iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** IV **Month of publication:** April 2023

DOI: https://doi.org/10.22214/ijraset.2023.50648

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue IV Apr 2023- Available at www.ijraset.com

Rescuing Food Grains Using Raspberry Pi

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Abstract: ***Saving the crop that is being dried after harvesting is the main objective of the endeavor. The problem must be resolved because post-harvest loss makes for 10% of the crop's overall loss. India produces about 150 million tons of food grains per year. However, 15 million tons of those grains are lost during the process of harvest. It's more than 10%. Farmers need to dry their crops after harvesting them, but they are unaware of sudden rainstorms and animals eating their harvests while they dry. If the farmer's home is far from the spot where the grains were spread out to dry, when he arrives, the entire harvest has already been ruined by rain or animals. One can protect themselves from sudden downpours and from animals devouring the grains by using a protective shield after detecting the rain and making a buzzer sound to approach the animals. Here, a PIR sensor is utilized to detect animal movement while a rain sensor is used to detect precipitation. The Raspberry Pi receives the sensing signals, analyzes them, and then send the mail to the farmer if rain is detected using PuTTY software, VNC viewer and SMTP libraries.***
Keywords: PIR sensor, Rain sensor, Raspberry Pi, Buzzer, PuTTY software, VNC viewer, SMTP libraries.

I. INTRODUCTION

A significant setback in the agriculture industry is currently the most critical issue. The most frequent losses in agriculture are material or monetary, and the bulk of them have to do with the health and quality of the crops. The crops can be lost if they are found at range. Therefore, we must make sure that the crops are safeguarded so that farmer can manage this. A farmer with large fields will find it difficult to consistently track the grains and preserve them. This is currently done by manually. However, there is a shortage of workers because people currently prefer basic employment. Excessive irrigation to meet the increasing population needs is the main cause of harvests that aren't doing well. This is the field that needs technological advancements as a result. Automation will be extremely beneficial to farmers which saves their grains, money, expenses and time. We have come up with the idea and implemented the project "Rescuing Food Grains using Raspberry Pi".

The idea being developed using the sensors "PIR sensor" and "Rainfall sensor" to detect the rain and motion of animals and additionally SMTP libraries, VNC viewer, PuTTY software for sending the mail to the farmer.

II. LITERATURE SURVEY

Survey played a very vital role in this project we have analyzed the products for protection of food grains after harvesting. As per the records its mentioned agricultural productivity in our country does not meet the required output due to the problems like entering of the threatening animals in the farm and unaware of the sudden rainfall which costs the complete crop.

The paper on "The design and implementation of a rain sensor as a protective system" by Johnpaul Okafor on July 2018, helped us getting the idea of how rain sensor is used as protective system for the agriculture purposes, but not motion of animals is not detected. The paper on "Smart automation system using Arduino and rain drop sensor" by Abhijit G kalbande on 2017, which gives the idea to agriculturally based system in which as per our observation during the rainy seasons the cultivated crops get affected due to the heavy rainfall. The paper on "Smart crop protection system from animals" by Mr. Jayesh Redij, Mr. Pranav Shitap, Mr. Shikhar Singh, Mr. Durvesh Zagade, Dr. Sharada Chougule on April 2022, helped us getting the idea of how PIR sensor is used to protect the crop animals.

III. AIM AND OBJECTIVES

A. Aim

To enhance the agricultural productivity by rescuing the harvested crop from rains and animals.

