Internet of Everything – Mini Project (ITL 802)

Forest Fire Detection & Prediction System

B. E. Information Technology

By

Prithvi Shetty	**13**
Shitaanshu Singh	**14**
Nishit Thakkar	**15**
Nelkin Eldho	**16**

Mentor:

Dr. Prachi Raut
Professor

Department of Information Technology
St. Francis Institute of Technology
(Engineering College)

University of Mumbai

2021-22

DECLARATION

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources.

We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in this submission.

We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

1. ----------
(Signature)

(Prithvi Shetty 13)

2. ----------
(Signature)

(Shitaanshu Singh 14)

3. ----------
(Signature)

(Nishit Thakkar 15)

4. ----------
(Signature)

(Nelkin Eldho 16)

CERTIFICATE

This Internet of Everything Lab Mini-project Forest Fire Detection & Prediction System by Prithvi Shetty, Shitaanshu Singh, Nishit Thakkar and Nelkin Eldho is complete in all respects and was successfully demonstrated on .

Name : ----------

Signature :----------

(Internal examiner)

Name : ----------

Signature :----------

(External examiner)

Name : ----------

Signature :----------

(Head of the Department)

Date:

Place:

CONTENTS

Chapter 1
Introduction

Millions of hectares of forest are destroyed by fire every year. Areas destroyed by these fires are large and produce more carbon monoxide than the overall automobile traffic[1]. Monitoring of the potential risk areas and an early detection of fire can significantly shorten the reaction time and also reduce the potential damage as well as the cost of firefighting.

Hence we have come up with a solution to this problem by building a forest fire detection and prediction system with the help of IoT products and Data Analysis that together comes under IoE.

Chapter 2
Literature Review

Ref no.	Title of Paper	Review	Limitations
[2]	IoT based forest fire prediction and detection.	In this paper they have used tmp sensor to collect temperature. Collected data is analyzed by KNN algorithm and is compared with real time forest fire occurrence data.	Tmp36 temperature sensor has the least accuracy rate compared to its alternatives.
[3]	IoT based forest fire warning system.	In this paper they have used nodemcu and the sensor used is lm35 sensor. When the sensor detects fire it will send notification via app and notifies the end user that forest fire is detected.	No early prediction of fire or smoke.
[4]	Forest Fire Monitoring System Based On ZIG-BEE Wireless Sensor Network.	A node system is used where a node contains two sensor and Ethernet connecting to a ZigBee connection. As soon as fire and smoke are detected it is transmitted to the nearest node and a message is sent to the cloud.	This system is expensive to implement and no early prediction of fire is implemented using prediction models.

Chapter 3
Problem Statement

To develop a forest fire detection and prediction system which would help in early detection according to the type of fire thus reducing the damage.

