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TITLE OF THE PROJECT: "AUTOMATIC HARVESTER FOR TUBEROSE"

NAME OF THE COLLEGE AND DEPARTMENT: AMC Engineering college & ECE Department

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INTRODUCTION

The development of an automatic harvester for tuberose is an innovative project that aims to improve the efficiency and productivity of harvesting tuberose flowers. The main goal of the project is to create a robot that can accurately and efficiently harvest tuberose flowers without damaging them. Interest in agricultural automation has increased considerably in recent decades due to benefits such as improving productivity or reducing the labor force. The development of an automatic harvester for tuberose is an innovative work that aims to improve the efficiency and productivity of harvesting tuberose flowers. The main goal is to create a machine that can accurately and efficiently harvest tuberose flowers without damaging them. This interest stems from the benefits that advanced agricultural automation can provide. Robotic harvesting can improve productivity many-fold by reducing manual labor and production costs, increasing yield and quality, and enabling better control over environmental implications. Robotic harvesting is a promising technology of agriculture in the future. Agriculture has conventionally been a labour-intensive occupation in India. However, the complexity of agricultural environments combined with the intensity of production demands requires robust systems capable of adapting to high crop variability. Two critical aspects for achieving a successful automation of harvesting tasks are detecting flowers in natural conditions and the proper harvesting and manipulation of the detected target products. In agricultural settings, scenes exhibit a large degree of uncertainty; they contain objects with various colours, shapes, sizes, textures, and reflectance properties that change continuously due to illumination and shadow conditions However, in order to provide for the rapidly increasing population, in the face of rising labor costs, there is a need to explore autonomous alternatives in place of traditional methods.

OBJECTIVE

1. Analyzing the method of harvest
2. Tracking the labor cost
3. Analyzing the research gap
4. Proposing a novel technique for tuberose harvest
5. Developing an efficient robot to harvest tuberose

METHODOLOGY

The Fig -1 shown below explains the complete flow of the methodology along with the objectives.

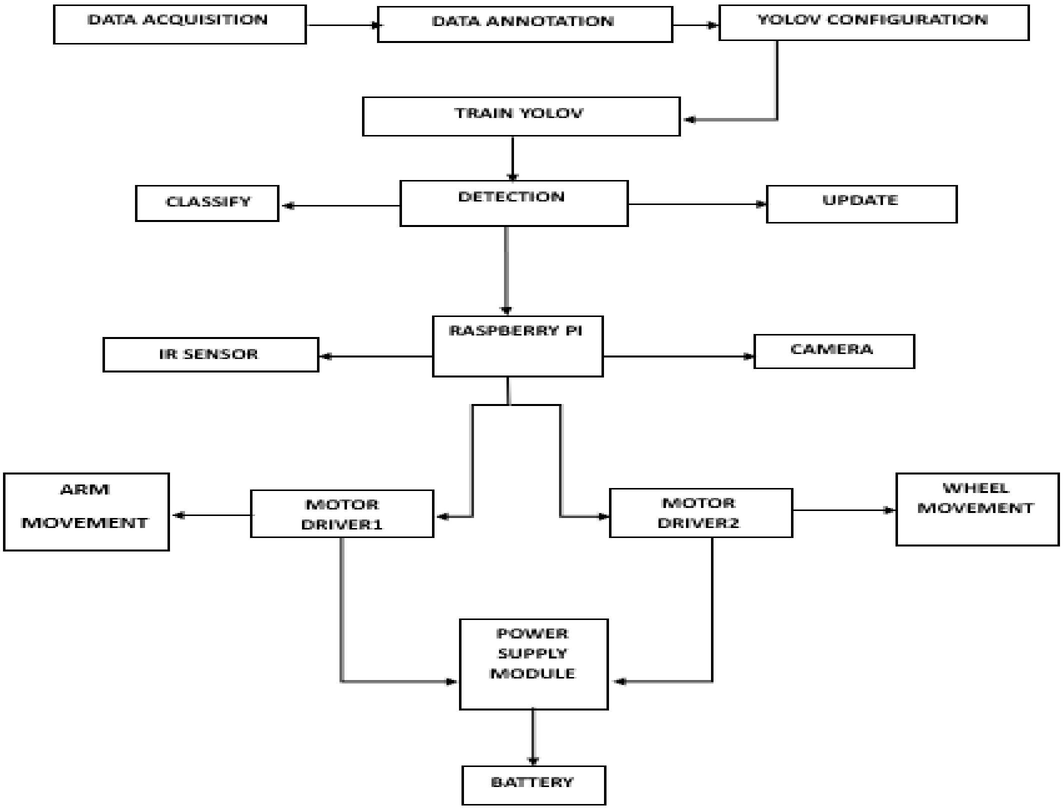

Fig -1 Methodology

- First the real-world images of the tuberose/bud are collected with the various background and the angle. The collected image is then trained using various online image processing platforms.The collected image is dumped into Make sense.Ai and the labelled data set of the images are created.The labelled dataset generated from Make sense.Ai is dumped in the Roboframe. Roboframe is basically used to annotate the images. The dataset generated is exported in yolo format.
- Identification and localization of objects in photos is a computer vision task called ‘object detection’, and here we use YOLOV5 (you only look once) algorithm.
- The trained dataset that is generated from the yolov5 is dumped into the Raspberry pi board. Raspberry pi board is used as the main board for the image processing as well as the control over all the components in the circuit .Hence when the image is detected the result is shown along with the rectangular border with the class of the image along with the accuracy of the class. Web camera is used for the detection of the image/bud that is connected to the raspberry pi board.
- When the camera detects the bud, the Raspberry pi board sends the control to the motor drivers l299d. out of the two l299d motor drivers, driver1 is responsible for the arm movement and the driver2 is responsible for the wheel movement.IR sensor is kept near the arm that is used for the detection of the bud. As the wheel moves towards the bud, the IR sensor near the arm detects the bud.

- Both of the motor drivers are connected to a power supply module that is used to supply the voltage across all the components equally throughout. Lead acid battery of 12 V is used for the power supply. When the web camera detects the bud, the control is sent to both of the motor drivers that controls the movement of the arm as well as the wheels. The arm uses IR sensor to detect the bud, after the detection of the bud. The arm now plucks the bud and places bud on the basket.

RESULT AND CONCLUSION

Development of Automatic Tuberose Harvesting Robot using YOLOv5 algorithm and Python codes has brought numerous benefits to the agricultural industry. The implementation of this innovative technology has improved the efficiency and accuracy of tuberose harvesting process, while reducing the cost of labor. Applying YOLOv5 algorithm has played a significant role in the success of the Automatic Tuberose Harvesting Robot. Its ability to accurately detect and identify tuberose flowers has led to better yields and higher-quality tuberose flowers. The use of this algorithm has also minimized damage to the plants, resulting in increased plant health and longevity. The Python codes used in the development of the robot have provided a flexible platform for customization and updating. The codes can be easily modified to optimize the robot's performance for specific needs, making it a valuable tool in the agricultural industry. Furthermore, the implementation of the Automatic Tuberose Harvesting Robot has led to significant cost savings. The need for manual labor as well as overall cost has been reduced, which benefits the farmers. This technology has made the harvesting process more efficient and cost-effective, making it accessible to more farmers.

FUTURE SCOPE

- Integration of various sensors and other image processing techniques for detecting and locating tuberose flowers.
- Testing and validation of the prototype robot in a real field.
- Assessment of the economic feasibility and market potential of the robot. Documentation of the design, development, and testing process, along with recommendations for further improvements and future research.