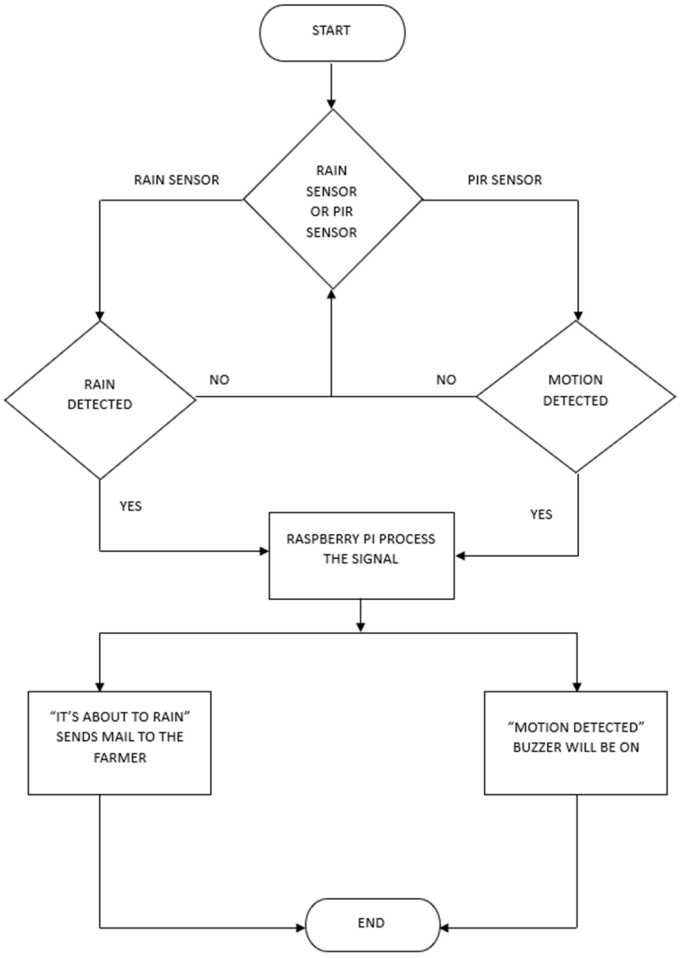
B. Objectives

1) To safeguard the crop.
2) To reduce the monetary loss.
3) To overcome the problems encountered in Manual work

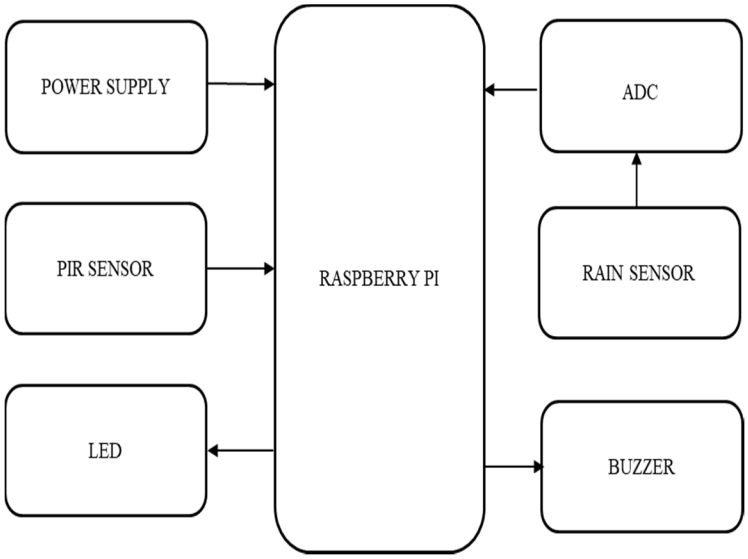
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IV. PROJECT DESIGN



V. BLOCK DIAGRAM



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VI. HARDWARE DESCRIPTION

A. Raspberry Pi

Raspberry Pi is the main component which is a family of microcontroller boards. It is a mini computer which can access all the components and reacts towards the data given by the interfaced components. In our project it is used to interface the sensors.

B. PIR Sensor

PIR sensor is an infrared sensor which detects the motion of the animals and sends information to the raspberry Pi. In turn, Raspberry Pi analyzes the data and turns on the LED to indicate and buzzer to rescue the crop from animals by forcing them to run away.

C. Rain Sensor

Rain sensor consists a sensing pad which detects the rain and sends information to the Raspberry Pi through ADC. In turn, Raspberry Pi analyzes the data and turns on the LED to indicate and sends the mail to the farmer “It’s Raining...”.

D. ADC

ADC is a converter which converts analog signals received from rain sensor into digitals signals which are input to the Raspberry Pi.

E. Buzzer

Buzzer is a Piezoelectric device which will be in ON position whenever motion is detected to make sure that no animal enters in to the harvesting grains.

F. LED

LED is a diode which will be in ON position whenever rain sensor detects the rainfall and PIR sensor detects the movements.

VII. SOFTWARE DESCRIPTION

A. Python

Python is a primary programming language which comes preinstalled in Raspbian. It is selected as the primary language because of its power, adaptability, simplicity and ease of use. Thonny, a Python IDE, makes it easier, quicker and more enjoyable to develop a code.

B. SMTP libraries

Emails can simply be sent using Python and Raspberry Pi with help of SMTP libraries. The email will be composed in code and sent through a third-party provider of email services that also serves as the mail server. We are capable of being able to construct the information we send according to sensor measurements.

