RAJALAKSHMI ENGINEERING COLLEGE

An Autonomous Institution
Affiliated to Anna University, Chennai,
Rajalakshmi Nagar, Thandalam–602105

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CS17612 – MINI PROJECT REPORT

Name:……………………………..AKASH A……………………………

Register No.:………………………… 180701017………………………………………

Year/Branch/Section:…………………IIIRD / CSE/ A………………………………….

Semester :………………………………. VIth …………………………………………

BONAFIDE CERTIFICATE

Certified that this project **“THEFT DETECTOR”** is the bonafide work of

“AKASH A , AKASH V, ARUNKUMAR M , BALAJI V, CHRIS GAVIN B”

who carried out the project work under my supervision.

SIGNATURE
Dr. R. G. SAKTHIVELAN
HEAD OF THE DEPARTMENT
Dept. of Computer Science and Engg.
Rajalakshmi Engineering College,
Chennai

SIGNATURE
Ms. J. JINU SOPHIA
ASSISTANT PROFESSOR (SS)
Dept. of Computer Science and Engg.
Rajalakshmi Engineering College,
Chennai

This mini project report is submitted for the viva voce examination to be held on __________

INTERNAL EXAMINER **EXTERNAL EXAMINER**

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CONTENTS

Abstract - To secure and guard our house in our absence, we propose the IOT based Anti-theft detection and alert System using Raspberry Pi. One single step anywhere inside the room Is tracked and user is alarmed through mms and phone call over IOT..

***Key Words*: IOT (Internet of Things), Raspberry Pi, Call, Message, Camera.**

1. INTRODUCTION

1.1 Overview

Now-a-days, Security has become the most challenging task. Everyone wants safety but in present scenario, nothing is safe not even in their own houses. Home is a place where we keep our assets and our capital. But we can never be sure about the security of that asset behind us and the possibilities of intrusion are increasing day by day. We generally lock houses when going out of the house. But just locking the home is not enough, there must be a system which safety our home, belongings and income from theft is the necessary requirements for home security system and keep track of the activities and report to the owner accordingly and works according to the response of the owner.

1.2 Objective

Now-a-days, Security has become the most challenging task. Everyone wants safety but in present scenario, nothing is safe not even in their own houses. Home is a place where we keep our assets and our capital. But we can never be sure about the security of that asset behind us and the possibilities of intrusion are increasing day by day. We generally lock houses when going out of the house. But just locking the home is not enough, there must be a system which safety our home, belongings and income from theft is the necessary requirements for home security system and keep track of the activities and report to the owner accordingly and works according to the response of the owner.

1.3 Purpose of the System

Now-a-days, Security has become the most challenging task. Everyone wants safety but in present scenario, nothing is safe not even in their own houses. Home is a place where we keep our assets and our capital. But we can never be sure about the security of that asset behind us and the possibilities of intrusion are increasing day by day. We generally lock houses when going out of the house. But just locking the home is not enough, there must be a system which safety our home, belongings and income from theft is the necessary requirements for home security system and keep track of the activities and report to the owner accordingly and works according to the response of the owner.

1.4 Scope

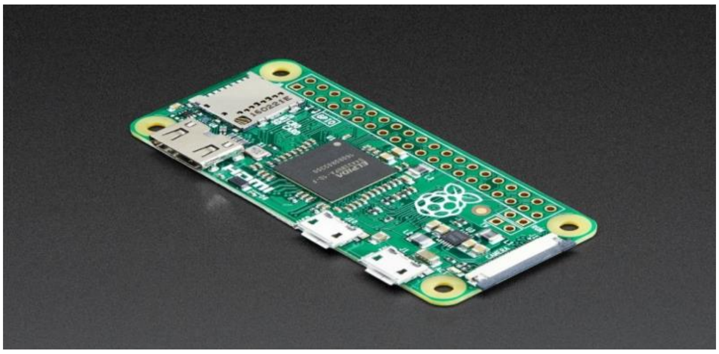
Now-a-days, Security has become the most challenging task. Everyone wants safety but in present scenario, nothing is safe not even in their own houses. Home is a place where we keep our assets and our capital. But we can never be sure about the security of that asset behind us and the possibilities of intrusion are increasing day by day. We generally lock houses when going out of the house. But just locking the home is not enough, there must be a system which safety our home, belongings and income from theft is the necessary requirements for home security system and keep track of the activities and report to the owner accordingly and works according to the response of the owner.

