APPENDIX D

PUBLICATIONS

[1] M Ashok, Kumar Ramasamy, R Karthikeyan, M Dineshkumar "Design of Twin Blade Digital Vegetable Cutter". Journal of Xi'an University of Architecture & Technology (JXAT) Volume: XII Special Issue: V, May 2020, Page No: 2231 – 2236.

DESIGN OF TWIN BLADE DIGITAL VEGETABLE CUTTER

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Abstract- Normally, vegetable cutter is equipment which is used to chop the vegetables into many slices and in different shapes which is done manually. Usually, chopping of vegetables is a difficult task for homemakers and the chefs who are involved in cooking as a need or profession. So, to overcome this difficulty an automated device is designed in which it saves the time, man power and cost. Many machines are there for cutting the vegetables but the only difficulty is user need to change the blade manually as and when required. The automated slicer is designed in such a way that the user can choose the type of blade in the user interface, in order to cut the vegetables in their preferred shapes and it is portable. The devices used in this project are Arduino UNO, Stepper motor, Bluetooth(HC-05) and customized mobile application.

***Keywords*— Interface, Arduino UNO, Cooking, Bluetooth(HC-05), Pneumatic Cylinder, Direction Control Valve(DCV).**

I. INTRODUCTION

Every human being's in this world needed three things necessarily they are, food, clothing and shelter. Here, food is the main resource, where every living being's is needed. Without food and water living organisms can't survey in this world i.e. without cloth and shelter they can live but no food there is no soul."Food is the one and only resource that helps us to balance the nutritional paradigms in our body". Food is a needed substance that is been consumed to provide a sufficient nutritional support for an organisms. The food things are usually of green plants or meats of animal origins that contain nutrients, such as minerals, proteins, vitamins, or carbohydrates. These substances are ingested by an organism and assimilated by the organism's cells to provide energy, maintain life and growth. A nice quote is said by the Thirumoolar in Thirumandhiram as follows, *"Udambar azhiyil uyirar azhivar…"***.** Many plants and their specimens are eaten as food and nearly 20,000 plant resources are cultivated for

food, many of these plant species have several unique cultivars. Vegetables are parts of plants that are consumed by humans or other animals as food. And it is collectively termed as plants to refer to all edible plant matter, including the flowers, leaves, roots and the meaning is still commonly used. In some culinary and cultural traditions, the definition for the term *vegetable* would be arbitrary. Initially, the gatherers used to collect the fruits and vegetables from forests, later they started to cultivate on their own in several parts of the world, which was probably during the period 10,000 BC to 7,000 BC, then a new agricultural way of life is developed. Nowadays, most vegetables are grown all over the world as climate permits, and crops may be cultivated in protected environments in less suitable locations. Cooking is a kind of art and craft for preparing food for consumption. The basic need to prepare a food is "fire and plant resources". Plant resources are vegetables which are usually added to the dishes which are been preparing. By including this vegetables into the dishes it will gives us a healthy food. Some of the people who involved in cooking are, Chef, Home makers and so on. Vegetables are needed to prepare the dish. The toughest job in the art of cooking is 'Chopping the vegetables'. So we need to chop the vegetables into different shapes based upon the dish is being prepared. To chop the vegetables basically we need a knife, by using knife the masters will the chop the vegetables into different shapes. By chopping the vegetables by using hand it takes more time and man power. So, to overcome this problem we need to automate this chopping work by applying some latest technologies. This will be helpful for them to make the work very fast and more efficient.

II. GOAL

The main objective of this system is to make the cooking process easier, faster and to reduce the man power. This system helps the user to chop the vegetables in their preferable shapes available in the system. The difficulty in the existing system is to change the blades manually, so to overcome this difficulty the blade changing process is been automated and then, there is no need to have the knowledge about the blade changing process.

