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Arduino based Beet Box-Launch Pad

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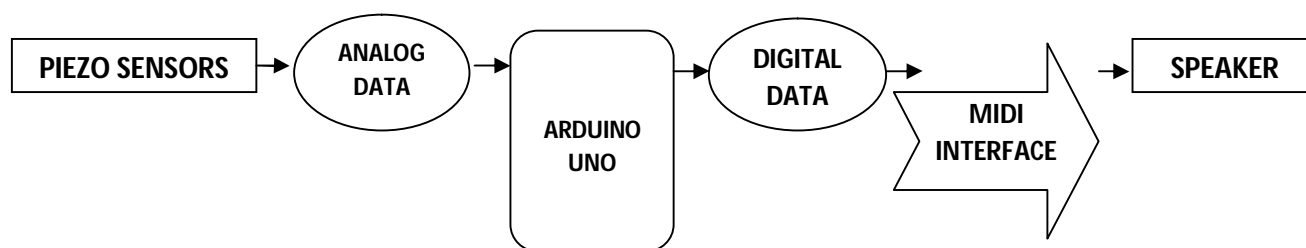
Abstract: Now days the continuous development of “MUSIC” with a handy technology is sophisticated fashion. The E-D-M (Electro dance music) also made a great progress as with enhancing and fast growing trends. The production of making music has largely linked up with Electronic gears. Where the technology gives a handy interface for the musician to fully show case their talents

Keywords: Arduino, piezo electric sensors, resistors, MIDI software.

I. INTRODUCTION

The main intention of the project illustrates our effort to design and implement a new musical interface that takes advantage of simple sensors as a source of musical inspirations for musical novices. The goal in making beet box is to: create a simple physical interface that gives voice to simple sensors, afford self-expression and immediate engagement for novices, and encourage novices to explore the musical potentiality of their surroundings through musical interactions with piezo sensors and digital sound productions . By building a prototype, we seek to expand the possibilities of new musical interfaces for novices that produce sounds from real world objects themselves in intuitive fashion. The MIDI interface provides novices with ways to explore rhythm patterns, sounds, and their combinations through task-oriented hand gestures with everyday objects This technology uses is based on “MIDI” interfacing musical instrument digital interfacing

- A. A play back that can play multiple programs (multi –timbral)
- B. Which interfaces drumming experience with the more advanced handy experience
- C. With velocity sensitive pads with “triggering” input options.
- D. By using “piezo sensors” it makes it comfortable for enhanced topping usage.



II. HARDWARE USED

A. Micro Controller

This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller is a main component in the project because it controls and monitors the devices which are interfaced and communicates with the devices depending on respective to the program being written.

B. Arduino UNO

Arduino is an open source electronic platform based on easy to use hardware and software. Arduino boards are able to read inputs, light on a sensor a finger on a button or a twitter message and turns it in to an output activating a motor turning on and off LED using some push buttons at input and publishing something on it you can tell your bored what to do by sending a set of instructions to the micro controller on the breadboard over the years

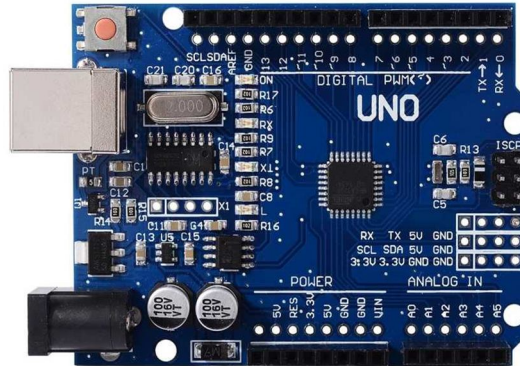


Fig: Arduino UNO

The Arduino has been the brain of thousands of users for everyday objects from advanced scientific-instruments Arduino computer code is straightforward to use for beginners get versatile enough for advanced users it runs on Mac, windows, Linux. we tend to accustomed build low price scientific instruments to prove chemistry and physical principles to urge started with programming and artificial-intelligence it conjointly simplifies

The method of operating with Arduino microcontrollers however it offers some advanced options. Arduino board are relatively impressive compared to other micro controller platforms the least expensive version. Arduino software published in open source tool available for extensive and experienced programmers the language can be expanded through c libraries and people waiting to understand the technical details can be the leap from Arduino to the AVR,C programming language in which its based similar you can add a B and C code directly into your program if you want to.

