

# AUTOMATIC FRUIT HARVESTING USING FIREBIRD V ATMEGA 2560

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**Abstract** –In order to improve robotic harvesting and reduce production cost, an Automatic fruit harvesting robot using Firebird V (fifth generation) AT mega 2560 is designed, which can be molded on a travelling platform, were developed and operated practically. This Firebird V robot plucks and picks fruits from trees in the fruit garden and carries to the required place and dumps in a container. The robot will move throughout the garden and reach all areas of the tree to pluck and pick the fruits like mango, apple and other fruits having similar shape and size without damaging the other parts of tree like branches, leaves etc. This robot consists of eight IR sensors, color sensor, gripper, micro controller AT mega2560 and AT mega 8, Buzzer, NIMH battery, LCD and two DC geared motors. IR sensors are used to detect the object without any physical contact between the fruit and robot, color sensor is used to detect the color of the fruit, buzzer is used to indicate the battery levels of the robot, motors are used for motion of the robot and gripper is used to pick and pluck the fruit.

**Keywords:** FirebirdVAtmega2560robot, Colour Sensor, Gripper, Sensors, Position Encoder, USB Communication.

## 1. INTRODUCTION:

Farmers play a major role in our society. Mainly migrant workers are doing the harvesting in the seasonal activity. So, we want to provide the huge number of wages to the workers. By using the robot we can reduce the cost and it is the one time investment. In agricultural industry, harvesting is done by handpicking methods to remove hundreds of fruits in various locations on the individual fruit trees in large scale is still inefficient and more cost effective. To avoid this, an automatic fruit harvesting robot is designed. Without any human interaction the robot is used to pluck the fruits from the trees. Fruit harvesting is done using the mechanical harvesting also but is cost effective and less efficient. To overcome this firebird V robot is used in this project. This robot consists of various features and used for the various applications. To increase the production of the fruits in the less time without any damage of the trees automatic fruit harvesting system is very efficient.

## 1.1 Problem Statement:

The world population is increasing day by day to feed such large amount of food to the people it increase the strain and stress to the workers it will take more time to feed the people. The Automatic fruit harvesting is used to reduce the time and energy of the workers.

Mainly fruit picking is done by workers who migrate from one place to another, they are facing lot of problems due to increase of production. The agricultural industry is also depends on technology to solve there problems. By using the firebird V robot we are reduce the cost because it is one time investment.

## 1.2 Objective:

The main Objective of the study was to develop a real-time fruit harvesting robot using firebird V Atmega 2560 microcontroller to control the robot intellectually and colour sensor used to detect the colour of the fruits. The colour sensor is capable of detecting the fruit similar to the human picker.

## 2. Literature Survey:

[1]In recent years, robotics in agriculture sector with its implementation based on precision agriculture concept is the newly emerging technology. The main reason behind the automation of forming processes are saving the time and energy required for performing repetitive forming tasks and increasing the productivity of yield by treating every crop individually using precision forming concept.

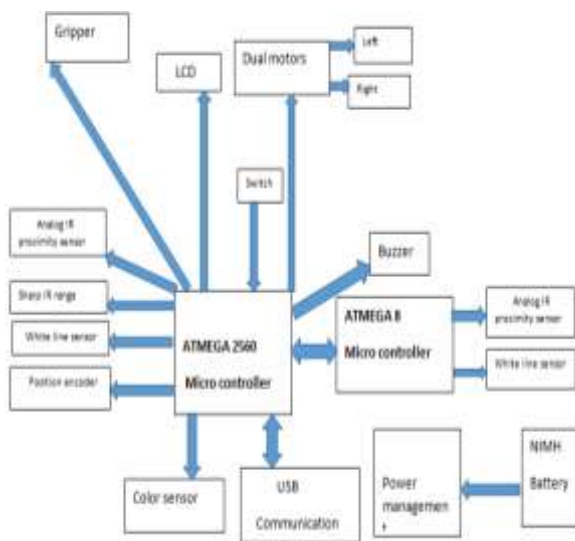
[2]Developed agriculture needs to find new ways to improve efficiency. One approach is to utilize available information technologies in the form of more intelligence machines to reduce and the targets energy inputs in more effective ways than in the past. Precision farming has shown benefits if this approach but we can now move towards a new generation of equipment.

[3]In order to improve robotic harvesting for fresh tomato harvesting and reduce the amount of human labor. This paper designed a automatic intelligent fruit picking robot. That picking robot included the vision position unit, the picking gripper, control system and a carrying platform. Based on the working principle of each component the working process of picking robot was revised.

[4] This paper investigates the possible reasons for this phenomena, By continuing the review of agriculture robot only this time focusing on the practicality and feasibility. Upon extensive review and analysis, the authors concluded practicality robots rely not only on advances in robotics, but also on the presence of support infrastructure.

[5] Based on the color model for the image detection, the recognition accuracy was improved. The sacs filled with constant pressure air were adopted as the grasping component of the picking end-effector, to prevent the fruits from the damaged.