III. LITERATURE SURVEY

The functionality of this machine[1] is slicing, grating, dicing vegetables into desired shapes. Material used for both outer layer and blade is Stainless Steel. Power supply provided to this machine is 230V. The weight of the machine is 21kg and the dimensions are 720x350x500mm. This machine comprises of multiple blades to chop the vegetables into user required shapes. The merits are Semi-Automatic. Demerit is input capacity is very less.

The feature of this machine[2] is commercial kitchen. Material used in this is Stainless Steel. This machine includes multiple blades to chop the vegetables into user required shapes. Input capacity of the machine is 60-120 Kg / hour. Disadvantage is difficult to change the blade amateur.

The usage of this machine[3] is slicing, dicing, chips, French fries and grating. Material used for blade is Stainless Steel. The weight of the machine is 35kg and the dimensions are "20" x 12" x 22"mm. This machine includes single horse power. Input capacity of the machine is 150 Kg to 200 Kg. per Hour. Disadvantage is difficult to change the blade amateur.

Material[4] which is been used for both outer layer and blade is Stainless Steel. The total weight of the machine is 30 Kg. The power supply provided to this machine is 230V and frequency is 50 Hz. Disadvantage is difficult to change the blade amateur.

The entire machine[5] is constructed with stainless steel material and added with 4 litre capacity food fritter, 550W in power. Tempered glass cover is provided for clear observation of working status. A rubber lid is attached for adding in water/oil anytime you want. To make the cutting process faster and easier, a thickened 420 SUS blades are used with improved rigidity, producing fine and smooth result. For example, it takes 14s for meat, 16s for vegetables and 17s for nuts. Simple switch, start and stop buttons offer easy operation. For safety concerns, the machine will only work when cover is closed. For firm connection 2 slots are included below the barrel. Thick handles on both sides enable convenient movement. Rubber feet keep the machine stable while using. Rubber gaskets are provided to prevent leakage. Fast buckles improve sealing. The advantage is, efficient for cutting all kinds of vegetables, fruits, meat and grains and it is widely used in catering service business.

This product[6] contains five disk blades, 5/64" and 5/32" two slicing disks and 5/42", 5/32", 1/8" three shredding disks. It's features are, a powerful 3/4 HP (550W) motor, dual hopper continuous feed system for vegetables, fruits and cheeses. It is safe and ergonomically friendly 45 degree angled work surface with auto stop food pusher. The material used is heavy duty cast aluminium construction and low maintenance belt drive. The advantage is, it is graded with USA standard.