III. SOFTWARE RESOURCES FEATURES

A. Arduino/IDE

Arduino boards style use a spread of small processors and controllers the boards are equipped with sets of digital and analog input and output pins that will be interfaced to varied growth board fields and different circuits. The board features serial communication interfaces as well as universal serial bus(USB) on some models that additionally used for loading programs for private computers

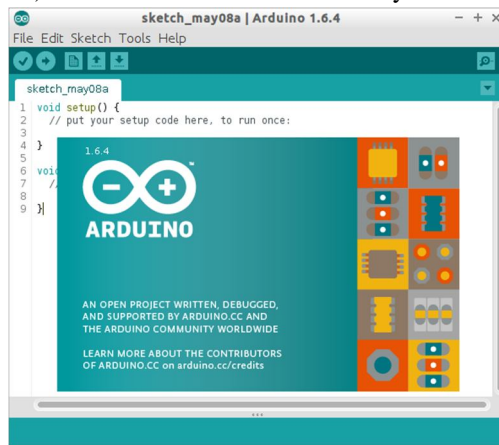


Fig: Arduino IDE

The micro controllers are typically program to with delight of features from the programming language C and C plus and in addition to using traditional compiler tool, chain the order no project provides an integrated development environment (IDE)

B. MIDI

1) *What is midi??*: Musical instrument digital interface: midi instrument that can play back multiple programs .communication between midi cable devices what do we call the device needed to input output midi using software it is called a midi interface. MIDI is unlike the audio not a direct representation of sound but more like a score of musician would read while playing but the musician will be some kind of synthesizer or sample that receives this information “MIDI stands for musical instrument digital

interface and is what we call a serial protocol in that one bit of information is sent at a time this process is really quick and if you play a chord it only send one bit of information



Fig: MIDI software

But this process goes so quickly that it will sound like a chord. a medium message includes a channel number and there are 16 possible channels in the middle specifications you can think of it as a TV channel it would allow me to play a single keyboard and axis 16 different sound sources. which would be synthesizers awesome place after the channel the type of message is sent and there are a variety of different types of media message just common midi messages are not on and off control change pitch bend. A note on a message, if you hold the key down on your keyboard a note on a message on that particular channel is sent. This is going to be 1 letter word which tells ,which note it is (c-e-17),velocity how hard you hit the keep both data word are 7 bit numbers and if you want to know how many values there are in a word which is 2 to the power of the length of the word which is 2 to 2 to the power 7 is equal to 128 so that these 7 bit words can send messages from 0 to 127 when you release the key a second message is sent which is the note of message and so includes the channel and which not it is specific number and actually also send velocity message. So how fast you go of the key if you ever experienced them ITI instrument of yours keeps playing if you would stop playing now that's because it didn't receive the note off message, so it just keeps playing the solution is to hit a randomly all keys so it gets on of those notes of are you some kind of-midi panic functions many synthesizers also love you to use whites called the channel pressure often referred to as after touch-which is how hard we push down the key

C. IDE

THE Arduino SOFTWARE (IDE) is a software interface which is used to program an Arduino .we can write a code computing all the given required instructions, commands or tasks for the Arduino to perform the given task it is written in java and c++ and compatible operating systems are: Windows, Mac and Linux platform is one a 32X86 and 64 ARM