2. System Overview

2.1 HARDWARE Component Details

2.1.1 Raspberry Pi

The Raspberry Pi Zero W is size of only 65mm long by 30mm wide, with the addition of wireless LAN and Bluetooth. The Pi Zero W is designed to be as flexible and compact as possible with mini connectors and an unpopulated 40-pin GPIO. At the heart of the Raspberry Pi Zero W is a 1GHz BCM2835 single-core processor with 512MB RAM.



2.1.2 Sensor Details

Camera module is Pi camera interfacing to the raspberry pi module. Its resolution is 5-megapixel and still picture resolution 2592 x 1944, Max image transfer rate 1080p: 30fps, this Pi camera module is used for captures an image and send captured image to the Raspberry pi module.

2.3 Protocol Details

The protocol is to first activate the http server through terminal and then execute the python file

2.4SOFTWARE DETAILS – IDE and Tools

The software components are used for the project has been mentioned below:

2.4.1 Raspbian OS:

Raspbian is an unofficial port of Debian Wheezy armhf with compilation settings adjusted to produce optimized "hard float" code that will run on the Raspberry Pi. This provides significantly faster performance for applications that make heavy use of floating point arithmetic operations. All other applications will also gain some performance through the use of advanced instructions of the ARMv6 CPU in Raspberry Pi. Although Raspbian is primarily the efforts of Mike Thompson (mpthompson) and Peter Green (plug wash), it has also benefited greatly from the enthusiastic support of Raspberry Pi community members who wish to get the maximum performance from their device.

2.4.2 OPEN CV:

Open CV (Open Source Computer Vision Library) is an open source computer vision and machine learning software library. Open CV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products. Being a BSD licensed product, Open CV makes it easy for businesses to utilize and modify the code. It is free for both commercial and non-commercial use.

2.4.3 Firebase

Firebase is a Backend-as-a-Service (Baas). It provides developers with a variety of tools and services to help them develop quality apps, grow their user **base**, and earn profit. It is built on Google's infrastructure. **Firebase** is categorized as a NoSQL database program, which stores data in JSON-like documents.

2.4.4 Twilio

Twilio is an American cloud communications platform as a service (CPaaS) company based in San Francisco, California. **Twilio** allows software developers to programmatically make and receive phone calls, send and receive text messages, and perform other communication functions using its web service APIs

2.4.5 YOLO

YOLO, a single CNN simultaneously predicts multiple bounding boxes and class probabilities for those boxes. **YOLO** trains on full images and directly optimizes detection performance. This model has a number of benefits over other object detection methods: **YOLO** is extremely fast.

