Motor:

Lever System:

A screw-thread attached

to the motor slowly

alters the force at one

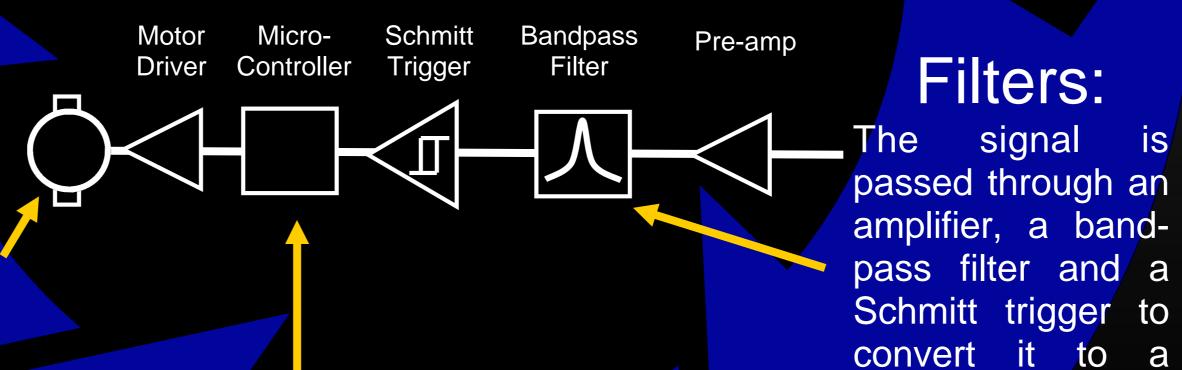
end of a lever. The other

end is directly attached

to the end of the string,

altering its tension

The motor direction speed and determined by the difference between the desired frequency and the measured frequency



## Microcontroller:

The period of the signal is determined by averaging the time between consecutive rising and falling edges. The frequency of this signal is the inverse of the period

#### Conclusion:

This system can be easily fitted into a conventional electric guitar, without significantly altering its size and weight. Such a system would be an asset to any stage performer

Figure 1: Closed Loop Control System