



## DETECTION OF PERISHABLE APPLE

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### Abstract

Whenever we went to market, we had seen lots of fruits and vegetables. Fruits and vegetables are not much fresh as the harvests on the past few years. We do not know whether it is edible or not, may it can be good face of it but we cannot see the depth. It may contains pests or perished from depth. It is because of environmental changes and uses of different pesticides for growth. From observing people and unfolding of natural events and visiting research facilities, fruits and vegetables that are perished or targeted by the pests may cause sickness or different allergies to humans. From reading various literature survey or watching news, there is a lot of fruits and vegetables that are rejected because it contains pests or perished from depth. Our government is working on safety but there is no proposed device to test it by customers. As customer's point of view, we are working with a device that will check this type of pests and perished fruits and vegetables. As a fresher, we are working on an apple because it has many benefits and it is a non-seasonal fruit. Our device is working on IOT, which works on spectral sensor. When a user press button on device then spectral sensor will receive radiation of ultraviolet rays. This will check different threshold and angles on the apple and give output in voltage form (0 - 1023) mV on the mobile through Wi-Fi module with the help of cloud as well as OLED will show whether the apple is good or bad.

**Keywords:** smart, Automation, Remote, Apple, Detection, Perishable, Spectral Sensor.

### I. Introduction

Main Source of food is vegetables and fruits. Fruits are very good for health. We are going to use the Fruits Scanner for detecting the perishable Apple. As per the today's scenario whenever we go to the market it is the biggest question which came in our mind that is the fruit is safe to eat or not. By looking towards the fruit, we can easily say that it is safe but when we go back to our home and after cutting it we came to know that fruit is perishable from inside. According to WHO, There is a survey that 28% people die due to food poisoning and infection due to food contamination. It is truly said, "An Apple a day, keeps a doctor away". Apple is the only fruit which have lots of benefits such as it improves eyesight, Improves prevent Cancer, helps in weight loss, Lowers Cholesterol level in body, etc. Therefore, we are going to design the system, which will helps to detect the perishable apple from inside at the time of purchasing.

Every time we go to the market, we see many fruits everywhere, we do not know if it is safe to eat or not, maybe it can be good physically but we do not see the inner part of it, it can contain pests inside. Fruits nowadays are not as fresh as the harvests on the past few years. It is because of the calamities and growing bad environment surrounding us. It is the cause why fruits are targeting by the different pests. It is the current issue in our country today. From observing people and unfolding of natural events and visiting research facilities,



Fruits that are targeted by the pests may cause sickness to humans. From reading various types of literature, listening to radio programs or watching TV programs, there's a lot of fruits and vegetables that are rejected because it contain pests in the inner part of it. Our government is testing our safety but there's no proposed device to test it further. Main Source of food is vegetables and fruits. Fruits are very good for health. We are going to use the Fruits Scanner for detecting the perishable Apple.

As per the today's scenario whenever we go to the market it is the biggest question which came in our mind that is the fruit is safe to eat or not. By looking towards the fruit we can easily say that it is safe but when we go back to our home and after cutting it we came to know that fruit is perishable from inside. According to WHO, There is a survey that 28% people die due to food poisoning and infection due to food contamination. It is truly said that "An Apple a day, keeps a doctor away". Apple is the only fruit which have lots of benefits such as it improves eye sight, Improves prevent Cancer, helps in weight loss, Lowers Cholesterol level in body, etc. So we are going to design the system which will help to detect the perishable apple from inside at the time of purchasing. As we all know doctors also suggest to their patient to eat an apple a day as it has lots of benefits of apple so, it led us to our research, on Detection of perishable Apple, and it is the device we decided to work on.

The conclusions are given in the last section, which makes a summary of the presented system and lists possible further improvements of the system.

## II. Literature

This literature survey will provide description of already existing system based application on fruit detection. There are many such systems based application already present, but each one of them has detect color and texture of fruits. . The focus of the literature review is to provide a demographic percentage of the effects of Bacteria present in an apple.