C. VNC viewer

VNC viewer is a Virtual Network Computing, a graphical desktop sharing system. With the help of VNC, computer can be remotely controlled via Remote Frame Buffer Protocol (RFB). It relays the graphical screen updates while transmitting input from the mouse and keyboard from one machine to another over a network.

D. PuTTY software

PuTTY is the software program to access the command-line interface of the Raspberry Pi from a desktop or laptop. One can communicate the Raspberry Pi using the terminal window that is opened on the computer by using secure shell. Although there are other tools available, PuTTY is by far the most common for connecting to the Raspberry Pi terminal.

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VIII. RESULTS

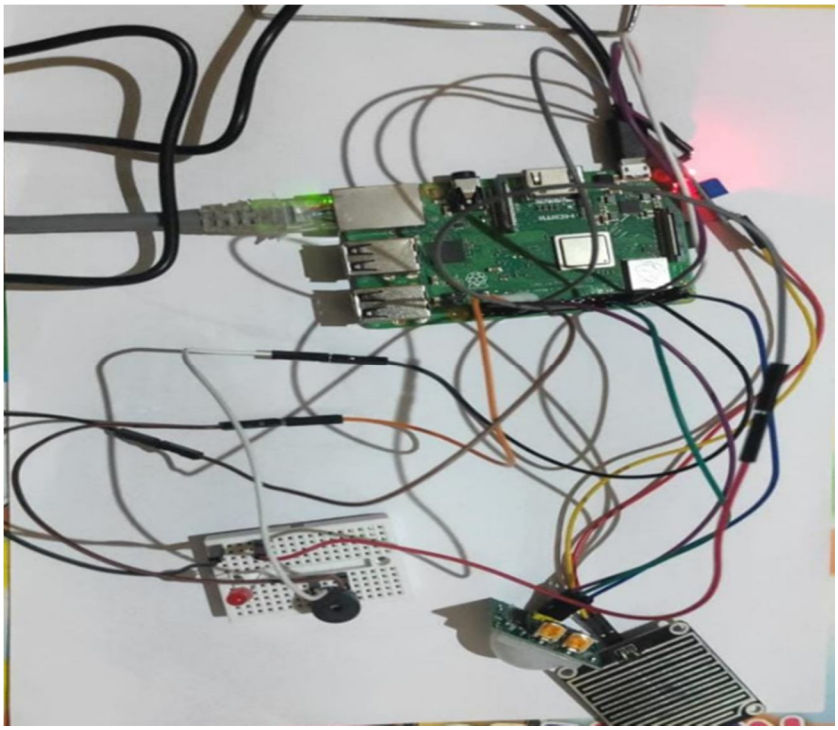


Fig. 1 Model when there is no motion and rainfall

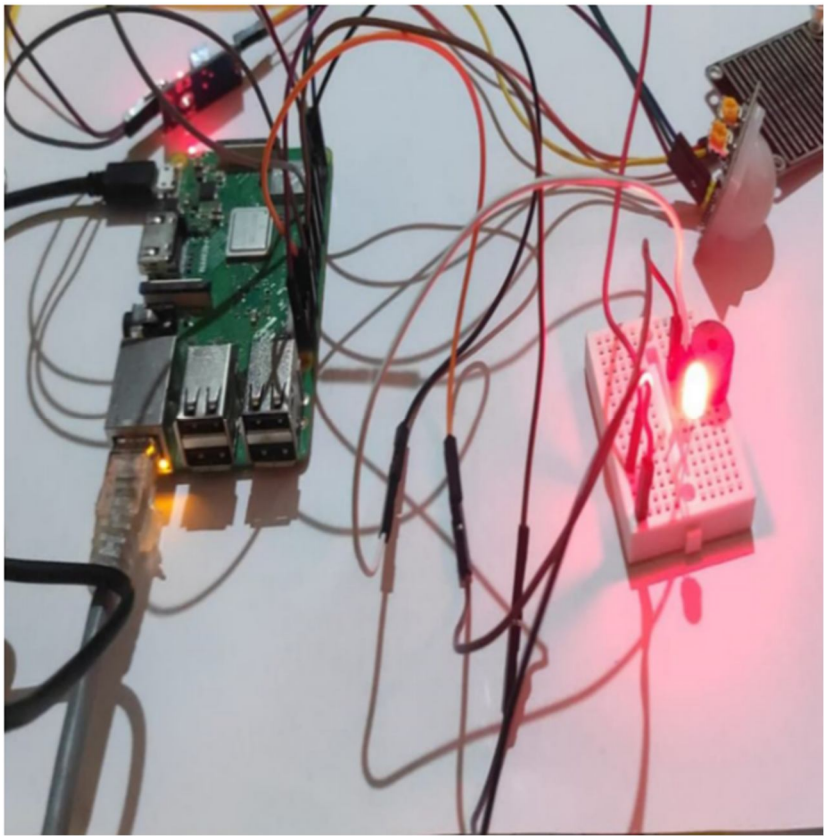


Fig. 2 Model when motion is detected

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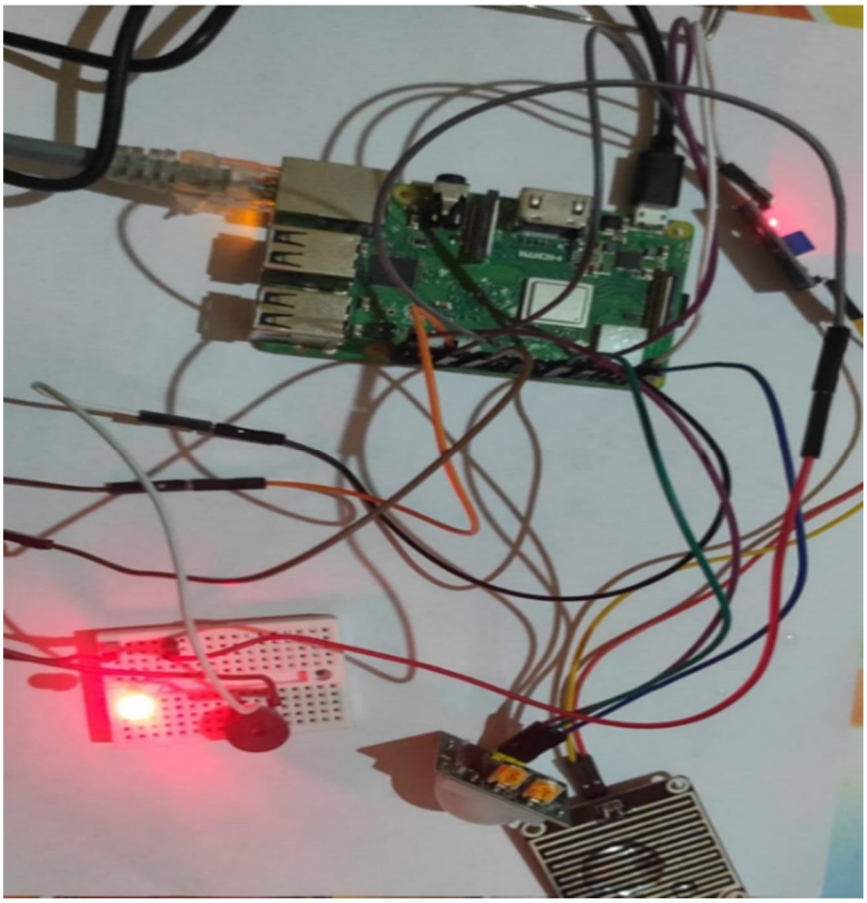


