



# INVENTORY MANAGEMENT SYSTEM AT HOME USING YOLO ALGORITHM

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**Abstract--** In this project, we demonstrate an effective method for controlling the inventory for numerous applications involving tangible or movable assets. Inventory management is made more effective by automating tasks that would otherwise require extra labour and utilising IOT-based inventory management. The concept makes use of a camera and a computer that can connect to the Internet, like a Raspberry Pi, to measure the inventory and manage daily demands.

**Keywords—** . IOT . Raspberry pi .  
Camera . Inventory

## I. INTRODUCTION

Technology will only advance in the future. Every innovation aims to improve the quality of human life. In this age of technology development, new concepts and proto-types are being developed every day that are supplanting some aspects of our daily lives. More than anyone can imagine, these technologies are making life easier for every-one. As each day goes by, people's schedules become busier even as life is growing easier. Grocery shopping is a straightforward yet important household duty that few people have time for. Our lives and ways of living are be-coming increasingly intelligent as we move towards digitalization. Numerous smart products, including phones, TVs, and other electronics, are already on the market. Additionally, the kitchen is a significant room in the house and is equipped with numerous smart appliances that are designed to improve services for a household. In a short while, consumers will

require a smart appliance to manage their groceries. The available smart fridges, however, only allow you to see what is inside the fridge from a distance, so users must go shopping on their own. A lot of individuals previously worked on the home inventory management system and online shopping independently.

Family Hub Fridge is a device made by Samsung. Without opening the door, the user can view what is in the fridge using a display on the door, the user can view what is in the refrigerator at any time and from any location. Thus, it assists the user in planning their grocery shopping trips. It cannot recall what is in the refrigerator, though. A display is mounted in the entryway of Family Hub. The entire system runs on the Windows operating system. We all have a propensity to utilise the notice board on our refrigerator door, and Family Hub offers a function where users may record essential notes. By using the display on the refrigerator door, the user can also check their mail.

Therefore, this is more akin to a sophisticated form of the Cabinet used in refrigerators. The concept of ordering goods through the refrigerator's display has been chosen by Samsung in collaboration with MasterCard. As a result, customers do not need to visit a superstore to buy groceries. However, Family Hub is quite pricey, making it unaffordable for most individuals. Each refrigerator costs close to \$4000. While many groceries must be kept in kitchen cabinets, it only covers products that are kept in refrigerators. Family Hub is then unable to provide coverage for any foods that are not kept in the refrigerator.

Inventory Management refers back to the calculation of available stock. Inventory control is achieved at distinct tiers

of the manufacturing chain. It is a critical device for ever-evolving industries in which product call for is excessive and delays are a huge problem.

This device is useful not only in industries but also in the medical field and other professions. The provided approach is quite effective and may be used to solve both simple and difficult problems.

Inventory management for wheat, barley, and other grain generators involves complex issues that need for high performance. Detergents, soft drinks, and other liquids can all be controlled with the help of our ideas. They are successfully utilised in medical applications to maintain and replenish the drug stockpile. The internet of things is the main technological foundation for this green inventory management future.

## II. LITERATURE REVIEW

Amirkoushyar Ziabari et.al [1] developed a Fast 3D localisation of cells is achieved using a 5D YOLO-based fusion ap-proach using 3D volumes of microscope data.

Rumin Zhang et.al [2] proposed a new technique to detect obstacles in an indoor setting using deep learning with a light field camera. Fanghong Bi et.al [3] proposed a Target detection system design and FPGA implementation YOLO v2 algorithm-based, to achieve real-time picture detection on a device with low power and resource requirements. Emilia I. Barakova et.al [4] a strategy for interpreting emotions seen in facial expressions within the context of the trigger events was put forth. Fan Hu et.al [5] refers to the backbone of the Densenet net-work and changes it in accordance with YOLO V3 algorithm. Li Tan et.al [6] used the real-time performance of YOLO algorithm, the target detection of multiple targets in the video is performed in real time, and the target depth features are extracted after removing the noise data. Pranav Adarsh et.al [7] proposed a model identify and localize objects, there exist many methods with a trade-off in speed performance and accuracy of result. Bojan Strbac et.al [8] a solution for distance estimation based on stereoscopy and the YOLO algorithm which uses images and video streams obtained by using two cameras.