### 2.1 Existing systems of Fruit Recognition:

R.Newlin Shebiah et al [1], Journal of Emerging Trends in computer and information sciences Fruit Recognition using color and texture features. In this computer vision strategies used to recognize a fruit rely on four basic features which characterize the object: intensity, color, shape and texture.

New app checks fruit and vegetables for chemical residues.

With a new app created by Fraunhofer [2] research you can display the ingredients of an object. The possibilities of the application are numerous: for example, you can check for residues on an apple.

Automatic Fruit Recognition from Natural Images using Color and Texture Features by Susovan Jana et al [3]. Automated harvesting is an emerging field that utilizes computer vision and machine intelligence in order to gather useful information about the growth and ripeness of fruits and vegetables, and other aspects of farming.

Automated Fruit Grading System by Mohammed A. H. Ali et al [4], IEEE 3rd International Symposium on Robotics and Manufacturing Automation in this automatic visual inspection technology has become more potential and important to fruit grading applications. This is due to that the quality of fruits are the important factor for the consumer and so essential for marketing a uniform high quality products.



Rashmi Pandey et al [5], International Journal of Computer Applications Image Processing and Machine Learning for Automated Fruit Grading System: Image processing has been widely used for grading of fruits into uniform categories (size, shape, color and texture, bruises, stem and calyx).

Deep Fruits: A Fruit Detection System Using Deep Neural Networks et al [6] This paper presents a novel approach to fruit detection using deep convolutional neural networks. The aim is to build an accurate, fast and reliable fruit detection system, which is a vital element of an autonomous agricultural robotic platform; it is a key element for fruit yield estimation and automated harvesting.

A Novel Approach for Apple Freshness Prediction Based on Gas Sensor Array and Optimized Neural Network-17 July 2023 [7]. This paper introduces a gas sensor array and Tent-SSA-BP neural network for predicting apple freshness. Results show high accuracy, stability, and a coefficient of determination over 0.95. The system, with a gas sensor array, enables accurate freshness prediction for the next 30 days, offering cost-effectiveness and non-destructive testing. Future research aims to explore practical conditions like refrigeration and transportation effects on apple shelf life. The approach shows promise for practical implementation in freshness classification systems.

Innovative Fruit and Food Scanning. Biometric is your overall electronic partner for controlling and optimizing all aspects of fruit processing. Using optoelectronic multi- sensor quality scanning technologies, we enhance the quality and value of fruit by optimizing grading, sorting, storage and production.

## 2.2 Examples of Fruit Detection

**Color:** Color features have been extensively applied for apple quality evaluation mostly for defect detection.

**Texture:** Texture features are found to contain useful information for quality evaluation of fruit and vegetables, e.g., classification of grade of apples after dehydration with the accuracy of 95.

**Table 2.1: Results of Fruit Recognition System**

Sr. No	Fruits	Using color Features	Using texture Features	Using color and texture Features
1	Agata Apple	56.435	74.257	95.049
2	Asterix Apple	52.747	65.93	90.10
3	Fuji Apple	34.90	78.30	82.07

## 2.3 Existing System



**Fig. 2.1 Existing System**

**III. System Requirement Specification**

This project focuses on the developing the Detection based system which is used for the Apple at the time of purchasing it. This project is basically about using the Internet of things. This project broadly includes concept of Spectrometer, Arduino Uno.

Detection of Perishable Apple System is one of the most important IoT applications. Since it also improves people’s lives, some research papers have addressed this idea. From open source standards, to proprietary protocols and applications, there are some implementations that support the Detection of Perishable Apple System concept.

**System:** - Performs various preventive actions.

**OLED:** - It will show whether the apple is good or bad.

**Database:** - It stores values of the sensor and print as in form of graph.

**Table 3.1 User Classes and Characteristics**

**Table 3.2**

User	Characteristics
Owner	Press the button on the device and it will get all the output in the form of text.
System	System will Receive the UV rays from the apple for detection of the bacteria.