IV. PROPOSED SYSTEM

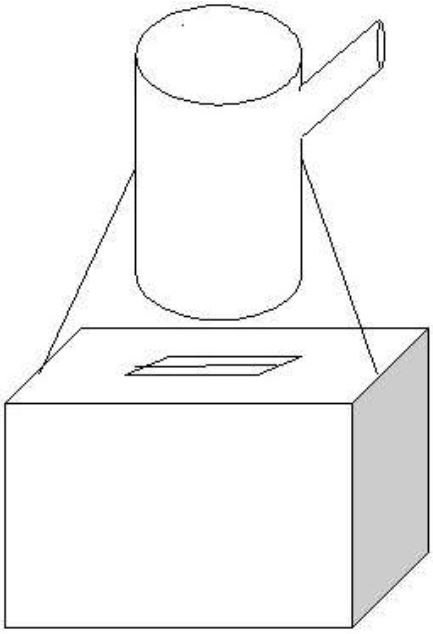

Figure 1. Abstract Design

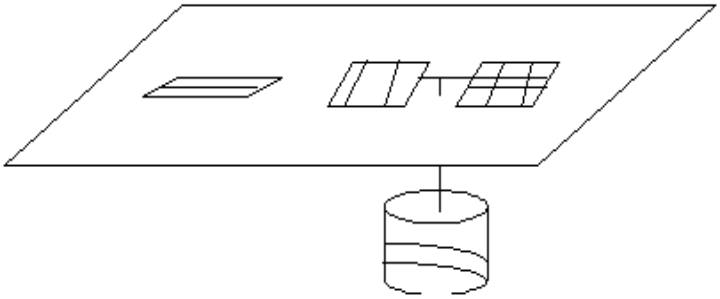

Figure 2. Slicer Design

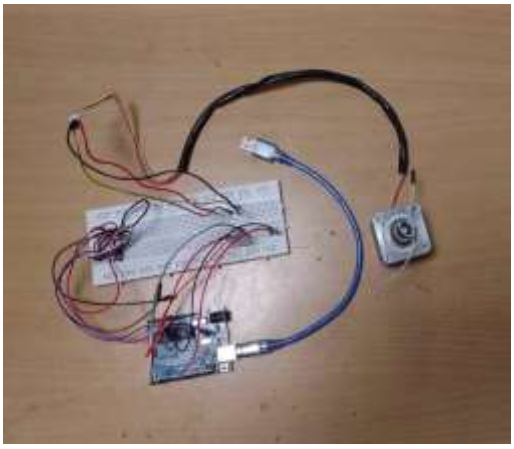

Figure 3. Motor Connection

Figure 4. Pneumatic Cylinder

Figure 5. Direction Control Valve (DCV)

Figure 6. Mobile Application Interface

This system consists of two major parts one is the mechanical setup involving the hopper block, hopper tube, square cutting case and grid along with the supporting frame, while the other part is the electrical circuit involving AC – DC converter, stepper motor, multi shapes cutting blades, relays, Arduino UNO, LCD display, Bluetooth module, drivers and keypad. The two parts, work with synergy, to perform the vegetable cutting process and the blade changing process automatically. The actuation of the pressure plate is linked to a pneumatic cylinder piston in which it helps us to cut the vegetables into the desired shapes. The entry

of the vegetables is through the hollow block and it is placed in the square cutting grid. The square cutting grid is made up of stainless steel in which the food safety is concerned. The pneumatic piston cylinder delivers a piston stroke for a set pressure and it is controlled by the Arduino board with the help of a mobile application connected to the Bluetooth module. The solenoid DCV helps us to controls the supply for extraction and retraction of the pneumatic cylinder. The pressure plate is used to force the vegetables through the cutting grid. There are regular, square shaped spaces between the cutting blades. The vegetables are forced between the spaces, thereby getting cut for the same shape.

This system contains two types of blade. These blades are used to chop the vegetables into desired shapes based on the type of blade chosen in the mobile application module by the user. The blades are changed using the stepper motor. The stepper motor is rotated to 180 degree; therefore the blade is changed according to the user request. To control these actions C code is used as an interface between the Arduino board and the external devices.

V. CODE

```
int led=8;
char val;
void setup() {
  pinMode(led,OUTPUT);
Serial.begin(19200);
}
void loop() {
 while(Serial.available() > 0)
{
  val = Serial.read();
  Serial.println(val);}
if(val == '1')
{
  digitalWrite(led, HIGH);
}
else if(val == '2')
{
  digitalWrite(led, LOW);
}
else if(val == '3')
{
  digitalWrite(15,HIGH);
  delay(5000);
```

```
  digitalWrite(15,LOW);
}
}
```

VI. CONCLUSION

Therefore, this system provides advancement to the existing vegetable cutter, it eliminating power fluctuations and low initial investment based on automating vegetable entry into the cutting tool. When compared to manual cutting, time consumption is very less and it reduces the difficulty in changing the cutting blade. This work provides the desired output and various cuts are made by using different cutting blades.