## III.METHODOLOGIES

### EXISTING SYSTEM

Traditional inventory control device presently in the marketplace is constructed on top of stock tracking program. Inventory details are updated by enterprise players in variety of ways. One such approach is a barcode scanner. This sort of inventory control device is suitable for the industry coping with packed bins. But, for clearing stock, you cannot use barcodes to track stock. As a substitute, use RFID incorporated with ZIGBEE. The detection range of the RFID reader itself is restricted. If multiple shipments are on the identical pallet, it'll be hard for the RFID reader to examine the sign effectively. Expenses boom if there are numerous rows, they need to be tagged with RFID, and more than one buttons effect more than one RFID readers and expenses. The drawback of RFID is that it could most effective be used to screen packed goods and can best be completed on the packing degree. by means of setting up a not unusual warehouse inside the organization's business areas, they could hold and manage their inventory in a welltimed and efficient manner. Several dimension sensors are commercially available for inventory size together with force sensor.

### PROPOSED METHODOLOGYAND BLOCK DIAGRAM:

Our layout tries to enhance performance while keeping the simplicity of the system. Right here, we take a simpler direction through harnessing the IOT to reduce unnecessary human interactions and automate the complete manner of dealing with goods. The difference among the present design and the proposed layout is that it uses committed hardware. The layout presented uses a digicam linked to a Raspberry Pi. The function of the camera is to use the object popularity algorithm (YOLO) to understand meals, end result and greens and show them on the liquid crystal display as products and quantities. The statistics is transferred to the mobile phone through MQTT and stored in the app. It additionally uses LED to locate if culmination and veggies had been spoiled or not. If the product is spoiled, the LED will mild up and the product will not be saved inside the database. After a while when the product moves away from the digital camera's subject of view, the quantity of that unique product reduces.

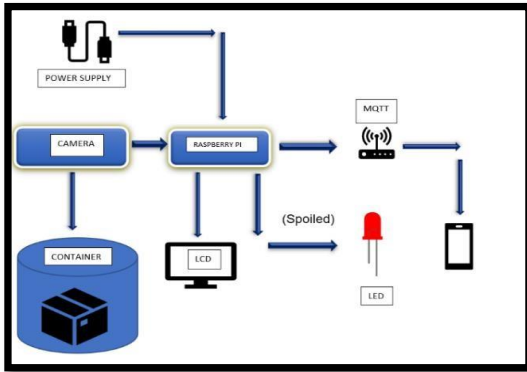


Figure 1: Block Diagram

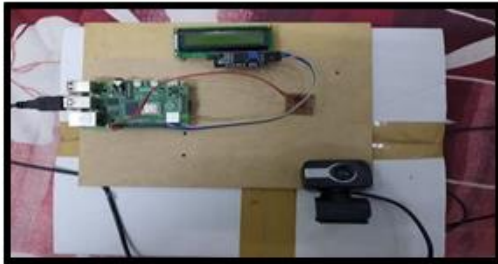


Figure 2: Model

## HARWARE COMPONENTS

### 1. Raspberry Pi

In this project we use a Raspberry Pi 4 Model B which is the latest addition to the Raspberry Pi line of popular computers. It includes 40 GPIO pins for connecting other devices. While maintaining the same power consumption, it dramatically improves processor speed, multimedia performance, memory, and connectivity compared to the previous generation Raspberry Pi 3 model B+. For users, the Raspberry Pi 4 Model B provides desktop performance comparable to entry-level x86 systems.

Figure 3: Camera



Figure 4: Raspberry Pi

### 2. Camera

Here we use a normal Logitech webcam to detect the products. It can be placed anywhere using the clip provided. A webcam is a video camera that transmits images or video to a computer in real time or through a computer to a computer network, such as the Internet. A webcam is a small camera, usually placed on a tabletop, attached to a user's monitor, or built into hardware. A webcam can be used during a video chat session of two or more people, and the conversation includes live audio and video.

