

DESIGN AND DEVELOPMENT OF MANGO QUALITY TESTER¹Omkar B Bhawke, ²Rohit R Shinde, ³Vishwajit S Chavan, ⁴Rohit B JadhavMechanical Engineering Mumbai, India^{1,2,3,4}omkarbhawke37@gmail.com¹, rohitshinde0014@gmail.com², chavanvishwa1045@gmail.com³,
rohitjadhav17897@gmail.com⁴**ABSTRACT**

In agriculture science, automation increases the quality, economic growth and productivity of the country. The export market and quality evaluation are affected by assorting of fruit. The crucial sensory characteristic of fruits is appearance that impacts their market value, the consumer's preference and choice. Although, the sorting and grading can be done by human but it is inconsistent, time consuming, variable, subjective, onerous, expensive and easily influenced by surrounding. Hence, an astute fruit grading system is needed. Quality determines the shelf-life and selling prices of fresh mango, and therefore quality observation and control of fresh mango are of utmost significance in the processing and management of its supply chain. Mango fruit (*mangifera indica*) quality methods are mostly destructive in nature. Different mechanical, electromagnetic and non-destructive methods are increasingly important nowadays because of the ease of operation, speed, and reliability of the process. This presents a detailed overview of various methods i.e. pre-processing, segmentation, feature extraction, classification which addressed fruits quality based on colour, texture, size, shape and defects.

Keywords— *automation, quality, productivity, mechanical, electromagnetic, colour, texture, size*

I. INTRODUCTION

India is an agricultural country. International comparisons reveal the average yield in India is generally 30%-50% of the highest average yield in the world. Agriculture has comprised of 16.5% GDP by sector (2019 est.) with approximately 50% labour force (2017 est.) and 10% total export. The budget 2020-21 pitched for more reforms in agriculture sector and increased funds for almost all areas of agriculture. India exported \$39 billion worth of agricultural products in 2016, making it 7th largest agricultural exporter worldwide. According to 2010 FAO, India is world's largest producer of many fresh fruits and vegetables, milk, major species, jute, millet and castor oil seeds. India is world's second largest producer of wheat and rice. India is world's second or third largest producer of several dry fruits, agriculture based textile raw materials, roots and tuber crops, pulses, farmed fish, eggs, coconut, sugarcane and numerous vegetables. Analysing the vision is a general characteristic of our brain. Our brain takes no effort to read and understand a sign, or separate a lion and a jaguar, or recognize people by their face. All this is too simple for humans. Where as for computers these are the actual difficulties to solve fruit classification and fruit grading is one of the most important and difficult task as in the supermarket the cashiers need to know the different categories of a fruit element to determine its price. In order to reduce the manual work of classification and sorting to improve the quality of the fruit grading, we can use the image processing and machine learning algorithms. Shape of the fruit, colour and size can be extracted to obtain a non-destructive type of fruit classification and gradation. Machine classification and grading can be carried out automatically if some standard rules for grading criteria are made. Automatic sorting system that can perform fast, save time and reduce manual labour can be used because it has a higher priority because of the ever growing need for high-quality fruit. Many automatic classification and sorting systems are available for various fruits such as citrus fruits, orange apples, oil palm fruits, strawberries, mangoes, lemons, dates, etc.

II. PURPOSE**A. Motivation**

India is a agriculture country. In India about 1500 varieties of mangoes are grown including 1000 are commercial varieties each of main varieties of mangoes have unique taste and flavour. So it gets difficult to identify the variety of mango. In market yard gives the another product on another variety so our main motto to identify the proper variety of fruit and get proper variety.

B. OBJECTIVE

- To check the quality of the fruits (mango) using different parameters like weight and colour.
- To reduce the manual work, for the checking quality and separation of fruits.
- To prepare complete and integrated solution for customer get proper quality of fruit.

III. COMPONENTS

A. Arduino Nano

Arduino Nano is a surface mount breadboard embedded version with integrated USB. It is a smallest, complete, and breadboard friendly. It has everything that Diecimila/Duemilanove has (electrically) with more analog input pins and on board +5V AREF jumper. Physically, it is missing power jack.

B. IR Sensor

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each colour of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the 22 same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation

C. Colour Sensor

A colour sensor is a type of "photoelectric sensor" which emits light from a transmitter, and then detects the light reflected back from the detection object with a receiver. A colour sensor can detect the received light intensity for red, blue and green respectively, making it possible to determine the colour of the target object.

D. DC Motor

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings.

E. L293D Motor Drive

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings.

F. 7805 Voltage Regulator

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings.

G. BC 547 Transistor

BC547 is a NPN transistor hence the collector and emitter will be left open (Reverse biased) when the base pin is held at ground and will be closed (Forward biased) when a signal is provided to base pin. BC547 has a gain value of 110 to 800, this value determines the amplification capacity of the transistor. The maximum amount of current that could flow through the Collector pin is 100mA, 30 hence we cannot connect loads that consume

more than 100mA using this transistor. To bias a transistor we have to supply current to base pin, this current (IB) should be limited to 5mA.

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