Chapter 4
System Design and Requirements

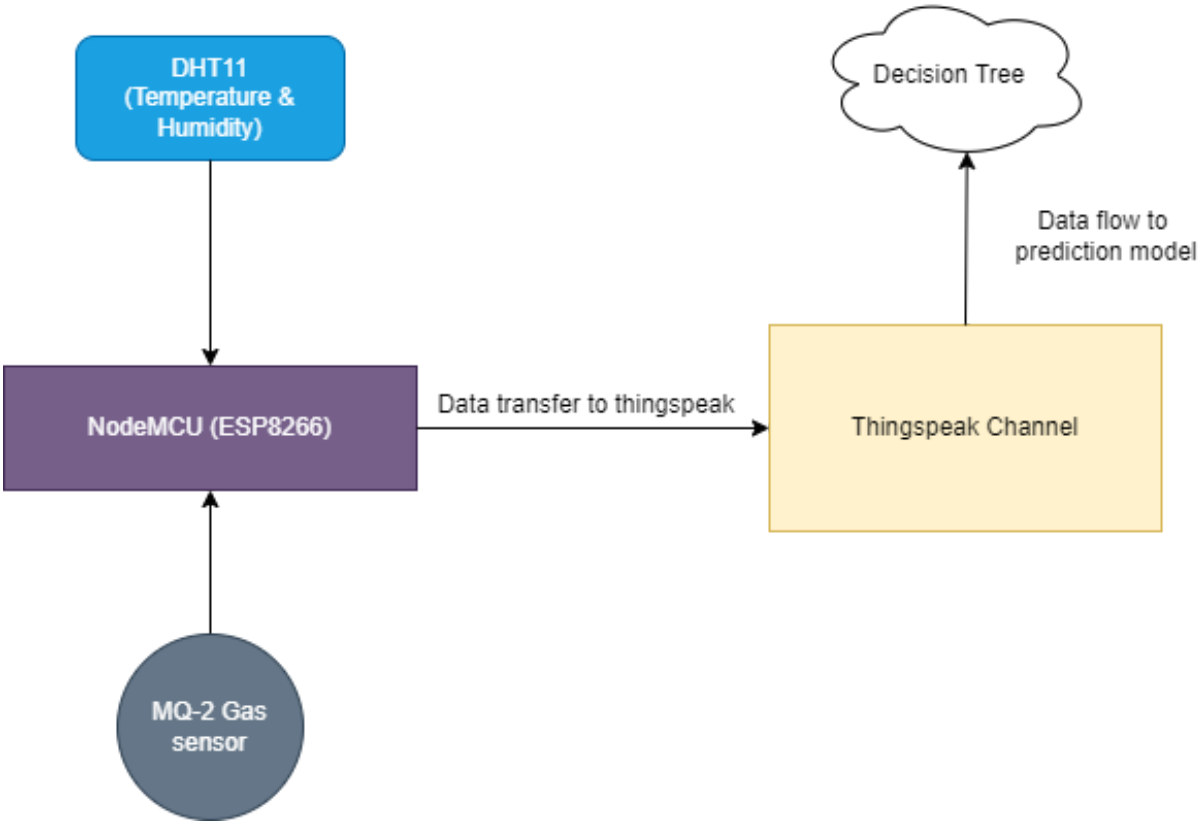

Figure 1: System Block Diagram

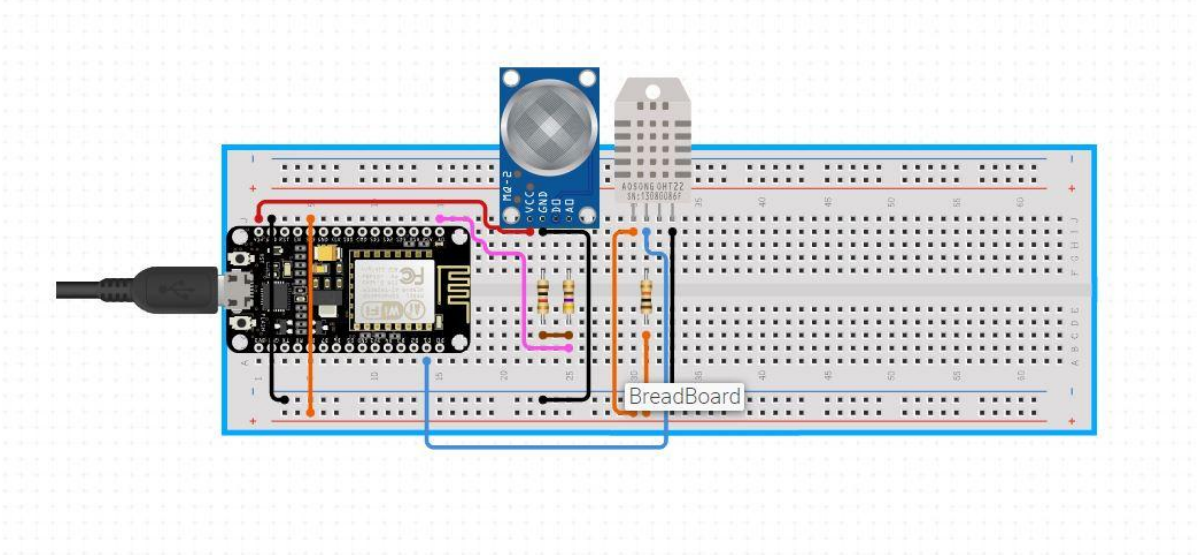

Figure 2: Circuit Diagram

Requirements Table

Sr No.	NAME	QUANTITY	PRICE(Rs)	TOTAL
HARDWARE COMPONENTS				
1	NodeMCU esp8266	1	350	350
2	DHT11	1	350	350
3	Wires	12	3	36
4	Breadboard	1	100	100
5	MQ2 Smoke sensor	1	120	120
			TOTAL	956
SOFTWARE				
1	WINDOWS 10	1	-	-
2	ARDUINO IDE	1	FREE	
			TOTAL	**956**

Chapter 5
Data Analytics

Decision Tree Algorithm:

Decision Tree algorithm belongs to the family of supervised learning algorithms. Unlike other supervised learning algorithms, the decision tree algorithm can be used for solving **regression and classification** problems too.
The goal of using a Decision Tree is to create a training model that can use to predict the class or value of the target variable by learning simple decision rules inferred from prior data(training data).

In Decision Trees, for predicting a class label for a record we start from the root of the tree. We compare the values of the root attribute with the record's attribute. On the basis of comparison, we follow the branch corresponding to that value and jump to the next node.