### 3. LCD

The LCD screen is used to display the detected products names along with the quantity. An I2C is used to reduce the number of pins used in the LCD to make the connections easier by creating a serial connection.

Liquid crystal displays are electronic display modules and have a wide range of applications. The 16x2 LCD

is a very simple module that is very commonly used in a variety of devices and circuits.



Figure 5: LCD

#### 4. LED

Here we use a LED to get notified whether any rotten or spoiled is present or not.

LED is a semiconductor device that emits light when an electric current passes through it. When a current flows into the LED, the electrons combine with the holes and emit light. LEDs carry current in the forward motion and cut off the current in the reverse motion.

### IV. SOFTWARE IMPLEMENTATION

#### 1. YOLO ALGORITHM

To locate the items, we use a set of rules referred to as YOLO which is primarily based on CNN. YOLO stands for "You Only Look Once". This is a set of rules that detects and acknowledges diverse objects in a photo (in real time). Object recognition in YOLO is accomplished as a regression problem and offers the class probability of the recognized image. The YOLO algorithm uses a convolutional neural network (CNN) to hit upon objects in actual time. As the call implies, the algorithm requires a single forward route through a neural network to understand an object. This means that one pass of the algorithm makes predictions over the large picture. CNNs are used to expect unique elegance chances and bounding bins at the identical time. Right here in this project the code using python by importing open cv. The YOLO is considered over others because of its speed, high accuracy and getting to know capacity.

#### 2. MQTT

We use MQTT to create a talk between the raspberry pi and smartphone by creating a client and server program using python software. MQTT (MQ

Telemetry transport) is a simple open messaging protocol that provides restrained network clients with a simple way to deliver information in low bandwidth environments. This protocol, employs a conversation pattern, which is used for machine-to-gadget conversation.

#### 3. VNC VIEWER WITH RASPBIAN OS

For installing the Raspbian OS we use virtual field like application referred to as VNC. Virtual network Computing is a graphical desktop-sharing device that uses the remote frame Buffer protocol to remotely manipulate another computer. It transmits the keyboard and mouse inputs from one pc to any other, relaying the display screen updates, over the network. VNC is platform-impartial software which doesn't require any extra software program. a couple of customers may also hook up with a VNC server on the equal time. the following steps indicates how to connect the VNC server to Raspbian OS:

**Step 1:** First, make sure each your Raspberry Pi and the opposite computer systems you operate are linked to the identical community. In Raspbian, click on the utility menu icon on the pinnacle left of the display screen and pick Raspberry Pi Configuration.

**Step 2:** you could now connect with your Raspberry Pi from every other laptop. It uses a home windows pc, but you can additionally hook up with other platforms, or some other Raspberry Pi at the same network.

**Step 3:** Enter the IP deal with of the Raspberry Pi to connect to the Raspberry Pi in the seek bar of the VNC viewer. Press go back to connect with your Raspberry Pi. You'll want to go into your Raspberry Pi username (usually "pi") and password. Click on good enough to hook up with Raspbian.

**Step 4:** A window appears on your home windows computer showing the Raspberry Pi's Raspbian computing device interface. in case you move the mouse around the window, you will see the mouse move at the viewer. you may now use this window to govern your Raspberry Pi over the network. Now you could open the app and use the Raspberry Pi as in case you had been operating directly on a small computer.

**Step 5:** To shut down the Raspbian OS, click on the raspberry icon and select shut down.

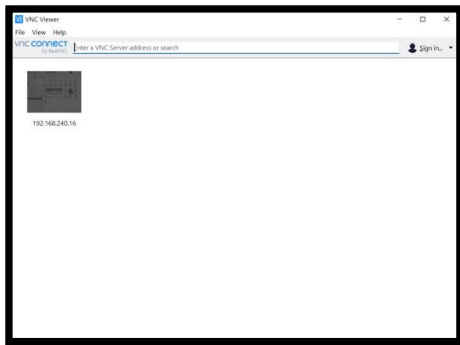


Figure 6: Procedure

#### 4. Android Application on Eclipse IDE:

Given below are the list of software required to setup android for eclipse IDE manually.

