

Clap Pattern based Electrical Appliance Control

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Abstract— In this paper, we present idea to control Electrical Home Appliances like Light, TV, Fan, Bulb etc. using Clap. There are various techniques available to control Electrical Home Appliances such as IR based remote control switch, ON OFF Switch, Using WIFI or Bluetooth Device control. But our method is most cost effective. This project has a big social impact. Our aim is that physically challenged user. We design PIC based circuit to detect clap from other sounds.

Key words: Hand Clapping, Condenser Microphone, Sampling LED, Relay, Clap Trigger Circuit

I. INTRODUCTION

Now a day's various methods are available for controlling devices. Example simple ON OFF switch, using SMS GSM based device is control, device control using IR remote, device control using WIFI or Bluetooth. These methods used for wired and wireless technology for the purpose and each technology have its own advantages and disadvantages. This projects deals with low cost new technology to control device. In clap pattern based electrical appliance control claps is used to turn ON or turn OFF device. Idea of project is when user claps for one time device one will turn 'ON' and if user claps for two times device two will turn 'ON' and if user claps for three times device three will turn 'ON' and two turn off device 1,2,3 user has to clap. For one or two or three times respectively again. In this project we are going to use PIC based suitable micro controller and condenser microphone to accept clap input from user.

II. LITERATURE SURVEY

A. Clap Switching

This paper proposed by Somangshu Bagchi, Subhadip Ghosh, Deepak Nandi present an clap switching work prior to November 2013. In this project it gives knowledge of 555 timers, i.e. working of relay and clocks. In this type of device it provide the working of NE555 timer and the relay. The relay is switch it gives a path only when current flown through it. In this project the second timer triggers relay of conducting path it is established terminals of the load and the device is gets turned on. Time interval of the claps is checked with the time constant and it can be established by the RC configuration of $T=1.1R7*C3$ [1].

B. Control of Light and Fan with Whistle and Clap

This paper proposed by Kashinath Murmu and Ravi Sonkar present a Control of Light and Fan with Whistle and Clap work prior accepted in November 2004. In this paper, it can detect clap and whistle properly by removing most of the noise. But it complicated to distinguish between clap and tap on a table with the analog circuits due to similar waveform generated by it [2].

C. Design of a clap activated switch

This paper is published Seyi Stephen olokede work prior accepted in July-December 2008. In this paper the clap activated switching device function properly by responding to both hand claps at about three to four meter away and finger tap sound at very close range, since both are low frequency sounds and produce the same pulse wave features. The resulting device is realizable, has good reliability and its relatively inexpensive [4].

D. GA-Based Feature Extraction for Clapping Sound Detection

This paper is published Jan Olajec, Roman Jarina, and Michal Kuba present GA-Based Feature Extraction for Clapping Sound Detection work from 25 September 2006. The results of the experiment does not give clear result, in which coefficient is more and less discriminative in the case of detecting clapping sound among other sounds. But it is valuable to notice the facts that: a) the performance increases when only selected features are led to the classifier; b) clearly, the highest and lowest MFCCs are more discriminative that the coefficient from the central part of the MFCC feature vector. The future work on generic sound detection will be oriented toward application of GA on wide range of various spectro-temporal audio features to get more clear answer to the feature selection problem [5].

E. Analysis and synthesis of hand clapping sounds based on adaptive dictionary

This paper is published by "wasim ahmad, ahmet M.kondoz" in "31 july to 5aug 2011" in the proceeding of international computer music conference 2011, university of U.K.

In this paper, the target clapping sound was synthesis by selecting and tuning the synthesis pattern and their corresponding atoms from the dictionary. In addition an expressive synthesis method was presented which can generate non repetitive and customized clapping sound[6].

F. Recognition of hand clapping sound-the significance of timbre in stev reich's clapping music

The "godfried t. toussaint" has been developed a paper in 2013 in the "international journal of computer science and electronics engineering", in this paper the project suggest new avenues for research in ethnomusicology.

For example, many of the clapping patterns in the African music describe by jones contains two or three patterns played by different performers, creating and overall result and patterns. It would be interesting to study not judge rhythm of the clapping patterns themselves but also effects of timbre variations[3]

G. Inferring the hand configuration from hand clapping sounds

The “Antti Jylha and cumhur Erhut has been developed a paper in September 2008 in the 11th international conference on digital effects, Espoo, Finland.

