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FACIAL RECOGNITION ROBOT USING IOT AND MACHINE LEARNING

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Abstract
Women protection is very important during the night time and alone. Even CC cameras exist, but there are many incidents taking place in which the victim is losing valuable things or large amounts of money. Sometimes we lose our lives due to attacks like bomb blast and terror attacks. So we are introducing a robot that moves as a patrol officer or ssecurity guard carrying a camera with a feature of facial recognition. So the robot identifies any type of criminal that is present among a group of people and if that person/hazard thing is captured in camera of a robot then it will immediately send the information regarding the presence of the person/hazard thing to the controller and the controller will alert the security to catch him. This robot can also be used in armed forces especially when they perform covert operations. It can also be used in universities to identify the ooutsiders. It can be used to identify the students who are not attending the classes but roaming around the college. This robot can also be used in the forest by the forest officers to roam and identify the number of animals present in the forest and also to catch the people who are cutting down the tree's and lead deforestation.

Keywords: Mobile App, Common Home Utility, Wi-fi is ubiquity.

1. Introduction

Existing System:
Trespassers cross our borders unknowingly. It is not possible for our soldiers to watch the borders at each and every moment. The key use of autonomous intelligent robotic systems is to provide remote surveillance using a security robot. An essential requirement in security is the capability to automatically detect trespasser in borders, to inform nearby control unit and to empower security personnel to track the trespasser. In this paper we propose an autonomous intelligent robot which identifies trespasser using PIR motion sensor, alerts security personnel by sms using GSM and captures image of trespasser using camera in Android device and mail this image to specified e-mail id using Android based application. This development enables security personnel to effectively detect the and at low cost to identify a potential intruder.

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Proposed System:

We are proposing a robot for the safety of people just like the ibot-guard but the thing is that we the existing system. Identifies the the objects here in our case the object is only human so that who ever enters the prohibited area are not identified but are detected and sends the e-mail with an upgraded version of that we are providing an database to the robot through which robot it self tries to identify the people if any one matches from the database only than it takes photo of the person in the current location and sends photo along with the details like name of the person to the specific email so that the security team will get ready to face the situation at the same time live video transferring is also done by the robot.

Software Specifications:

- IDE
- RASPB IAN OPERATING SYSTEM
- PYTHON
- APP

Hardware Specifications:

- Raspberry Pi
- Node MCU ESP8266
- Jumper Wires
- Usb Camera
- Sigle shaft gear motors with tiers
- Motor shield

Raspberry pi: Raspberry Pi is a series of small single-board computers (SBCs) developed in kingdom by the Raspberry pi Foundation in association with Broadcom. The Raspberry Pi project originally leaned towards the promotion of teaching basic computer science in schools and in developing countriesThe original model became more popular than anticipated, selling outside its target market for uses such as robotics. It is widely used in many areas, such as for weather monitoring,because of its low cost, modularity, and open design. It is typically used by computer and electronic hobbyists, due to its adoption of HDMI and USB devices.

Node MCU ESP8266:

The **NodeMCU ESP8266 development board** comes with the ESP-12E module containing ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects. NodeMCU can be powered using Micro USB jack and VIN pin (External Supply Pin). It supports UART, SPI, and I2C interface.

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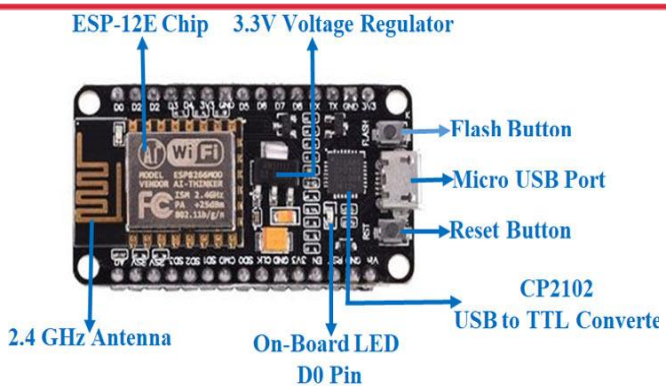

Jumper Wires:

A **jump wire** (also known as jumper wire, or jumper) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

WEB CAM:

A webcam is a video camera that feeds or streams an image or video in real time to or through a computer to a computer network, such as the Internet. Webcams are typically small cameras that sit on a desk, attach to a user's monitor, or are built into the hardware. Webcams can be used during a video chat session involving two or more people, with conversations that include live audio and video. For example, Apple's iSight camera, which is built into Apple laptops, iMacs and a number of iPhones, can be used for video chat sessions, using the Messages instant messaging program. Webcam software enables users to record a video or stream the video on the Internet. As video streaming over the Internet requires much bandwidth, such streams usually use compressed formats. The maximum resolution of a webcam is also lower than most handheld video cameras, as higher resolutions would be reduced during transmission. The lower resolution enables webcams to be relatively inexpensive compared to most video cameras, but the effect is adequate for video chat sessions.

Single Shaft Gear Motors with Tiers:

A gear motor is an all-in-one combination of a motor and gearbox. The addition of a gear head to a motor reduces the speed while increasing the torque output. The most important parameters in regards to gear motors are speed (rpm), torque (lb-in) and efficiency (%). In order to select the most suitable gear motor for your application you must first compute the load, speed and torque requirements for your application. ISL Products offers a variety of Spur Gear Motors, Planetary Gear Motors and Worm Gear Motors to meet all application

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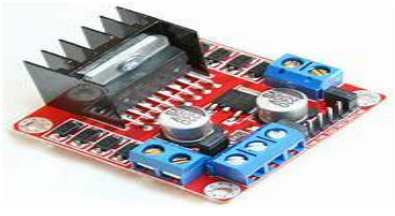
requirements. Most of our DC motors can be complimented with one of our unique gearheads, providing you with a highly efficient gear motor solution.

Motor Driver:

The motor driver IC is an integrated circuit chip used as a motor controlling device in autonomous robots and embedded circuits. L293D and ULN2003 are the most commonly used motor Driver IC that is used in simple robots and RC cars. A motor driver is undoubtedly something that makes the motor move as per the given instructions or the inputs (high and low). It listens to the low voltage from the controller/processor and control an actual motor which needs high input voltage. In simple words, a motor driver IC controls the direction of the motor based on the commands or instructions it receives from the controller. Many motor drivers follow different topology, in this article we will focus on the popular H-bridge topology which is used in the L293D motor driver IC.



2. About The Project

Synopsys:

Facial Recognition Robot is a security system proposed for identifying the criminals that are present among the people. It sends the live video transfer footage from any where to the robot controller in which the controller can identify the mischievous or suspicious things happening apart from that it detects and identifies the faces if any face is recognized or matched with the database then the robot itself takes photos of the recognized person and mails it to the specific recipient mail.

Problem Definition:

Women protection is very important during the night time and alone. Even CC cameras exist, but there are many incidents taking place in which the victim is losing valuable things or large amounts of money. Sometimes we lose our lives due to attacks like bomb blast and terror attacks. Our idea is to take control of all those mischievous things and provide security and peace to the people.

Existing System and its Working:

Experimental Procedure: First we initialize GSM module and LPC2193 to configure special function registers. This autonomous robot will be left in borders; robot will move randomly and have Passive Infrared Sensor (PIR) sensor connected to the I/O pins of LPC2103. A PIR sensor [8] is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. It is used to sense movement of people, animals. Here sensor will keep on checking for the human motion, in case any human motion is detected then robot will send SMS to military authority and to the android device mounted on robot. When android device receives the message the android application will be activated and it directs the device to capture

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the image then it will upload that image to specified email id.

Drawbacks of Existing System:

- Existing System can only be used in the prohibited area.
- It only detects humans just as the objects.
- If it is released into public places it detects all the people and sends the emails iteratively to the security team.
- Even though the person detected is on our side it send an e-mail and confuses the security team.
- It cannot send the live video footage so the mischievous things cant be identified or observed.