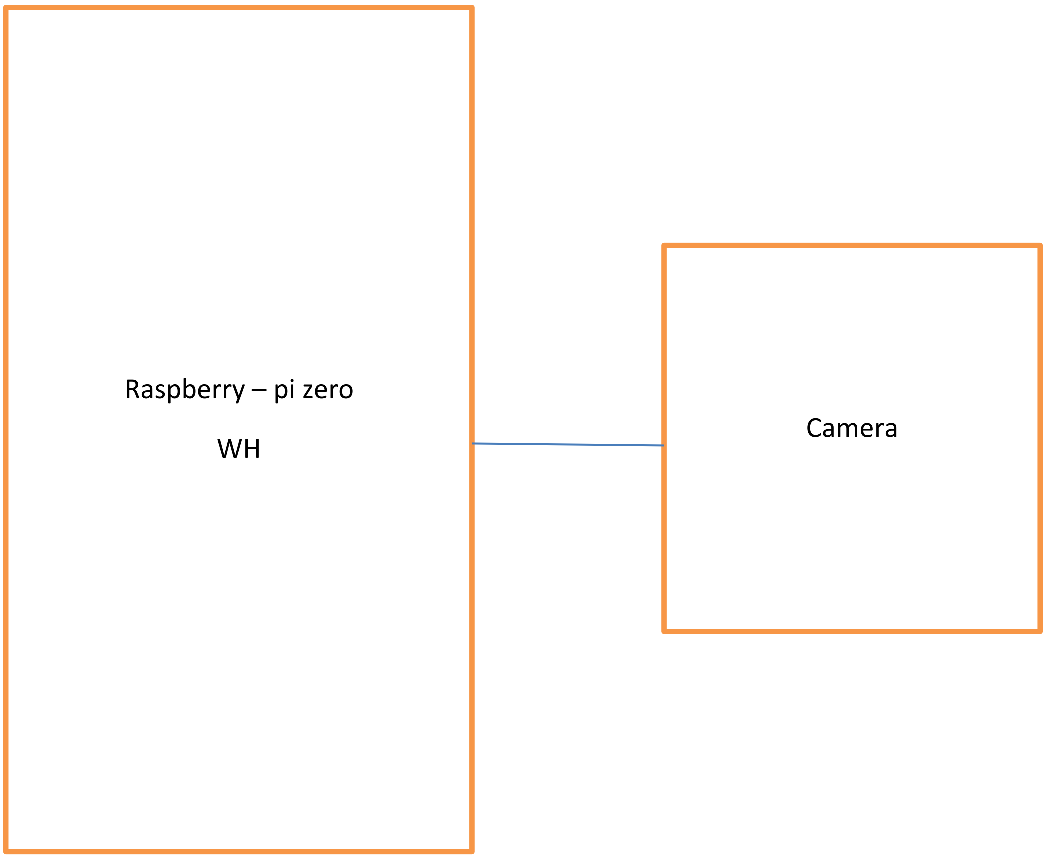
2.5 Programming Language Details

2.5.1 PYTHON:

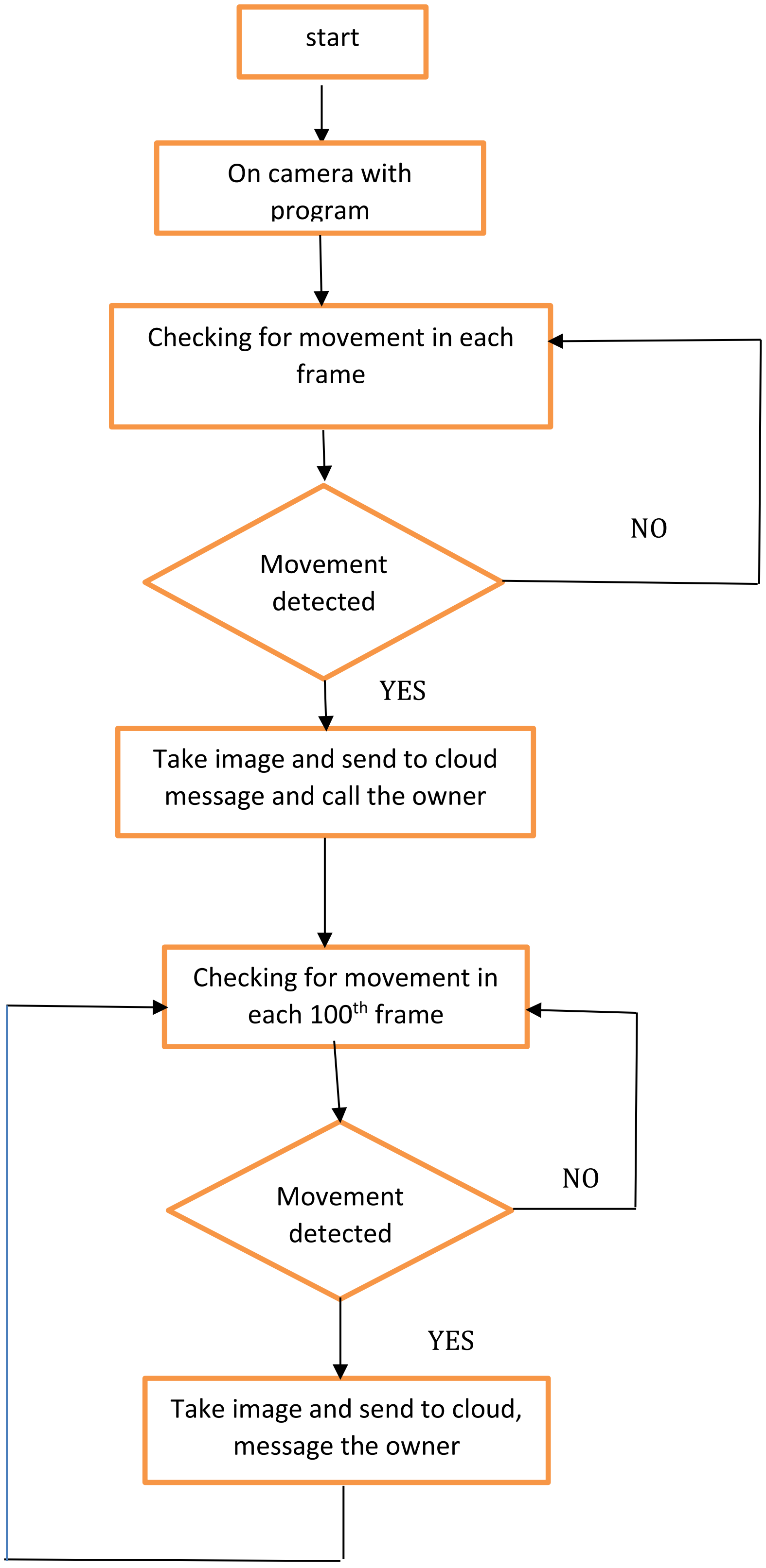
Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python’s elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms. The Python interpreter and the extensive standard library are freely available in source or binary form for all major platforms from the Python Web site, https://www.python.org/, and may be freely distributed. The same site also contains distributions of and pointers to many free third party Python modules, programs and tools, and additional documentation. The Python interpreter is easily extended with new functions and data types implemented in C or C++ (or other languages callable from C). Python is also suitable as an extension language for customizable applications.

3. Architecture Design

3.1 Raspberry pi board Architecture



3.2 Circuit Diagram and Explanation


start
On camera with program
Checking for movement in each frame
Movement detected
NO
YES
Take image and send to cloud message and call the owner
Checking for movement in each 100th frame
Movement detected
NO
YES
Take image and send to cloud, message the owner

4. Working Principle

4.1 Explanation of Working Principle

In this project raspberry Pi zero (model) has been used as heart of system. This proposed system is an intelligent system and it eliminates the need of continuous by human resource. Thus, any human extra work is ruled out. This system continuously checks the status of place by sensors that is anyone entering in the home or not and sends the alert message to the owner with live images by using camera with different angles. The main aim of this project is to make an automated security system for Home, Banks or jewelry shops. The project consists of Raspberry Pi with sensor and camera. The whole system is placed in that place. If system detect someone in Home/Bank/shop it sets the capture the live images and sent it on phone through mms.

5. Experimental Results and Analysis

5.1 Comparison of Existing Project

Several anti-theft control systems have developed over the previous few years. An integrated Info-Security Circuit Board that communicates with ECUs and sensors inside a vehicle through LIN bus,CAN bus, Flex Ray and MOST Bus communicates with other vehicles, road-side structures and mobile phones with wireless interfaces. The main disadvantage with the system is the data timeliness and network delays to understand reliable safe car communications. The existing car antitheft system are flashing light techniques, Car alarm which makes use of different type of sensors which can be pressure, door & tilt and shock sensors.