In this paper, it is possible to make inference of the hand configuration of the clapper given the result in sound. Result also suggest that the clap of individual clappers may incorporate systematic differences from other people’s claps, both the personification and clapper independency of the proposed systems should be studied[7].

III. PROPOSED OF WORK

The clap pattern based electrical appliance control is based on the patterns of claps. The claps are one, two, and three likewise devices can be ON and OFF. In this the specific time delay can be given to the microcontroller because by using this microcontroller can read the triggering pulses.

IV. BLOCK DIAGRAM

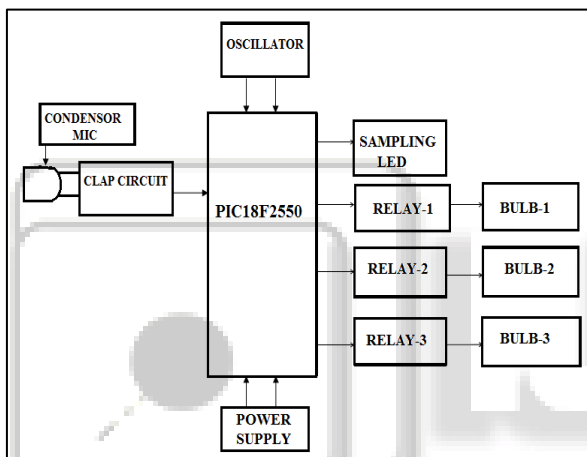


Fig. 1: Block Diagram of Clap Pattern Based Electrical Appliance control

The above system consists of following blocks:

- PIC18f2550
- PIC16f628A
- Condenser MICROPHONE
- Sampling LED
- Power Supply
- Oscillator

A. PIC18F2550

In pic 18F2550, 16 bit timer is used and prescaler used in this 256. By using this prescaler delay generated is more. In this we used three pins RA0, RA1, RA2. Sampling LED is connected to pin number 28. And in this 4 to 5 sec delay is given to sampling LED. In this time period, LED will be ON or OFF. Pulse input is given to the 24 number pin i.e., RB2.

B. PIC16F628A

In PIC16F628A, two comparator is used. Pulse input is given to the RB4. Comparator in 16F628A is configured in four inputs multiplexed to two comparators with internal reference voltage.

C. Condenser Microphone

A microphone is an acoustic-to-electric transducer or sensor that converts Sound into an electrical signal.

D. Clap Trigger Circuit

Comparator in 16f628a is configured in four inputs multiplexed to two comparators with internal reference voltage. RA0 acts as input to the comparator first. In normal condition the output voltage across collector of transistor is around 0.3volt. When clap input is given, this voltage increases to 1.5volt approximately.

- When Vref is greater than RA0 then C1OUT is equal to one.
- When Vref is less than RA0 then C1OUT is equal to zero.
- Invert bit of comparator first is set, therefore,
- When Vref is greater than RA0 then C1OUT is equal to zero. When Vref is less than RA0 then C1OUT is equal to one.

E. Sampling LED

For sampling led some specific time delay is given which is 4 sec is for on time and after every 4 sec it takes 5 sec delay.

F. Oscillator

Oscillator is used to generate audio and radio frequency energy. And the output of the oscillator sine wave output. It has many shapes like square wave or saw-tooth wave. The sinusoidal waveform in the form of ac or dc. Oscillator is a very low power devices use in a radio frequency circuits. Electronic oscillator related with a both produce sinusoidal electrical energy. Output of the oscillator on a frequencies measure in tens of a megahertz or the output produce of a special oscillator at microwave frequencies. Oscillator actually generates radio frequency output in the low power transmitter most basic form.

V. ALGORITHM

- 1) Start.
- 2) Initialize Timer-0 in, 16 bit timer mode with 128 bit presales.
- 3) Initialize Timer-0 interrupt.
- 4) Initialize port -A as output port.
- 5) Initialize RB2 pin as input.
- 6) Initialize RB7 pin as output.
- 7) Load timer-0 initial count.
- 8) Turn ON sampling LED.
- 9) Run timer-0.
- 10) Count pluses from RB2 pin.
- 11) Wait timer-0 interrupt flag to set.
- 12) If timer flag doesn't set, jump to step 10.
- 13) Turn OFF sampling LED.
- 14) If pluses received is = 1, toggled RA0.
- 15) If pluses received is = 2, toggled RA1.
- 16) If pluses received is = 3, toggled RA2.
- 17) Wait for some time.
- 18) Go to step
- 19) Stop.