- Install the JDK
- Download and install the Eclipse for developing android application
- Download and install the android SDK

- Install the ADT plugin for eclipse
- Configure the ADT plugin
- Create the AVD
- Create the hello android application

Along with JDBC and SQL a data table is created to store the detected data as products and quantities. By using these software's, we created an app to store the detected products.

#### 5. Twilio API:

Here we use this API to receive SMS when a rotten product is detected in the groceries.

### V. RESULTS AND DISCUSSION

With the above-mentioned hardware and software program implementation, the system changed into realized and tested. The GUI can be more advantageous if necessary to visually display the anticipated quantity. The presented design specially focuses to be compact, price effective, and easy to put in force. Very few efforts were put into designing the app. This gadget isn't confined to a single sensor. More than one sensor may be connected to the Raspberry Pi due to the more than one GPIO and I2C pins. If the storage containers are separated by a huge Distance and multiple cameras are required, multiple systems can be hooked up because of the low cost. Our device detects a stock quantity, that could range relying at the rate at which the stock is consumed. As soon as detected, the inventory is saved in an app for tracking.

**Normal Detection:**

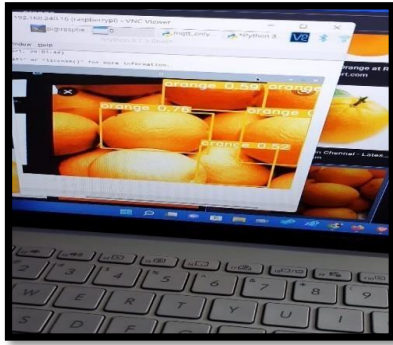


Figure 7: Detection of Objects



Figure 8: LCD



Figure 9: Message from Twilio API when the image is detected.

Figure 10: Rotten Objects

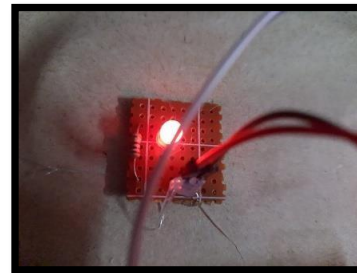
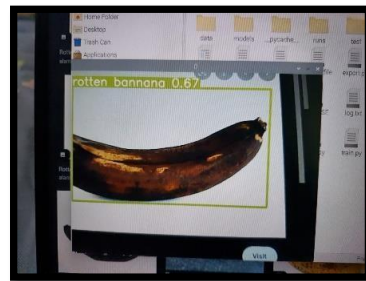


Figure 11: LED glows when rotten object detected.



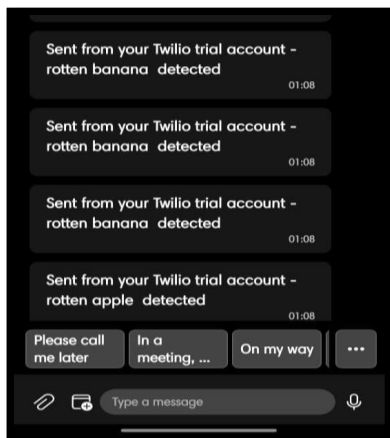


Figure 12: Message (Twilio API) is sent to the mobile phone.

## VI. CONCLUSION

It makes sense that this system is successful. The Raspberry Pi is a cheap device that is less expensive than the inventory tracking software that is currently on the market. We have streamlined the solution that can be utilised for both solid and liquid inventories by using the camera for inventory management. Installation is less complicated and more straightforward because the camera must be mounted on the top of the tank. As is evident, the method minimises human mistake by sending the inventory directly to the developed app. There are no delays brought on by a lack of inventory because the system is self-sufficient. It may be used in hospitals, small businesses, and big businesses because of its inexpensive cost, simple implementation, and effective design. The only restriction is our imagination.

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