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FRUIT DIFFERENTIATION GRABBER USING UAV

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ABSTRACT: Nowadays humans and their being technologies are becoming advanced in aircrafttechnologies. Even the new arrived technologies in aviation industries drones (unmannedaerial vehicle) plays a vital role. Many kinds of UAVs have been used in the world for certainduties. Even most of the industries and futuristic companies may use UAV technologies inpresent and future. One of the specific and a bit unsolved technology in UAV machines is toidentify fruits to be differentiated while in the tree and it has to be harvested with the help ofUAV. At present drones fly to pick fruits with wired connected UAV technology. This seemsto be a major problem existing in current technology. The method to be proposed with usingwireless UAV(unmanned aerial vehicles)to be used in the fruit harvesting industries withwireless technologies. This benefits the people to harvest and identify whether the fruit in thetreeis ripe orunripe. We can analyze it with the help of a UAV and even we can harvest it. Comparing the man work with UAV, the time consumption of the work will be three timesfaster.So the work is faster based on thetechnology.

Keywords: UAV, Harvesting, Differentiation of Fruit detection

I.INTRODUCTION

In 2020 covid-19 have changed the world crises. The continuity loss of financiallosses arrived at every industry in the world. The most popular country in the time ofcoronavirus crises, they used drones for their agriculture purpose even the agricultural robotshave not been used at that time. For UAV was largely used. The drone's appearance with astraight facing camera was coded and developed with AI to differentiate the difference offruits that were ripen or unripe. They were secure should be protected and they should fly inbetween the trees. Even in the present technology, there is no bigger importance to the fruitgrabber drones. The basic criteria in this project are challenging to fly a drone towards thetree. The drone propellers should be protected safely without hitting and damage in thebranches of the tree. The throttle calibrated power of the UAV must be softs and it should bewell controlled. They should not be jailed like FPV drones. The appearance of the drone wasthe top portion is fixed with the fruit grabber machine which helps to grab the fruit. The UAV camera as were coded and developed by AI and high-level languages to differentiate the current state of the fruit. The method analysis first about every fruit in the tree and it harvestsfastercompared to humans.

The drones are connected by cloud-based interfaces and they are not controlled by RC(remote control). they are calibrated and programmed in the computer already and theywill be automatically automated a flown over the agricultural lands. Whether will theydamage while flying in between the branches? The answer to that is the quadcopter the motorblades are well being protected by the protected guards which makes the quadcopter not toget damaged inthebladeparts.Thegrabber's armis paired inthebelow ofthequadcopterthe functionalities of them is programmed by raspberry pi 4 VL53LIX they are helped to spotthedistancebetween thefruitdistanceand the quadcopterarmdistance.

Now let us see all the appearances of the quadcopters the good gimbal technology controlsthe quadcopter to control the stability of the UAV(unmanned aerial vehicle). The robot arm helps to pluck the fruits from the tree. Now the technology that we assume that the current future technology of the quadcopters areoften connected with wired connections and they drop the fruits in the grabber machine. butthe future criteria that we implicit is to do it with wireless technology so that the drone can flyeven to the higher trees. Then the grabber of the quadcopter is attached to the bottom whichwill hold the payload of (2kg). then the drone comes to the ground when the connection iscalibrated and the man will take the things from it. Again the process repeats so that themanpowerand time getsaved.

II.LITERATURESURVEY

This system distinguishes fruits based on images captured by image. Asample set of images Is loaded and the model is trained to detect fruits. This system uses pre-processing for efficient image detection. This system provides a guarantee to work stablyeven in the change of environment. This system is flexible to use and eliminates the need ofpeople to get fruits on dangerous land surfaces, thus preserving more time and its efficiency,thethroughput of thesystem is increased

In this, we developed a fruit harvesting drone. Multicopters include Helicopter, Tricopter, Quadcopter, Hexacopter and Octocopter. Hexacopter have six wings. Because it has to liftheavyweight. In rotation of blades,3 will rotate in a clockwise

direction and another 3 willrotate in an anti-clockwise direction. Batteries play a vital role in Hexacopter during the plucking of fruits. Therefore current should be more than motor current.

A binocular Stereo Vision Camera is used in this copter, to get three(3D) images of fruit. Digital Color Charged Couple Device (CCD) is used to give color to the image. A Robotic Arm is fixed inthe drone to plug the fruits from the trees. The arm is fixed in a servo motor Controlled by Arduino Mega. The robotic arm consists of four fingers and a scissor which is mounted on the top of the robotic arm. Plugged fruits are stored in a bag and then it is transported.