Proposed System and its Merits:

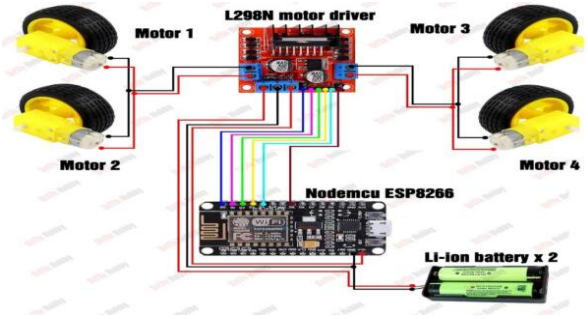
We are proposing a robot for the safety of people just like the ibot-guard but the thing is that we the existing system. Identifies the the objects here in our case the object is only human so that who ever enters the prohibited area are not identified but are detected and sends the e-mail with an upgraded version of that we are providing an database to the robot through which robot it self tries to identify the people if any one matches from the database only than it takes photo of the person in the current location and sends photo along with the details like name of the person to the specific email so that the security team will get ready to face the situation at the same time live video transferring is also done by the robot.

Merits or Advanteages of Proposed System:

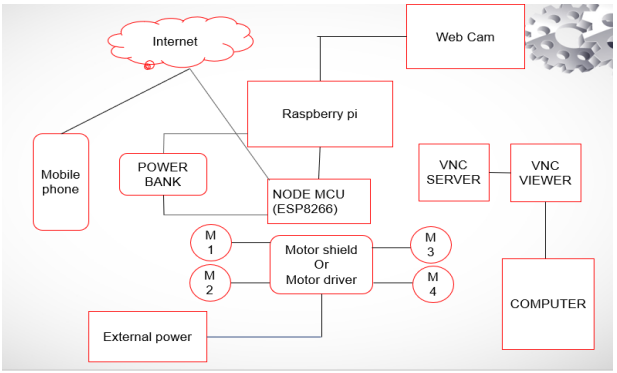
- It can be controlled by the controller where ever it is as robot is connected to the cloud.
- Live video footage sharing is possible by the robot.
- Only single user can access the robot.
- It detects and recognises faces depending on the database.
- Generates the email automatically and send to the mentioned recipient's.
- It can be sent to any where even in non-surveillance area so that every place will be secured .

3. SYSTEM DESIGN AND ANALYSIS

CIRCUIT DIAGRAM:



BLOCK DIAGRAM:



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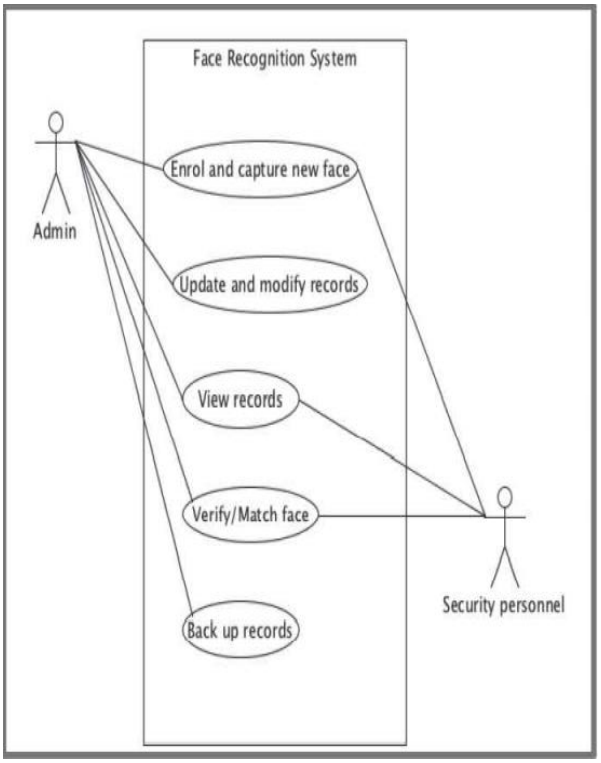
USE CASE DIAGRAM:

Any real-world system is used by different users. The users can be developers, testers, business people, analysts, and many more. Hence, before designing a system, the architecture is made with different perspectives in mind. The most important part is to visualize the system from the perspective of different viewers. The better we understand the better we can build the system. UML plays an important role in defining different perspectives of a system. These perspectives are