**3. Block diagram:**



**Fig 3: Block diagram of Project**

**3.1 Description:**

**Atmega2560 microcontroller:**

It is high performance, low-power microchip 8-bit AVR RIUSC based micro controller combines 56kB ISP flash memory, 8kB SRAM, 4KB EEPROM, 86 general purpose I/O lines, 32 general purpose working registers, real time counter, six flexible counters with computer modes, PWM, 4USARTS, byte oriented 2-wire serial interface, 16 channel 10-bit A/D converter and a JTAG interface for on chip debugging.

**Atmega8 Microcontroller:**

It is a tiny computer on a single chip and it is termed as a control device. Similar to a computer, all the pins of microcontroller support 2 signals except 5 pins. It consists of 28 pins. It consists of 3 ports.

**IR range Sensors:**

It is used to detect the presence of nearby objects without any physical contact between the object and

sensor. It has high reliability and long functional life because of the absence of mechanical parts and lack of physical contact between sensor and the sensed object.

**LCD:**

Liquid CRYSTAL Display, a flat electronic visual display that contains crystal. It is commonly used in digital cameras.

**Gripper:**

This is a light weight gripper designed for mobile robotics applications from nex robotics. It grip objects with the size up to 30mm. Gripper is made up of Acrylic parts means one type of plastic .while Gripping the gripper jaws moves almost parallel to each other .

**Colour Sensor:**

It is used to detect colours. It is generally used for colour identification by their RGB values. when the light hit the object based upon the wavelength of the colour after the reflection of the light it will detect the colour of the object.

**USB Communication:**

Atmega2560 has on board USB port for direct interface with personal computer. It is the most popular connection used to connect a computer to devices. It was designed to support data transfer. It is easy to interface.

**NIMH Battery:**

30-40% of higher capacity over Ni-cd. It is potential for yet higher energy densities. Less prone to memory. It is used in digital cameras.

**4. Working:**

Automatic fruit Harvesting using Firebird v robot. Firebird V robot is the 5<sup>th</sup> version in the firebird series. It is a robotic research platform. It consists of various sensors which is used for various applications. Power is applied to the robot and it will start moving in the forward direction and when the object is present near by to the robot it will sense the object using the IR sensors present around the robot After the object is detected using the IR sensors the sensors check for the colour of the object using the colour sensor. The colour sensor is used to detect the colour of the object if the colour of the object is red then the robot pick and pluck the fruit. If the object is not in red colour it will not pick the fruit and move forward till the object is present. After the fruit is pluck it will reach the fruit to the basket and reach its destination.

**5. FLOW CHART**

The below figure shows the flow chart of automatic fruit harvesting using firebird V robot

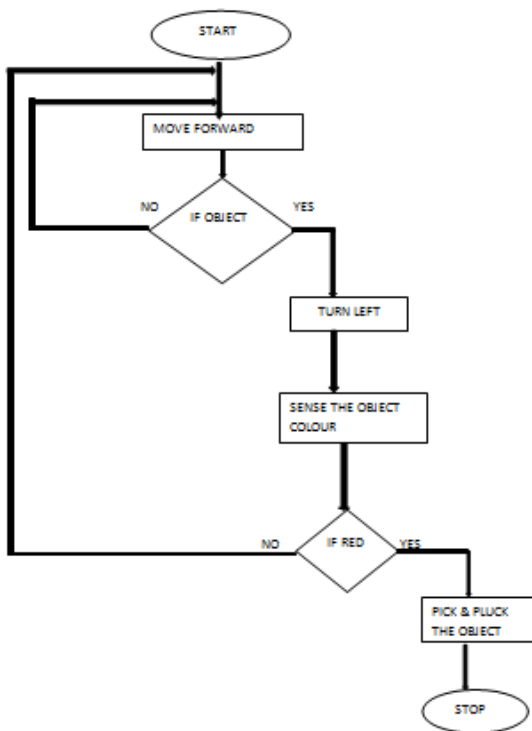


Fig 5: Flow chat of the project

### 6. RESULTS AND CONCLUSION:

In this project we have studied and implemented a Automatic fruit harvesting robot using ATMEGA 2560 microcontroller to pick and pluck the fruits without human intervention. The programming and interfacing of microcontroller has been mastered during the implementation.

Make sure that the desired code is burned into the robot. Click on the start button of the robot to start the functionality of the robot.



6.1: Automatic fruit harvesting robot using FirebirdV

Finally, it will pick and pluck the fruit which is in red colour and take into the basket



Fig 6.2: Robot picking and plucking the fruit

### 7. FUTURE SCOPE:

- Smarter versions of line followers are used to deliver mails with in office buildings and deliver medications in hospitals.
- Used in Agricultural industry
- Used where high load and risky operation going on.
- Used for planting and Seeding.
- Producing food to feed such a large population will significantly increases the strain. To meet this challenge in the food sector one important direction is towards increasing automation and robatisation.

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