Fig. 3 Model when rain detected

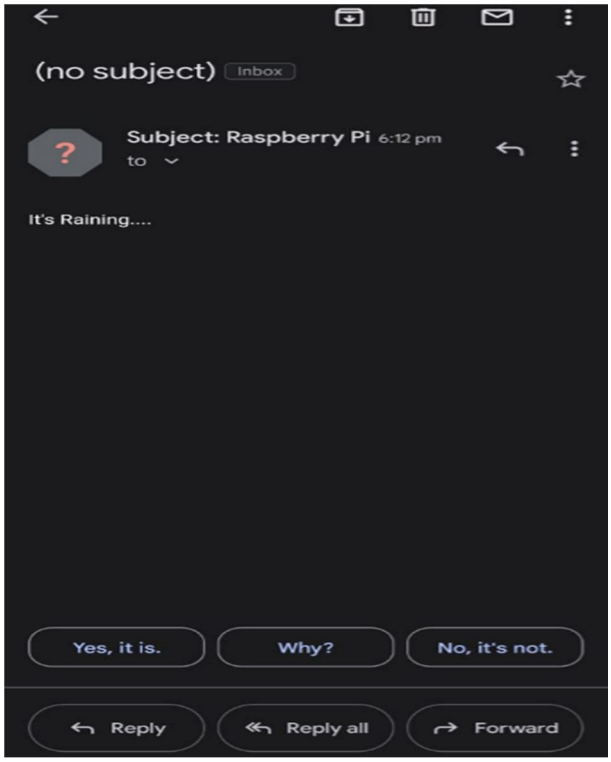


Fig. 4 Mail to the Farmer when rain detected

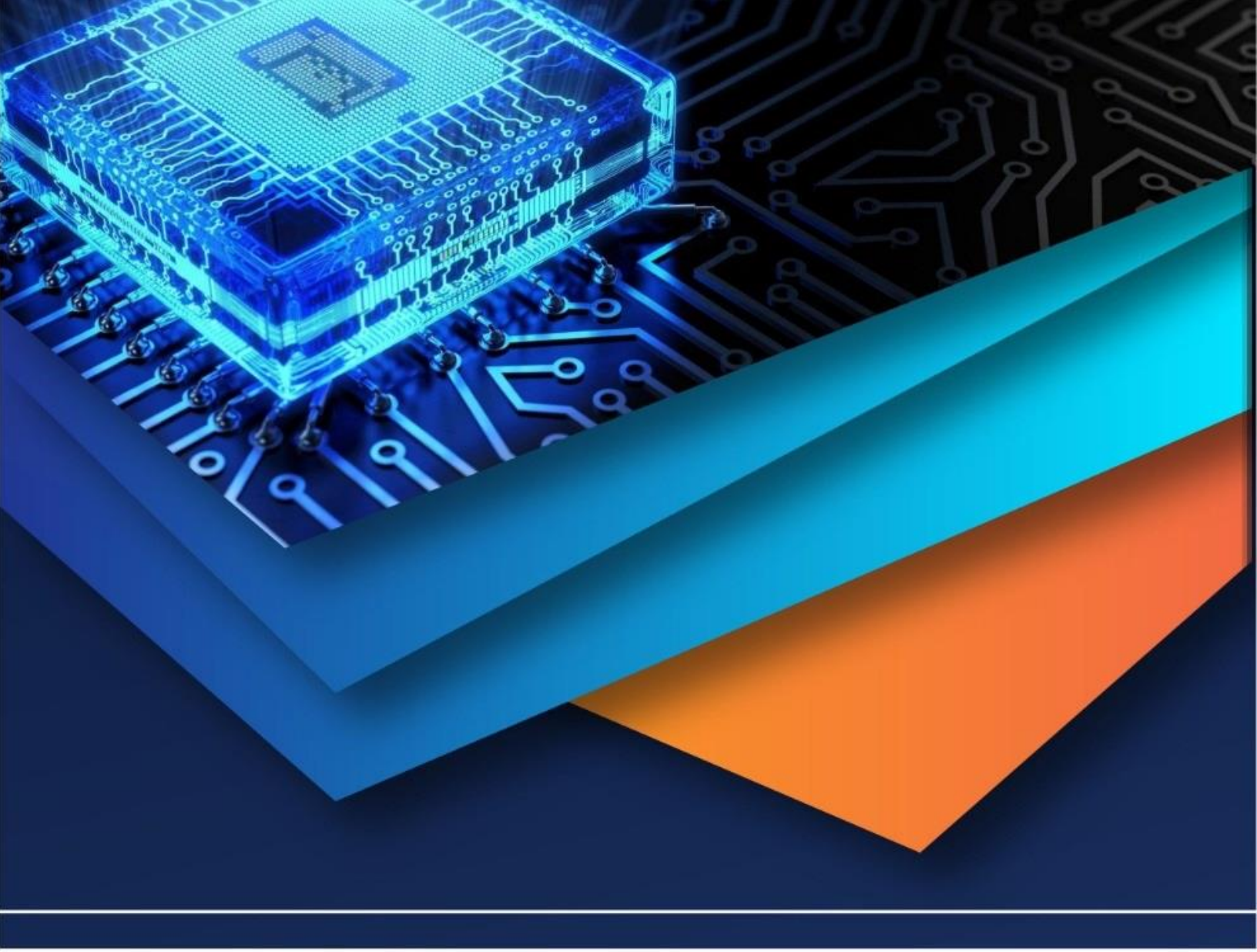
IX. CONCLUSION

From this project we can rescue the food grains from heavy rain falls or unpredicted rain falls and from animal interventions using the sensors and alerting the farmer by sending mail using SMTP libraries, VNC viewer and PuTTY software by receiving and analyzing the sensed data by the Raspberry Pi. This method reduces the man power. The farmer can control and monitor the grains that are being dried even from the remote location. With the help of this project bulk amount of food grains can be saved all over the world.

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