



VIT[®]
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

AUTOMATIC EARLY FIRE DETECTION USING DEEP LEARNING AND SENDING ALARM ALERT AND SMS

NAME	REGISTRATION NUMBER
MANDLA SHESHI KIRAN REDDY	20BAI1061
AMARAVADI DHEERAJ	20BAI1191
UPPANAPALLI LAKSHMI SOWJANYA	20BAI1289

COURSE CODE: CSE1901

COURSE TITLE: Technical Answers for Real World Problems (TARP)

CLASS NUMBER: CH2022235002332

SLOT: TDD1

FACULTY: DR. RUKMANI P

ANALYSIS REPORT:

ABSTRACT

The safety of people and property is paramount, and reliable fire detection systems are critical in preventing loss of life and damage to property. Wireless fire detection systems have gained popularity due to their ease of use and convenience. One such system is the Wireless Fire Detection System Using Deep Learning & Python with Raspberry Pi Pico - GSM Call / SMS Alert.

This system uses a combination of Deep Learning and Python programming language to detect fires in real-time. The Raspberry Pi Pico serves as the microcontroller to control the entire system, and it is a wireless system that is easy to install and maintain.

The system includes a camera that captures real-time video footage, which is analysed by the Deep Learning algorithm. The algorithm has been trained to detect fire by analysing various features such as colour, texture, and motion of flames. Once the system detects a fire, it sends an alert message to the GSM module, which can either make a call or send a text message to a predetermined phone number. This feature ensures that people can be alerted promptly, even if they are not present on the premises.

The Wireless Fire Detection System Using Deep Learning & Python with Raspberry Pi Pico - GSM Call / SMS Alert is an efficient and reliable solution for detecting fires. By using advanced technologies such as Deep Learning, the system can detect fires quickly and accurately. The wireless design of the system makes it easy to install and maintain, which makes it suitable for both residential and commercial buildings. With this system in place, people can have peace of mind knowing that their property is protected from fires, and they will be alerted promptly in case of an emergency.

In conclusion, the Wireless Fire Detection System Using Deep Learning & Python with Raspberry Pi Pico - GSM Call / SMS Alert is a powerful system that leverages Deep Learning technology to provide fast and accurate fire detection. The system's wireless design, coupled with its ability to send alerts via GSM calls or SMS, ensures that people can take immediate action to prevent loss of life and property.

INTRODUCTION

In recent years, technological advancements have revolutionized the way we approach fire safety in our homes and workplaces. Wireless fire detection systems have become increasingly popular due to their ability to detect fires quickly and efficiently without the need for complex wiring or infrastructure.

One of the latest innovations in wireless fire detection systems is the use of deep learning and Python with Raspberry Pi Pico to create an intelligent and efficient system that can detect fires and alert authorities using GSM call or SMS. The system utilizes machine learning algorithms to analyse data from various sensors, including temperature sensors, smoke detectors, and motion sensors.

The Raspberry Pi Pico is a powerful microcontroller board that is compatible with Python programming language, making it an ideal platform for developing a wireless fire detection system. Its compact size and low power consumption make it ideal for use in small spaces, making it an ideal choice for both residential and commercial applications.

Deep learning algorithms allow the system to analyse data from sensors in real-time, making it possible to detect fires quickly and accurately. The system can also learn from past data, allowing it to improve its accuracy over time.

The GSM call and SMS alert feature is a critical component of the system, ensuring that authorities are alerted to fires quickly, allowing them to respond promptly and minimize damage. This feature is particularly useful in cases where the building is unoccupied, such as during weekends or holidays, ensuring that fires are detected and reported regardless of whether anyone is present.

In summary, the wireless fire detection system using deep learning and Python with Raspberry Pi Pico is an innovative and intelligent solution for fire safety. Its ability to detect fires quickly and accurately, and its GSM call and SMS alert features make it an essential tool for protecting homes and businesses from the devastating effects of fires.