IV. SYSTEM ARCHITECTURE AND MODULE INTERFACE

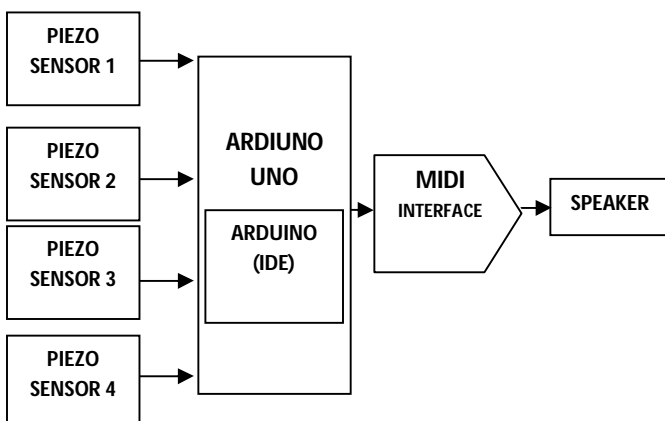


Fig: Block Diagram

V. BOARD HARDWARE RESOURCES FEATURES

A. Piezo Sensor

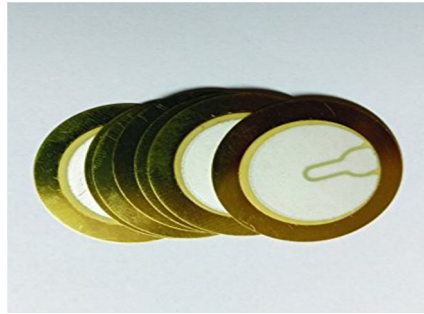


Fig: piezo sensors

Piezo sensor element works in a such a way that it generates voltage in response to mechanical stress so when it is hit/truck physio electric disk produces a signal which is received by an analog input of the Arduino pins(802 a5) Generated signal is not the perfect signal. but it changes in time and sometimes its un predictable due to the vibrations and response of aluminum plate got worse task is to interpret the signal to a proper way reject all vibration switch or not the exact hit the goal is achieved by the return code your train no sense midi signal over the serial USB port to the computer we use free to download program loop midi and fearless midi serial which leads the midi signal from USB port and creates a virtual midi output in the computer such output can be seen by specific special program called DAW-digital audio workstation do is responsible for mapping midi signal with music samples ,we use free version of fruity loops and addictive drums to map midi signal .

B. Sensor Theory

1) *Transfers Effect:* "force applied along a neutral axis displaces charge along the X direction perpendicular to the line of force the amount of charge CX depends on the geometrical dimensions of the respective piezo electric element " with the dimensions ABC apply where the dimension is the corresponding piezo dielectric coefficient.

2) *Logitudinal Effect:* "It is the amount of charge displaced strictly proportional to the applied force and independent of the piezo electric element size and shape putting several elements"

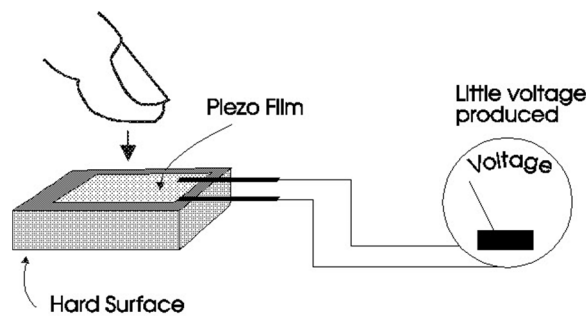


Fig: principle of peizo electric effect

Piezo sensor API is a door sensor is a sensor which works on the principle of piezo electric effect API auto electric sensor is a device that uses the piezo electric effect measures changes in pressure ,acceleration, temperature ,strain or force by converting them to an electrical charge the prefix PIEZ is a Greek word for press or squeeze API is a door electric transducer has very high DC output impedance and can be modeled as a proportional voltage source and filter network the voltage V at the source is directly proportional to the applied force pressure or stream the output signal is then related to this mechanical force as if it had passed through the equivalent circuit.