III.METHODOLOGY

The working of the project is shown in the above flowcharts 1,2. The quadcopter is made tofly to pick off the fruit and it will fly until it finds the fruit in the tree. once the fruit isdetected it marks the fruit and finds whether the fruit is ripe fruit or unripe fruit. Then itleaves the unripe fruit and starts to measure the distance between the ripe fruit using thesensor. The distance must be less than or equal to 2meters, if the distance is greater or equalto 2 meters then the drone will move forward n steps. The fruit is grasped using the gripper itholds the fruit and rotates. It moves the arm backwards n steps and releases the fruit in thebasket and the drone can hold 2killograms of fruits in the air. The drone will do the sameprocessuntil it finishes the job

FLOWCHART

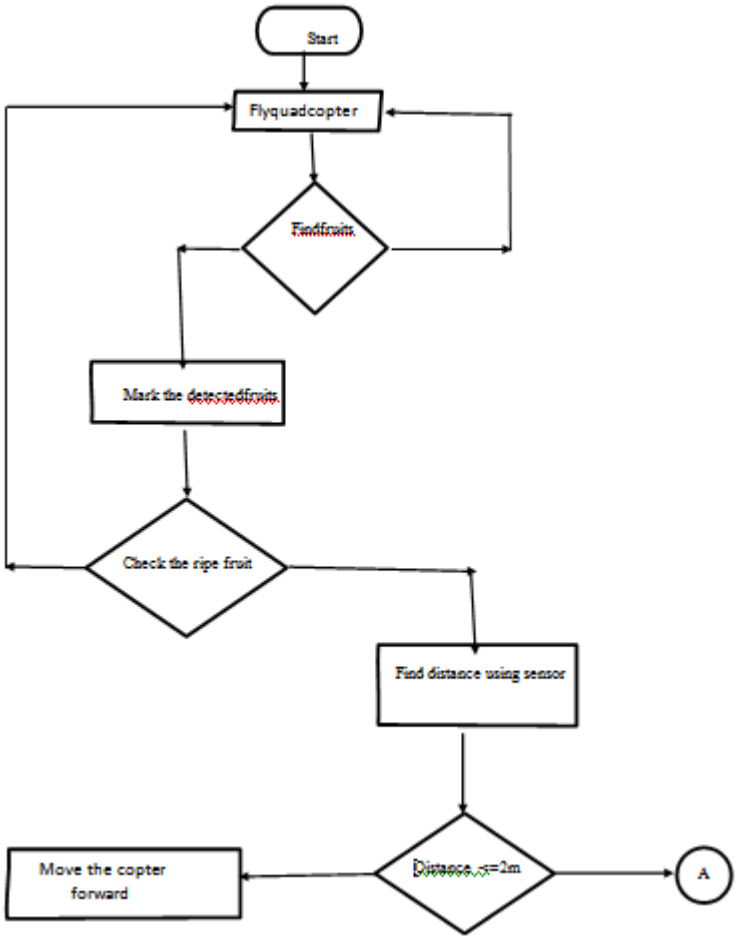

Figure 1: Working flow proposed system

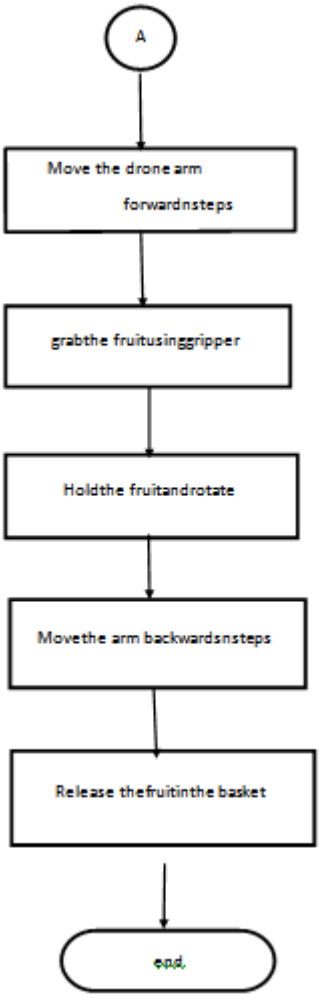

Figure 2: Working flow proposed system 2

IV.METHODS AND MATERIALS

The materials used in the proposed system consist of a transmitter, sensor, raspberrypi4, camera, quadcopter, gripper. The user can control the drone by the transmitter signal and can command its flight and itsdirection of flight through the channel. By this channel, the speed and the rotation of the drone are controlled. The video can be seen in the connected mobile through the transmitter.

The quadcopter is an unmanned aerial vehicle that is used for flight purposes and it can move faster and lift weight upto 2kgs.Thecontrollergetsthe signal from the transmitter to alter the speed and the direction of flight. Raspberry pi 4 is the microcontroller. It controls thegripper of the quadcopter. The rotators are protected with the steel outer body for their safetyissues. The raspberry controls the gripper and get the distance of the fruit using the distancesensor and move its gripper forward or backwards according to the distance and hold the fruitand pluck it from the tree and place it in the basket. The raspberry also controls the camera totake the picture of the tree and finds the fruits in the tree using the sensor and then transmitthe signals to the controller. The captured image undergoes the process and finds the positionof the fruit in the tree through image processing Then it finds out whether the fruit is ripe orunripe if the fruit is ripe then it will pluck or it will find the ripe fruit as per the controllerinstructs. the dc motor is also connected with the raspberry to control the movement of therod and the gripper is attached at the end of the rod to pluck the fruit. The gripper plucks thefruit without causing any damage to the fruit and places the fruit in the basket it can fill thebasket up to 2kgs and if the basket is filled it return to the controller. This method is useful tomake the process faster and helps to pluck the fruits at the right time in the right quantitiescan improve the quantity of produced fruits as there is minimal wastage and maximumoutput.