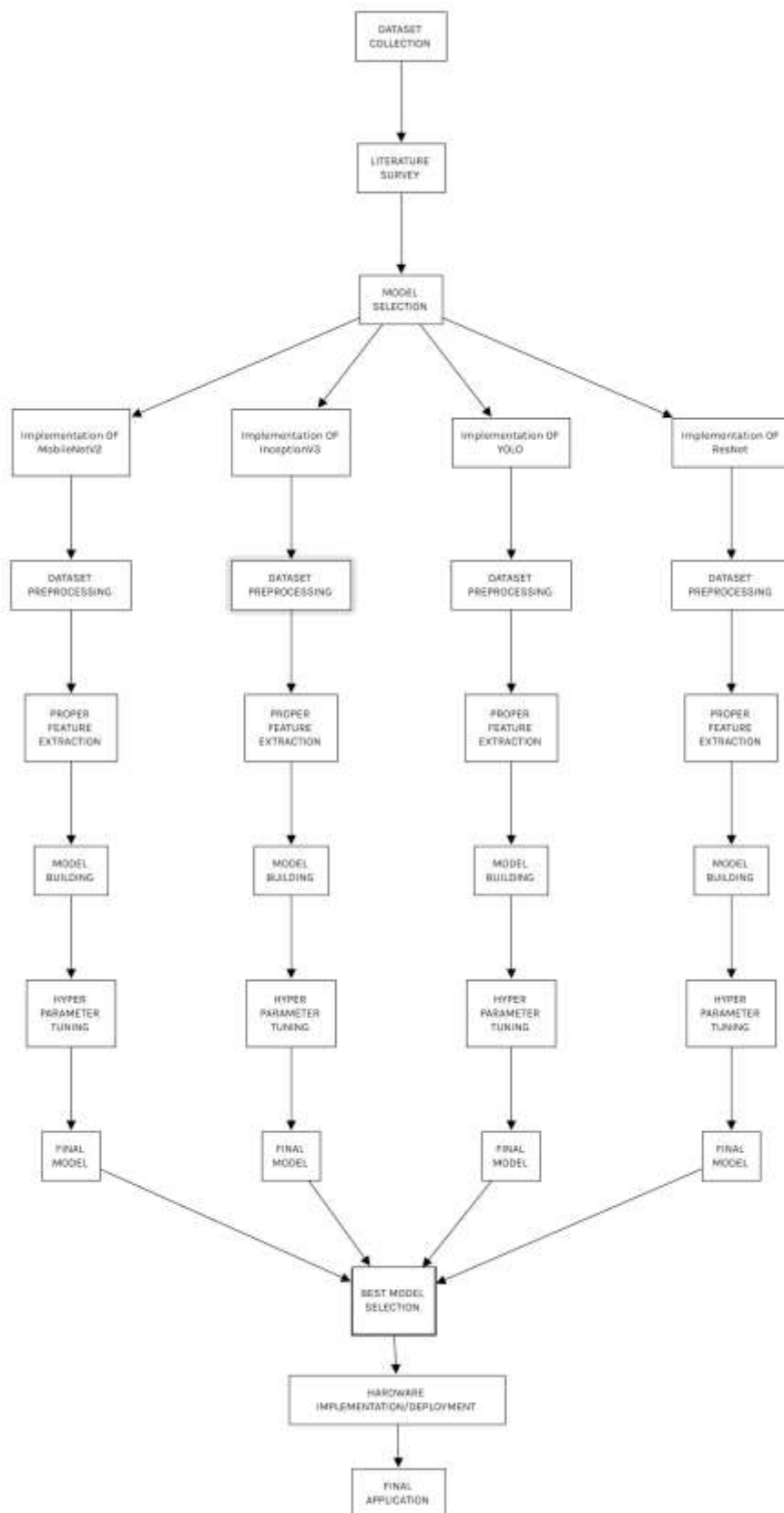
APPLICATIONS

1. FOREST FIRES DETECTION
2. PUBLIC FIRES DETECTION NEAR HIGHWAYS
3. PUBLIC FIRES DETECTION NEAR RAILWAY TRACKS
4. EARLY FIRE DETECTION NEAR POWER STATIONS OR TRANSFORMERS IN PUBLIC PLACES
5. EARLY FIRE DETECTION IN VEHICLES WITH INSTALLED CAMERAS /SENSORE
6. EARLY FIRE DETECTION IN OUR HOMES OR SMALL ORGANIZATIONS WITH INSTALLED CAMERAS

MODULES DESCRIPTION

MODULES	DESCRIPTION
MODULE-1	<p>Implementation OF InceptionV3: InceptionV3 is a deep convolutional neural network architecture that has been used for image classification and object detection tasks. It consists of multiple layers of convolutional and pooling operations, followed by fully connected layers. InceptionV3 has shown high accuracy in detecting flames and smoke in fire scenarios.</p>
MODULE-2	<p>Implementation OF ResNet: ResNet (short for Residual Network) is a deep neural network architecture that has won several image classification competitions. It uses skip connections to enable the training of much deeper neural networks without vanishing gradients. ResNet has been used for early fire detection and has shown high accuracy.</p>
MODULE-3	<p>Implementation OF YOLO: YOLO is an object detection algorithm that can identify and locate objects in real-time video. YOLO has been used to detect flames and smoke in video feeds from cameras and sensors. YOLO-based approaches for early fire detection can achieve high accuracy and real-time performance.</p>
MODULE-4	<p>Implementation OF MobileNetV2: MobileNetV2 is a lightweight convolutional neural network architecture that has been optimized for mobile and embedded devices. It uses depth wise separable convolutions to reduce the number of parameters and increase the speed of the model. MobileNetV2 has been used for real-time fire detection on low-power devices and has shown high accuracy.</p>
MODULE-5	<p>HARDWARE IMPLEMENTATION WITH REQUIRED DEVICES AND CODING WITH BEST MODEL</p>

ARCHITECTURE



OpenCV is used for better accuracy and training.

Hardware

The hardware component consists of a Raspberry Pi Pico microcontroller, wireless fire detection sensors, and a GSM module. The wireless fire detection sensors detect the presence of smoke and heat and send signals to the Raspberry Pi Pico microcontroller. The GSM module is used to send SMS or make calls to alert the user in case of fire detection.

THE END