**System**

**Requirement**

Requirements	Name
Hardware Requirements	Node MCU 1.0
Sensor	Spectral Sensor, Wi-Fi module
Software Requirement	Arduino IDE
Platform	Android OS 4.4 and above
Language	C#

#### IV. Assumption and Dependencies

Owner will press the button of the device, which will emit the photon radiation on the apple.

Because of the photon radiation, if there is any bacteria present inside then it will detect it and conclude it as a bad or perished apple, else apple is healthy.

The device should have the continuous internet connection or it should be connected to mobile via Wi-Fi module

#### V. System Architecture

The system architecture explain about the concept of the whole project. What is our project, how it will work, which software, database, applications, hardware system and other requirement used in project are shown in this phase. Full Flow of system is shown in this architecture.

“Detection of Perishable Apple” is depending on owner or user. When the user will tap the button on a given device, then the device will emit a photon radiation, which will reflect or penetrate the apple. If the radiation will reflect back from the given apple then the apple is safe to eat. If the radiation will penetrate the apple then the apple is not safe to eat. In both the condition reflect or penetrate the device will send notification to the users mobile through Cloud.

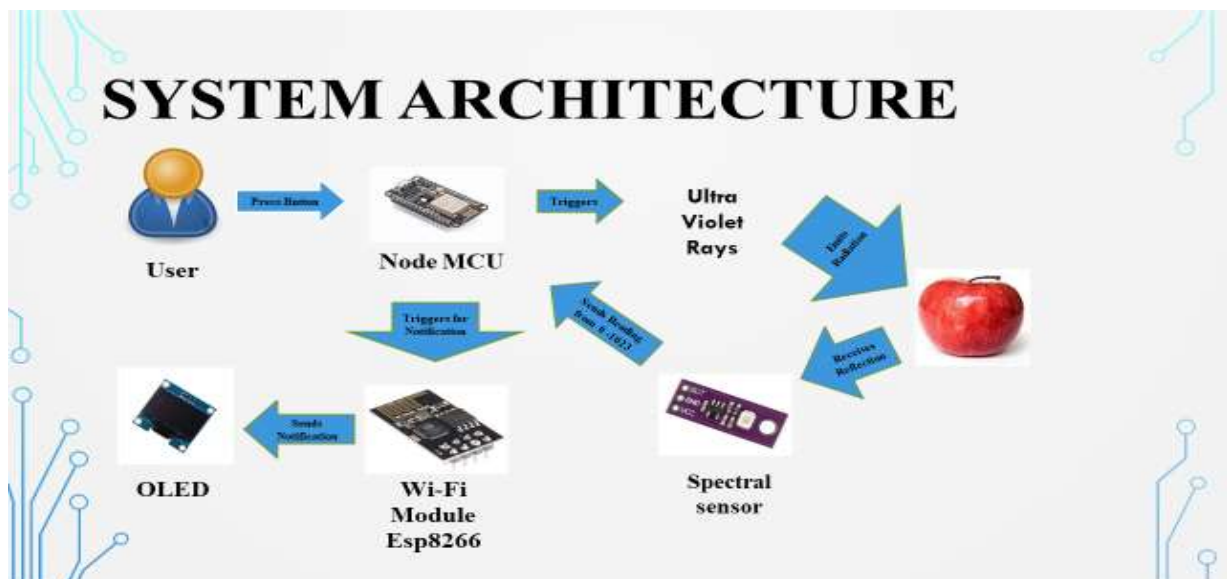


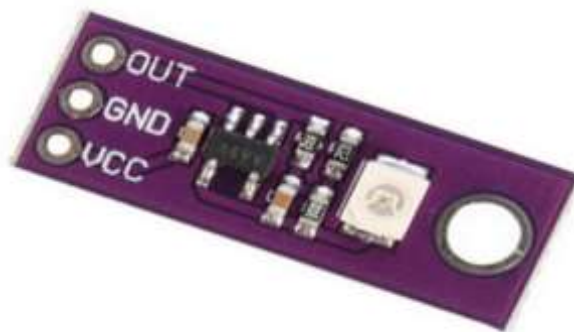
Fig. 5.1 System Architecture

#### 5.1 Spectral Sensor:

Spectral Sensor Breakout brings spectroscopy to the palm of your hand, making it easier than ever to measure and characterize how different materials absorb and reflect different wavelengths of light. The AS7263 Breakout is unique in its ability to communicate by both an I2C interface and serial interface using AT commands. Hookup is easy, thanks to the Qwiic connectors attached to the board — simply plug one end of the Qwiic cable into the breakout and the other into one of the Qwiic shields, then stack the board on a development board. You'll be ready to



upload a sketch to start taking spectroscopy measurements in no time. It detects the Perishable apple by the wavelength of photon radiation.



**Fig. 5.2 Spectral Sensor**

The AS7263 spectrometer detects wavelengths in the visible range at 610, 680, 730, 760, 810 and 860nm of light, each with 20nm of full-width half-max detection. The board also has multiple ways for you to illuminate objects that you will try to measure for a more accurate spectroscopy reading. There is an onboard LED that has been picked out specifically for this task, as well as two pins to solder your own LED into.