Other systems include an in vehicle anti-theft component that will not enable the functions of the applications if it should find itself is illegally moved to one more car. The restriction here is that it needs a secure processor and smart card chips to store in the Group Identification Number. There are numerous remote controlled security systems that restricts key auto systems of automobile through remote control when it is stolen. This needs secure vehicle-vehicle communications.

5.2 New Features

- **Object Detection**
- **MMS**

5.3 Coding

sender_camera.py

```
import cv2, datetime, os, time, numpy as np, subprocess


# Camera ON

video = cv2.VideoCapture(0)

image_frame = 0


# dl datasheets

net = cv2.dnn.readNet("yolov3.weights", "yolov3.cfg")

with open("coco.names", "r") as f:

    classes = [line.strip() for line in f.readlines()]

layer_names = net.getLayerNames()

output_layers = [layer_names[i[0] - 1] for i in net.getUnconnectedOutLayers()]


# Image processing

def dl():

    img = cv2.resize(frame1, None, fx=2.0, fy=2.0)

    height, width, channels = img.shape

    blob = cv2.dnn.blobFromImage(img, 1 / 255.0, (416, 416), swapRB=True, 
crop=False)

    net.setInput(blob)

    outs = net.forward(output_layers)
    class_ids = []
    confidences = []
    boxes = []
    for out in outs:
        for detection in out:
            scores = detection[5:]
            class_id = np.argmax(scores)
            confidence = scores[class_id]
            if confidence > 0.5:
                center_x = int(detection[0] * width)
                center_y = int(detection[1] * height)
                w = int(detection[2] * width)
                h = int(detection[3] * height)
                x = int(center_x - w / 2)
                y = int(center_y - h / 2)
                boxes.append([x, y, w, h])
                confidences.append(float(confidence))
                class_ids.append(class_id)
    indexes = cv2.dnn.NMSBoxes(boxes, confidences, 0.5, 0.4)
    colors = np.random.uniform(0, 255, size=(len(classes), 3))
    for i in range(len(boxes)):
        if i in indexes:
            x, y, w, h = boxes[i]
            label = str(classes[class_ids[i]])
            color = colors[class_ids[i]]
            cv2.rectangle(img, (x, y), (x + w, y + h), color, 2)
            cv2.putText(img, label, (x, y - 5), cv2.FONT_HERSHEY_SIMPLEX, 2/2,
color, 2)
```

```
    cv2.imwrite("/home/linuxlite/Desktop/frames/snap.jpg", img)
    cv2.imwrite(f"/home/linuxlite/Desktop/Dl_processed/{frame_uid}", img)
    time.sleep(2)
    os.remove("/home/linuxlite/Desktop/frames/snap.jpg")

# http connection for transferring files(like socket, ftp...)
# process = subprocess.Popen("xfce4-terminal -x python3 -m http.server
22111", shell=True)
# Above line triggers the terminal for http connectivity but it isn't working!!

# Movement detecting
while video.isOpened:

    # difference
    check1, frame1 = video.read()
    check2, frame2 = video.read()
    diff = cv2.absdiff(frame1, frame2)

    # frame conversions
    gray = cv2.cvtColor(diff, cv2.COLOR_BGR2GRAY)
    blur = cv2.GaussianBlur(gray, (5, 5), 0)
    _, thresh = cv2.threshold(blur, 20, 255, cv2.THRESH_BINARY)
    dilated = cv2.dilate(thresh, None)
    contours, _ = cv2.findContours(dilated, cv2.RETR_TREE,
cv2.CHAIN_APPROX_SIMPLE)

    # if motion...
    for contour in contours:
        (x, y, w, h) = cv2.boundingRect(contour)
        if cv2.contourArea(contour) >= 2500:
            if (image_frame % 50) == 0:
                print("Movement Detected")
                frame_uid = str(datetime.datetime.now()) + ".jpg"
                dl()
                original_img = cv2.resize(frame1, None, fx=2.0, fy=2.0)

cv2.imwrite(f"/home/linuxlite/Desktop/Movement_images/{frame_uid}",
original_img)
            image_frame += 1


    # Showing frames
    cv2.imshow('CCTV', frame1)



# Quitting program
    if cv2.waitKey(1) == ord('q'):
        break


video.release()
cv2.destroyAllWindows()
```

