

IOT Enabled Smart Toaster

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ABSTRACT

This paper is titled ' IOT enabled smart toaster.' It is not a daily use item by everyone, but it will be a significant change in the business from the commercial point of view. The basic idea behind this is just making the brand advertising closer to the customers using small technology like Arduino. The leading working of this product is that it is used to print or obtain a design on a bread toast it may be the brand's logo or even maybe according to the requirement of the customer.

*For this project, we need an Arduino board, and we use the IR LEDs (infrared light-emitting diode) placed in the 8*8 matrix pattern. We need 2 of these matrices so that the bread can be placed in between these two matrices so that whenever there is current passing through these LEDs, they emit the infrared radiation so that the heat transfer takes place to the bread and it gets toasted. The same principle is used in the standard toaster, which, when the current passes, the radiation makes the heat transfer, and aluminum material is used to toast the bread. So we use the same principle here, bypassing the current, and maybe the LEDs do not produce the same amount of heat, but over time, it gets heated up, and much current is also not used. The place where we need the pattern, the LEDs in that specific area should be switched off so that the remaining part of the bread gets toasted, and we have the pattern, which is just plain. If we switch on LEDs in the pattern area, then it is called engraving on the bread. Instead, we need a toast; hence this is the brief about the project.*

Keywords: arduino; infrared radiation; internet of things; joule heating effect; led matrix; shift registers; toaster.

1. INTRODUCTION

THIS document is based on the main principle of the joules heating effect and indirectly is an application of Internet of Things. These days, the applications of Internet of Things are mainly based to make every job easy to humans. However, this paper's main idea is to change the daily used product to make it look more exciting and even do a business out of it. So this would be a luxury item rather than a simple item.

The main idea is to make more publicity and to make every minute detail more creative in a low economical and more efficient way with the things we have. The smart toaster's main idea is to make a daily routine toast into something new using the principle of joules heating effect and Internet of Things.

2. BACKGROUND

When it comes to this SMART TOASTER background, it is not a game-changer, but it is a luxury kitchen product. Imagine multi-national food chains like KFC, McDonald's, and other food chains printing their edible logo on a piece of bread saves much promotion cost, and it attracts people easily. Every component we use in this is food grade qualified. We can also draw our desired pattern, and we can choose the amount of toast to be high or low.

The primary task is to use the joules heating principle and using an LED matrix of IR LEDs since in the toaster, the two main components of

heating are Infrared Radiation, and the other one is the metal which the bread is in contact from both sides so that it gets heated on both sides.

3. METHODOLOGY

When it comes to implementing this, it does not even occupy much space and needs minimal components. By using the basic principles of Infrared radiation and heat transfer, the idea can be implemented. However, the infrared radiation is used in the normal toasted we also do the same, but we cannot generate such high heat with Arduino, so we use IR LEDs as an 8*8 matrix. The heat from the IR as we want will be transferred to the bread and gets toasted except in the design area. Hence the final output will be a bread toast with a design we need at exact area.

4. WORKING

This project's leading work starts when the joules heating and Arduino Uno principles are used to define the pattern we want on the IR LED matrix. Joules heating principle states that joule heating is the effect of heat created due to electric current through a conductor. This electric current's energy is converted into heat when the electric current passes through the resistive material. and design an Led matrix using these LEDs. We can control this via the Arduino Uno, and the code we write into the Arduino will define the pattern we want on the toast. Once the whole program is written, we complement it because we need to make a toast, so the remaining part of the bread should be toasted rather than that of the pattern we want to remain the same; hence we switch off LEDs which are in the pattern and remaining should be switched on.

5.1 INFRARED RADIATION

Infrared radiation is one of the most crucial parts of a standard toaster in this project since we need specific designs and patterns, so we use the IR LEDs. Common infrared LED that emits infrared rays has the same appearance as visible light LED. Its appropriate operating voltage is around 1.4v, and the current is generally smaller than 20mA. Ordinary infrared LEDs can be divided into the following three types: small power LED (1mW-10mW), medium-power LED (10mW-50mW), and immense power LED (50mW-100mW and above).