### 5.2 Node MCU:

Node MCU was created shortly after the ESP8266 came out. On December 30, 2013, Express if Systems began production of the ESP8266. The ESP8266 is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core,[citation needed] widely used in IoT applications (see related projects). Node MCU started on 13 Oct 2014, when Hong committed the first file of nodemcu-firmware to GitHub. Two months later, the project expanded to include an open-hardware platform when developer Huang R committed the Gerber file of an ESP8266 board, named devkit v0.9. Later that month, Tuan PM ported MQTT client library from Contiki to the ESP8266 SoC platform, and committed to NodeMCU project, then NodeMCU was able to support the MQTT IoT protocol, using Lua to access the MQTT broker. Another important update was made on 30 Jan 2015, when Devsaurus ported the u8glib to NodeMCU project, enabling NodeMCU to easily drive LCD, Screen, OLED, even VGA displays.

In summer 2015 the creators abandoned the firmware project and a group of independent contributors took over. By summer 2016 the NodeMCU included more than 40 different modules. Due to resource constraints users need to select the modules relevant for their project and build a firmware tailored to their needs.



**Fig. 5.3. Node MCU**

### 5.3 Wi-Fi Module:

The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by manufacturer Espressif Systems in Shanghai, China. The chip first came to the attention of western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer Ai-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at first there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation. The ESP8285 is an ESP8266 with 1 MiB of built-in flash, allowing for single chip devices capable of connecting to Wi-Fi. The successor to these microcontroller chips is the ESP32, released in 2016.



Fig.5.4 Wi-Fi Module

## VI. System Implementation Plan

There are many important phases for implementation. Following are the important phases and task of implementation. The main phase is to study existing related devices. All the necessary software for implementing the system must be installed on machine where system is to be implemented. Software project management begins with sets of activities that are collectively be done, the resources that will be requiring and the time that will be elapse from start to finish. Planning involves estimation your attempt to determine how much money, how much effort, how much resources and how much time it will take to specific device or system base to product. Would one build a house without knowing how much you were to spend for construction? Of course, not and since most computer based system cost considerably more than build a house, it would seems reasonable to develop and estimate before you start creating a software.

## VII. Conclusion

As per the today's scenario, people should be aware of the diseases and infections which are caused by the eating fruit and vegetables. For this, we have taken an apple for our project. For this system, we have worked for the 3 to 4 diseases of apple which people can't identify. By using this system, people will be able to differentiate between eatable apple and perishable apple. By detecting the perishable apple, it will also save people from diseases and infections as well as it will also saves money.



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