receiver_system.py

```
import requests, os, datetime, time, pyrebase, numpy as np, cv2
from twilio.rest import Client
from gpiozero import LED
```

```
led1 = LED(23)
led2 = LED(24)
# To avoid multiple calls
called = 0
# Firebase Storage Connectivity
config = {
        "apiKey": "AIzaSyB0QxPtqRbAvbb0bZshtdPh_5PYuvMIkeE",
        "authDomain": "theft-detector-iot.firebaseapp.com",
        "databaseURL": "https://theft-detector-iot.firebaseio.com",
        "projectId": "theft-detector-iot",
        "storageBucket": "theft-detector-iot.appspot.com",
        "messagingSenderId": "1060700333231",
        "appId": "1:1060700333231:web:f4be0b491e6451c074e05a",
        "measurementId": "G-Q1GW9RH818"}
firebase = pyrebase.initialize_app(config)
storage = firebase.storage()
# Twilio call & message connectivity
TWILIO_PHONE_NUMBER = "+12243026503"
DIAL_NUMBERS = ["+918608550403"]
TWIML_INSTRUCTIONS_URL = \
  "http://static.fullstackpython.com/phone-calls-python.xml"
client = Client("ACbf7167e386e0c2cc7966460a82dcaac2",
"0bd6964c5bc9ee6613b9f4a553ca8ad7") # Check Auth token, it may
change in times!
# Function to make call
def dial_numbers():
    led1.on()

    for number in DIAL_NUMBERS:

        print("Dialing " + number)

        client.calls.create(to=number, from_=TWILIO_PHONE_NUMBER,
url=TWIML_INSTRUCTIONS_URL, method="GET")

    led1.off()

# Function for Image processing

def cloud():

    led2.on()

storage.child(f"images/{frame_uid}").put(f"/home/pi/Desktop/dl_pr
ocessed/{frame_uid}")

    view_img = storage.child(f"images/{frame_uid}").get_url(None)

# For sending messages

    for number in DIAL_NUMBERS:

        print("messaging" + number)

        client.messages.create(body=f'Movement detected @
{frame_uid[:-4]} - Click below url to view the spotted image
{view_img}', from_=TWILIO_PHONE_NUMBER, to=DIAL_NUMBERS)

    led2.off()

while True:

    #driver.refresh()

    time.sleep(2)

    url = 'http://192.168.43.41:22111/Desktop/frames/snap.jpg'

    r = requests.get(url)

  open('/home/pi/Desktop/frames/snap.jpg', 'wb').write(r.content)
size = os.path.getsize('/home/pi/Desktop/frames/snap.jpg')

    if size > 500:
        print("image got")
        frame_uid = str(datetime.datetime.now()) + '.jpg'
        open(f'/home/pi/Desktop/dl_processed/{frame_uid}', 'wb').write(r.content)
        if called == 0:
            dial_numbers()
            called = 1
        cloud()
    os.remove('/home/pi/Desktop/frames/snap.jpg')
```

6. Conclusion And Future Work

6.1 Conclusion

- The research work that will be carried out in this thesis would be mainly focused to design and develop efficient and convenient motion detection surveillance i.e. an Anti-Theft device to solve security problems which will help to reduce/stop theft.
- This system is suitable for small personal area surveillance. I.e. personal office cabin, bank locker room, parking entrance. Whenever the motion is detected through. The main Advantage of the project is Easy to implement, Low cost with High quality.