VII. ACKNOWLEDGEMENT

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[4] The Pattish SS Vegetable Cutter https://www.indiamart.com/proddetail/vegetable-cutter-8955246412.html.
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[6] HDS Stainless Steel Vegetable cutter https://www.indiamart.com/proddetail/vegetable-cutter-21502620062.htm

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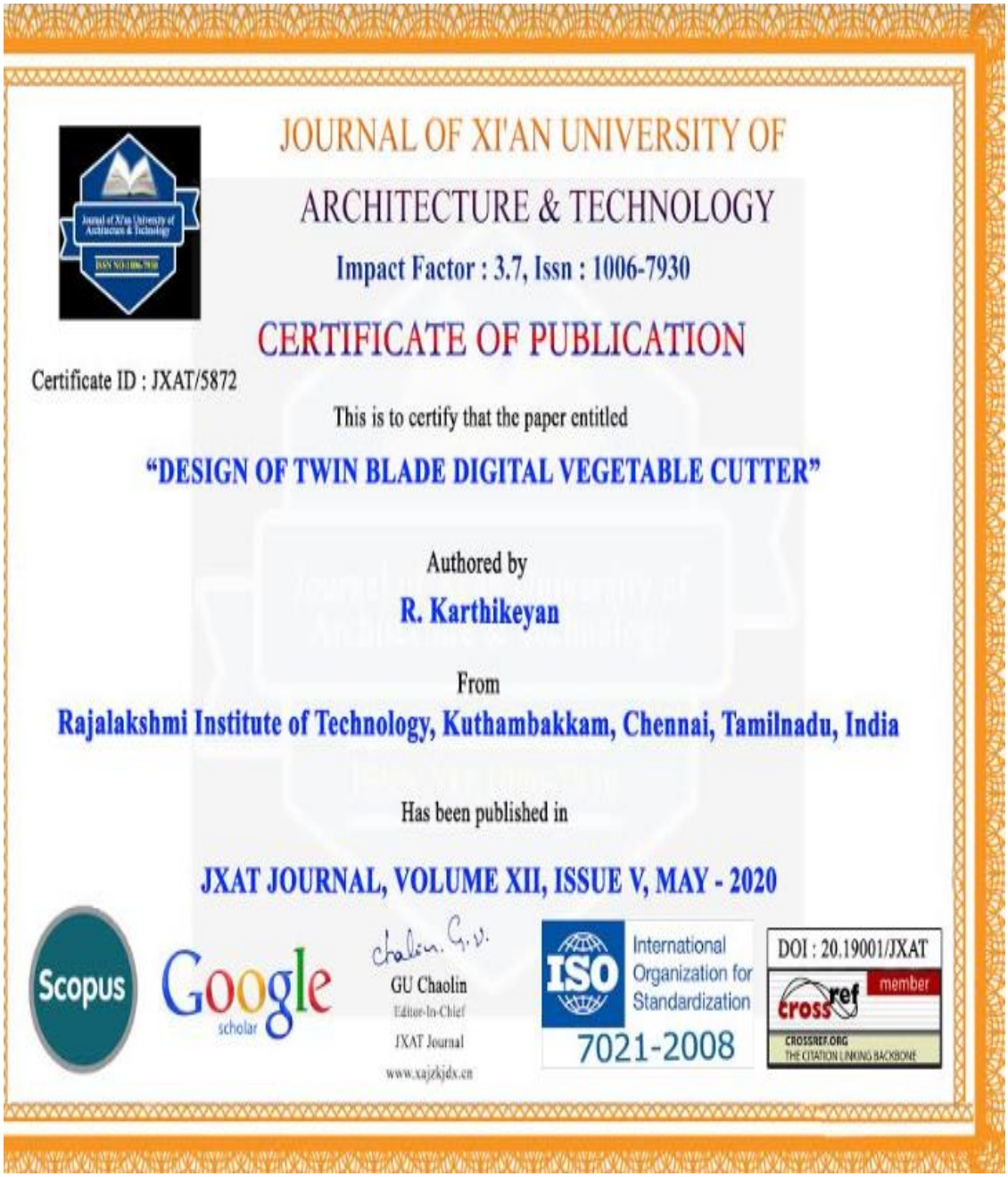

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