Input- Temperature and Humidity

Output- Occurrence of Fire

Data size- 100-200 observations

Chapter 6
Results

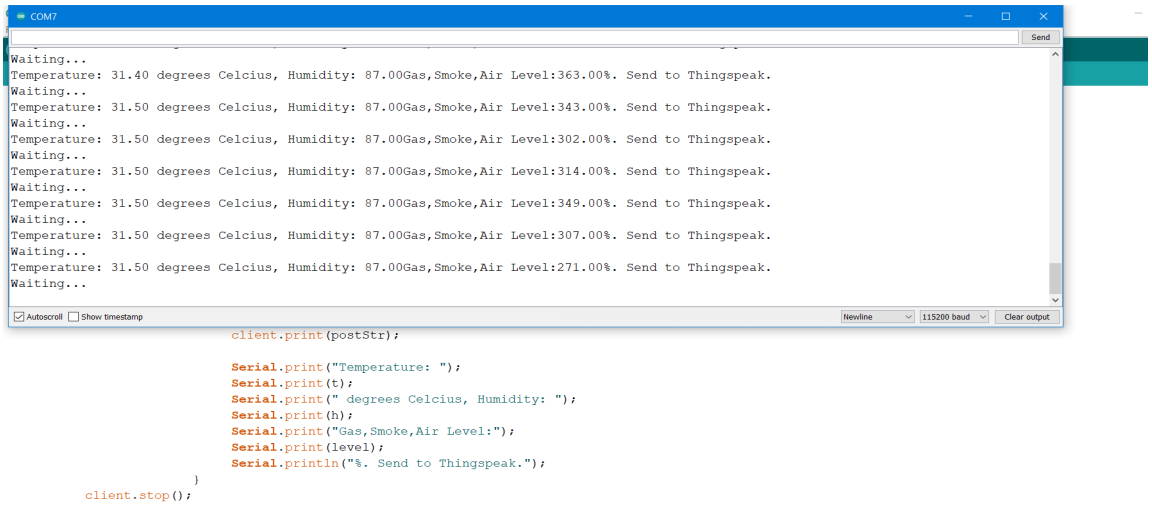

Figure 3: Sensor readings on serial port

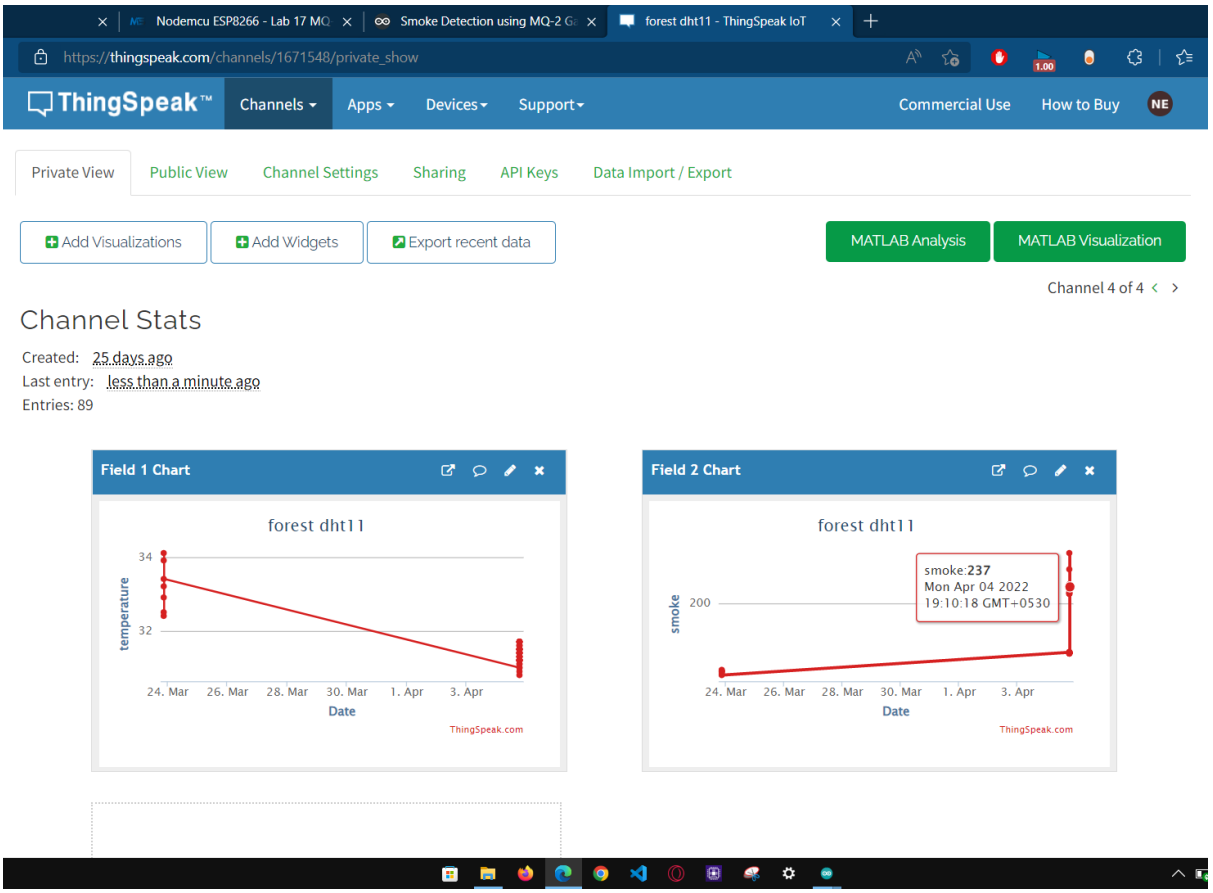

Figure 4: Output sent and displayed on thingspeak channel

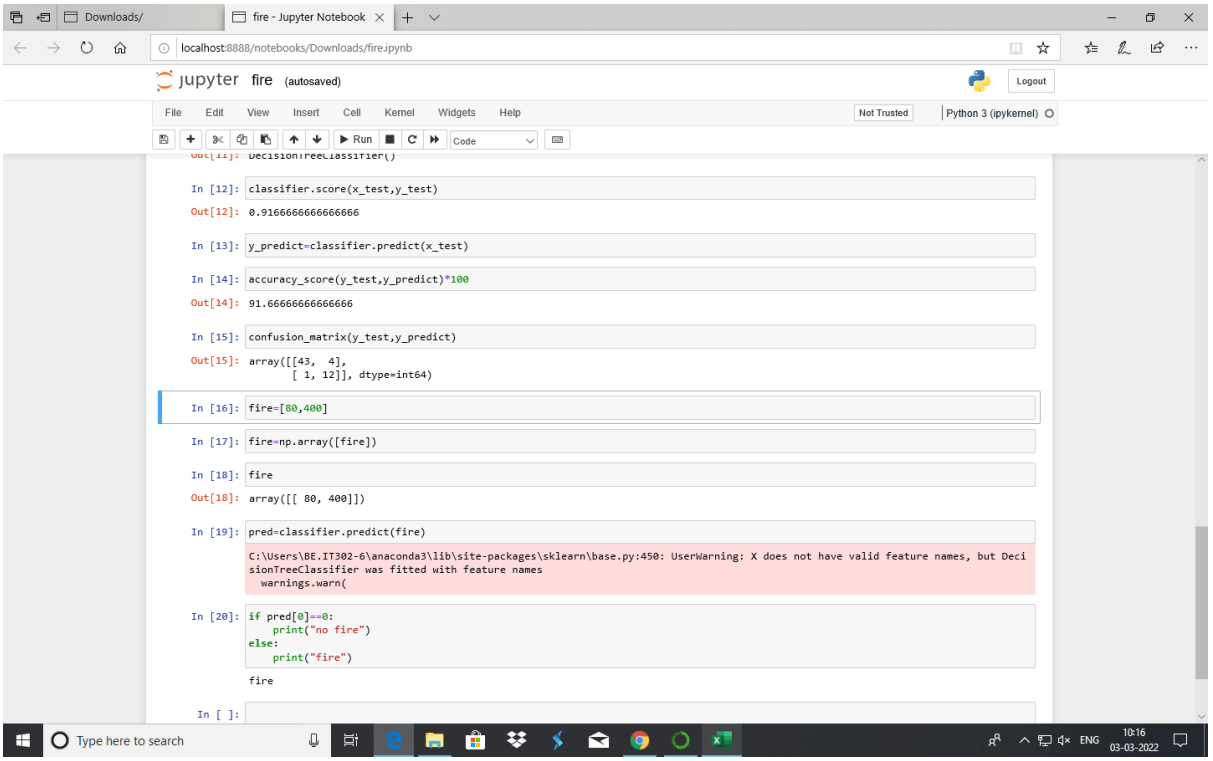

Figure 5: Output of prediction model using the dataset

Chapter 7
Conclusion and Future Scope

The system will be helpful in predicting fire using data collected from fire and smoke sensors. The early prediction & detection will lead to early precautionary measures to prevent the occurrence of fire and save the flora and fauna of wildlife. The prediction model used in this system achieved **90%** accuracy.

References

[1] https://en.wikipedia.org/wiki/Wildfire

[2] N. Saranya, S.Sahana, B.Suganthi, R.K. Vijaynigilesh,T.vivin, “Iot based forest fire prediction and detection”, April 2020-International Journal of Innovative technology and exploring engineering.

[3] Ragipati Karthik, M. Trinath Basu, J. Mahitha, V. Lokesh Reddy, “IoT established forest fire warning system”, March 2018 - International Journal of Engineering & Technology

[4] P.S. Jadhav , V.U. Deshmukh, “Forest Fire Monitoring System Based On Zig-bee Wireless Sensor Network”,International Journal of Emerging Technology and Advanced Engineering,(Volume 2, Issue 12, December 2012)