VI. FLOWCHART

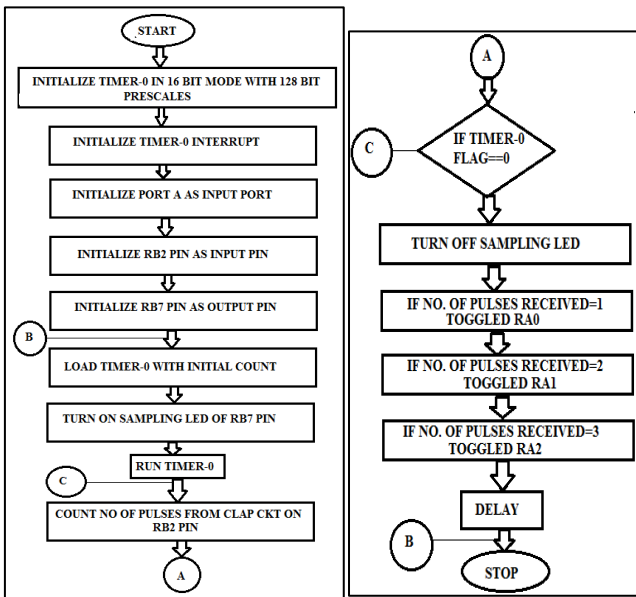


Fig. 2: Flowchart of Clap Pattern based Electrical Appliance control

VII. CIRCUIT DIAGRAM

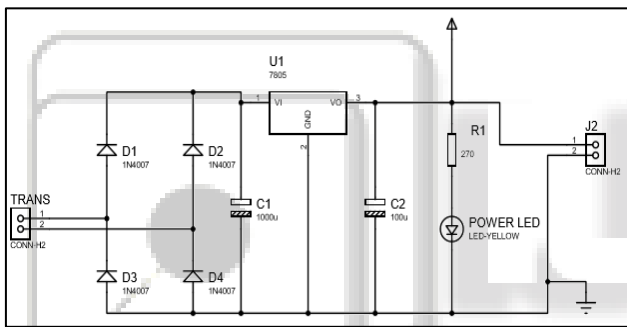


Fig. 3: Power supply of circuit

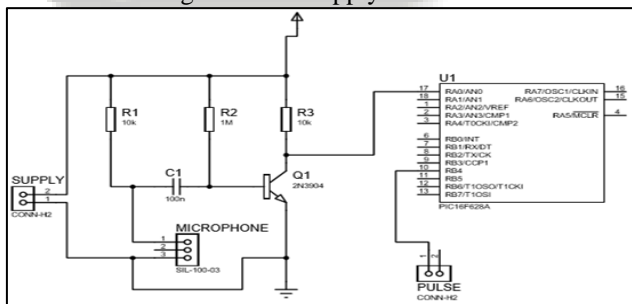


Fig. 4: Clap trigger circuit

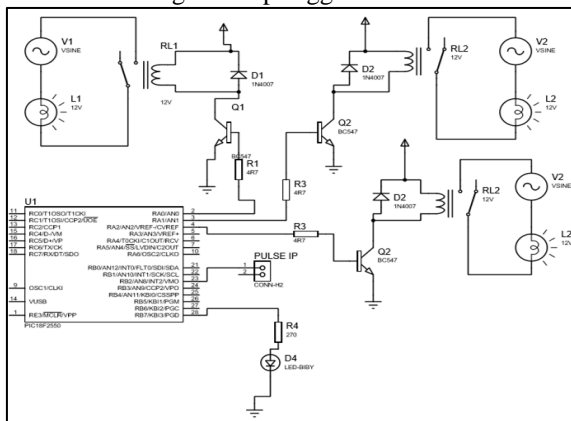


Fig. 5: Main circuit

VIII. CIRCUIT DIAGRAM EXPLANATION

The project has two circuits:

- Clap circuit: For clap detection and pulse generation, second circuit is for
- Main circuit: For processing of pulses & ON -OFF devices

A. Working of Clap Trigger Circuit

- Condenser microphone is used to convert clap sound into electrical signal. 2N3904 transistor is used as an amplifier to amplify clap signal. Normally output voltage across collector is around 0.3V when there is no clap signal and output of transistor increases up to 2 to 2.5V whenever clapping signal comes.
- The output of transistor is given to the inverting terminal of comparator1 in PIC16F628A.
- This output signal of transistor is compared with internal reference signal 1.25V in PIC16F628A whenever transistor output signal is greater than internal reference voltage RB4 pin of PIC16F628A goes high for 150ms. This 150ms pulse is applied as an input to the main circuit. Therefore whenever user claps pulses are generated across RB4 pin as shown in above fig. of clap trigger circuit.

B. Main Circuit Working

Pulses came from clap circuit are counted by PIC18F2550 during ON period of sampling LED.

- If pulse received is equal to one, RA0 pin is toggled.
- If pulses received are equal to two, RA1 pin is toggled.
- If pulses received are equal to three, RA2 pin is toggled.

Relay circuit is used for ON OFF control of bulb. Transistor BC547 is used as switch, base of transistor is connected through 4.7k ohm current limiting resistor to pin RA0 of PIC. When logic of RA0 pin is high i.e. current is applied to base of transistor, transistor conducts and current allows through coil of relay which completes the circuit of bulb1 and bulb1 turns 'ON'. When logic of RA0 pin is low i.e. current to base is zero transistor turn off and act as open switch, therefore coil get deenergized and plunger get connected to 'NC' of relay therefore bulb circuit dose not complete and bulb1 turns off.

When logic of RA1 pin is high i.e. current is applied to base of transistor, transistor conducts and current allows through coil of relay which completes the circuit of bulb2 and bulb2 turns 'ON'. When logic of RA1 pin is low i.e current to base is zero transistor turn off and act as open switch, therefore coil get deenergized and plunger get connected to 'NC' of relay therefore bulb2 circuit dose not complete and bulb2 turns off.

When logic of RA2 pin is high i.e. current is applied to base of transistor, transistor conducts and current allows through coil of relay which completes the circuit of bulb3 and bulb3 turns 'ON'. When logic of RA2 pin is low i.e current to base is zero transistor turn off and act as open switch, therefore coil get deenergized and plunger get connected to 'NC' of relay therefore bulb3 circuit dose not complete and bulb3 turns off.

IX. CONCLUSIONS

As per aim of the project devices can be controlled by simple clapping. Device 1 can be toggled by clapping one's, device 2 can be toggled by clapping twice & device 3 can be toggled by clapping thrice.

But clapping circuit is not immune to other sound than clapping therefore any sound in the range of clap can toggle devices. The resulting device is realizable, has good reliability and it is relatively inexpensive. This project is useful for handicap person.

During working on project we have learned programming of micro-controller is using embedded "c" interfacing of different device with micro-controller. We also learned PCB layout designing, virtual simulation of circuit in Proteus.

X. RESULT



Fig. 6: Circuit is in off condition when user claps then device will be ON.

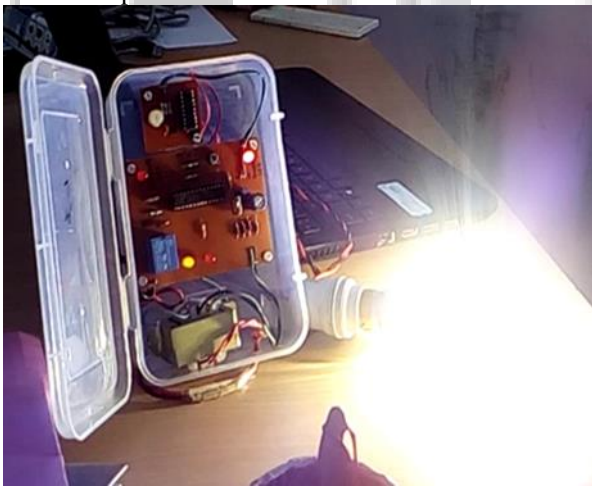


Fig. 7: Circuit is in ON condition

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