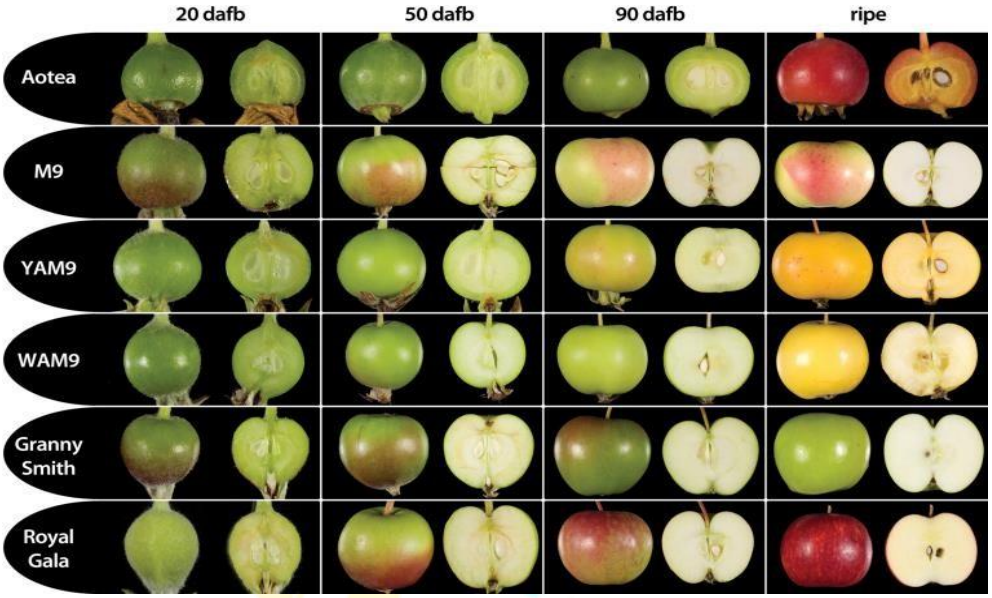

Figure 3: Finding the fruits

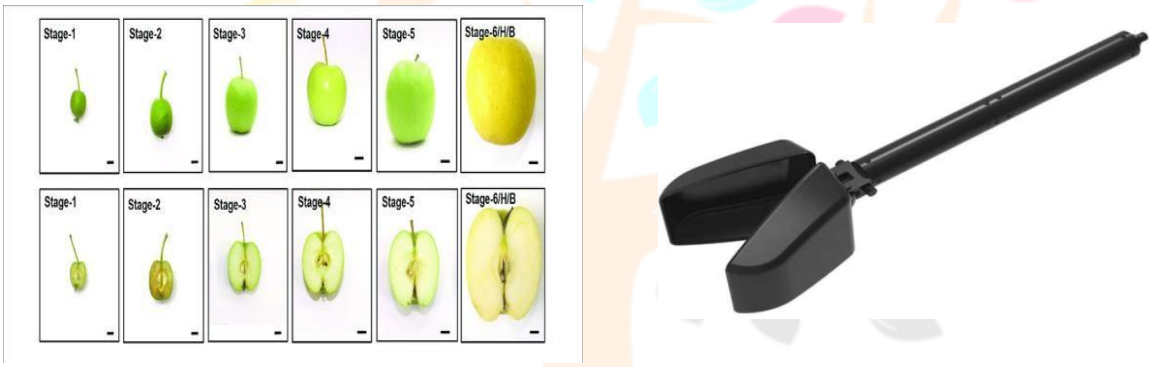

Figure 4: Grab the fruit

V.RESULT

The fruit harvesting drone quadcopter is processed with the mentioned specifications.The quadcopter has four rotors covered with a steel body as shown below figure. The dronearm is used for moving forward and backwards horizontally to reach the fruit with a gripperat one end as shown in the figure. The gripper is made with two gears at one end opening andclosing are those two gears. The gripper is used to pluck the fruits and the camera sensor isused to recognize the fruits by image processing technique.

Figure 5: Grab the fruit using Drone

VI.CONCLUSION

This conclusion narrates how the UAV technology is used in harvestingfruits from the tree. The machine will be automatically harvesting the fruits. The timeconsume compared to man is very less and the work done very faster. By this, we can saveour time as well as money. But the main drawback is the initial pay and investment of thistechnology is high. If the drone technology is then used by the lithium-ion then the batteriesmay be recharged and reused. If this technology arises in the future farmers gets their workeasier and the work process will be faster.

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