C. Peizo Sensor

Piezoelectric sensor are versatile tools for the measurement of various process they are used for:

- 1) Quality assurance process control and for research and development in many interest rates: This was discovered in 1880 but only 1950 is that manufacturing begin to use the piezo electric effect in the industrial sensing applications. Since then this measuring principle as being increasingly used and it has become mature technology with excellent inherit they have been successfully used in various applications such as medical, aerospace, nuclear instrumentation and as a tilt sensor in consumer electronics or a pressure sensors in a touch pad or mobile phones in the automotive industries Piezo is a dielectric elements are used to monitor combustion when developing internal combustion engines the senses are either directly mounted in to an additional hole into the cylinder head

D. Piezo Sensor

Piezoelectric sensors are electromechanical frameworks that respond to pressure or weight the detecting component indicate zero deflection when presented to pressure This gives piezo electric sensors rigidity an extremely high natural frequency and excellent linear over a wide amplitude range additionally, piezo electric technology is insensitive to electromagnetic fields and radiations.



Fig: practical operation of piezo sensor with LED

Enabling measurements under what conditions some materials used especially gallium phosphate or chromaline are extremely stable at the high temperatures enabling sensors to above working range of UP 2000-Celsius, when the temperature of the crystal changes this effect is also common to pco Ceramic this is the ability to generate an electrical signal when the temperature of the crystal changes

VI. IMPLEMENTATION & WORKING

At this point hardware is complete piezo electric element works in such a way that the velocity on the sensor generates voltages in response to mechanical stress so and the piezo electric disc produces a signal which is received by an analog input of the order no pins (802/A5) Generated signal is not perfect ,but it changes in time and sometimes its unpredictable due to the vibrations and resonance of the dilute aluminum plate. The ordinance task is to interpret the signal in a proper way reject all vibrations which are not the exact hit ,the goal is achieved by the pin code then order no sense midi signal over the serial USB port to the computer Here we used free download programs(loop midi and fearless midi serial)—which reads the midi signal from the USB port and create a virtual midi output in the computer, this output can be seen by special programs called-DAW(digital audi workstation or cubase ,protocols any audio work station) Which Is responsible for mapping the input signals with music samples (we can use free version of fruity loops/logic pro x samples in elective drums)to map midi signals. To change the values of buffer offset 20 Ms not obtain any delay effect now upload midi library to the Arduino through IDE and upload the code to the Arduino board. Now open the hairless midi serial bridge and set the input for your Arduino Port for displaying in the suggestion box. Now install the MIDI loop and open it and create a port and copy the port name to the hairless midi serial bridge –output.N Now Google/for the FL Studio and download install it opens FL Studio and download install it opens FL studio and map the given drum samples to your input signal

VII. RESULT

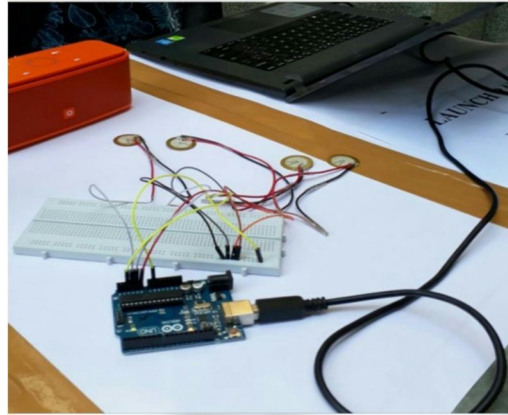


Fig: Piezo sensors are connected to arduino with MIDI software interface via speaker

VIII. CONCLUSION AND FUTURESCOPE

This paper is implemented successfully for a Music with combination with electronic technology in a sophisticated fashion easily understandable and with interesting features working with wide number of nodes simultaneously and further it can be developed with the help of Raspberry pi 3 which has an inbuilt Wi-Fi and has a great option to view stats in an IP using IOT technology we can have data visualization and data controlling and monitoring also can be possible

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