LED matrix, the led matrix is the matrix that is built using any breadboard or any Veroboard. Hence the Cathode of an led should be conned to the negative (-) of the supply, and the anode of an

led should be connected to the positive (+) of the supply. We connect cathode terminals of all the LEDs row-wise and anode terminals of all the LEDs column-wise. So for an 8x8 matrix, we need a total of 64 IR LEDs, in which all the Cathode of all the LEDs are connected row-wise and solder with a soldering iron and soldering wire and connect the anode of all the LEDs column-wise either directly or using the soldering iron.

Hence, verifying how the led matrix works, we need to connect all the rows to negative (-) of the supply and all the columns to positive (+) of the supply.

5. ARDUINO UNO

In our project, we have used the Arduino UNO chip, a microcontroller with 32 pins in total and has around eight dc output pins. Arduino only takes input and output in the form of a DC signal.

Arduino has gotten so popular that people can use Arduino to build hardware systems, hardware-software systems, without knowing hardly anything about hardware. Arduinos contain several different parts and interfaces together on a single circuit board. The design has changed through the years, and some variations include other parts as well. However, on a bare board, we are likely to find the following pieces: Several pins are used to connect with various components we might want to use with the Arduino.

These pins come in two varieties: Digital pins, which can read and write a single state, on or off. Most Arduinos have 14 digital I/O pins— analog pins, which can read a range of values and are useful for more fine-grained control. Most Arduinos have six of these analog pins. These pins are arranged in a specific pattern so that if we buy an add-on board designed to fit into them, typically called a "shield," it should fit into most Arduino-compatible devices easily.

6. SHIFT REGISTER

The next step is to connect this matrix to the Arduino Uno board, for which we need the shifting and multiplexing method.

74595 shift register: Shift Register is a group of flip flops used to store multiple data bits. The bits stored in such registers can be made to move within the registers and in/out of the registers by applying clock pulses. An n-bit shift register can be formed

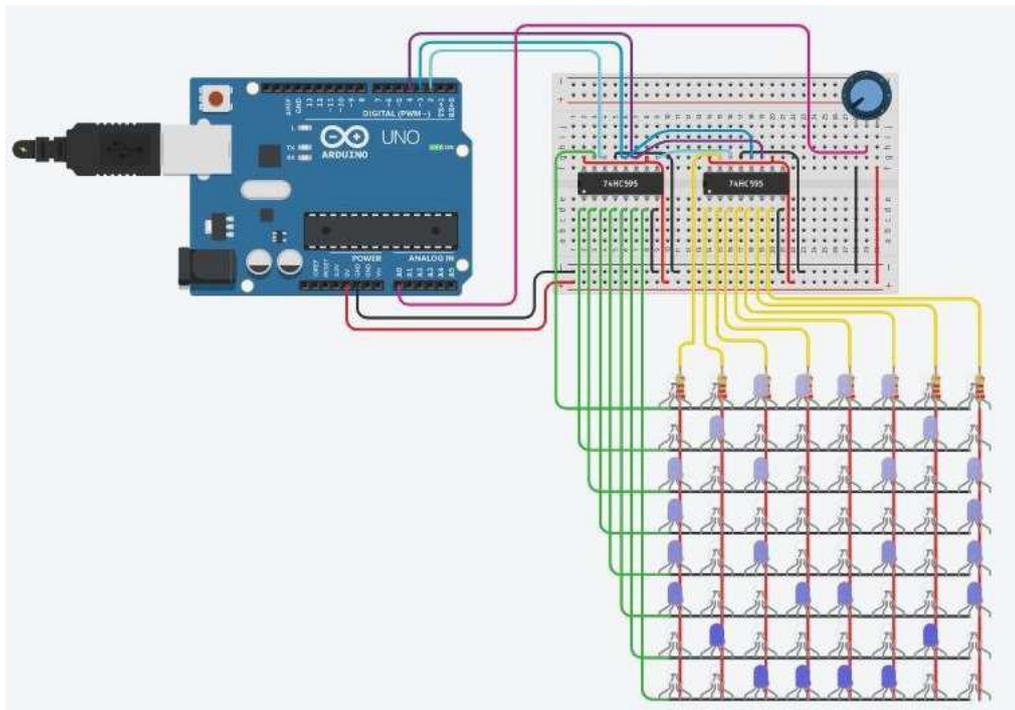


Figure 2:Final output in virtual simulation

9. ACKNOWLEDGMENTS

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