- Design
- Implementation
- Process
- Deployment



CLASS DIAGRAM:

The purpose of use case diagram is to capture the dynamic aspect of a system. However, this definition is too generic to describe the purpose, as other four diagrams (activity, sequence, collaboration, and Statechart) also have the same purpose. We will look into some specific purpose, which will distinguish it from other four diagrams. Use case diagrams are used to gather the requirements of a system including internal and external influences. These requirements are mostly design requirements. Hence, when a system is analyzed to gather its functionalities, use cases are prepared and actors are identified. When the initial task is complete, use case diagrams are modelled to present the outside view.

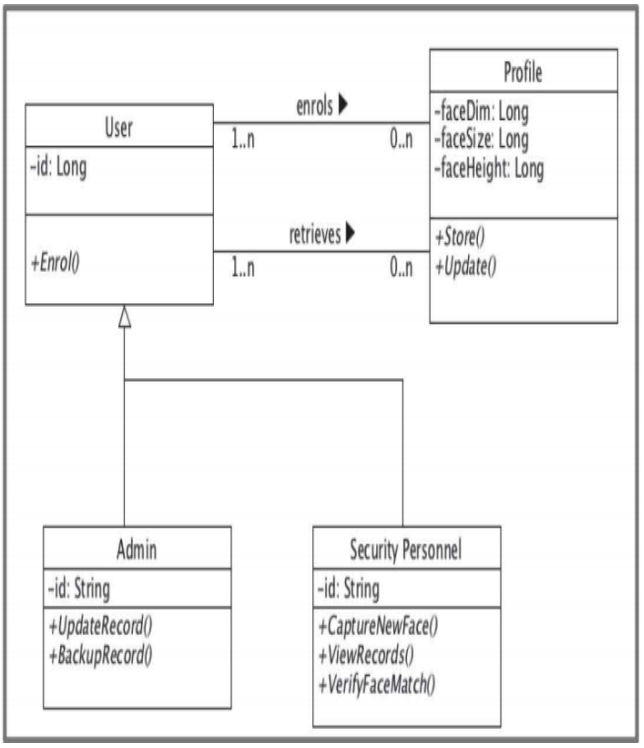
In brief, the purposes of use case diagrams can be said to be as follows −

Used to gather the requirements of a system.

Used to get an outside view of a system.

Identify the external and internal factors influencing the system.

Show the interaction among the requirements are actors.



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4. CODING:

4.1 ROBOT CODE:

```
//Nodemcu ESP8266 WIFI control car.
 #define BLYNK_PRINT Serial
 #include #include //Motor PINs
#define ENA D0 #define IN1 D1
 #define IN2 D2 #define IN3 D3
 #define IN4 D4
#define ENB D5
bool forward = 0;
bool backward = 0;
bool left = 0; bool right = 0;
int Speed; char auth[] = “”;
 //Enter your Blynk application auth token
char ssid[] = “”; //Enter your WIFI name
 char pass[] = “”; //Enter your WIFI
    22assword void setup() {
 Serial.begin(9600); pinMode(ENA,
    OUTPUT);
 pinMode(IN1, OUTPUT);
pinMode(IN2, OUTPUT);
 pinMode(IN3, OUTPUT);
pinMode(IN4, OUTPUT);
 pinMode(ENB, OUTPUT);
Blynk.begin(auth, ssid, pass); }
BLYNK_WRITE(V0) { forward =
    param.asInt();
 } BLYNK_WRITE(V1) { backward =
    param.asInt();
 } BLYNK_WRITE(V2) { left =
    param.asInt(); }
BLYNK_WRITE(V3)
 { right = param.asInt(); }
 BLYNK_WRITE(V4) { Speed =
    param.asInt(); }
void smartcar() { if (forward == 1) {
    carforward(); Serial.println(“carforward”);
    }
 else if (backward == 1) carbackward();
    Serial.println(“carbackward”); }
 else if (left == 1) { carturnleft();
    Serial.println(“carfleft”);
} else if (right == 1) { carturnright();
    Serial.println(“carright”);
 } else if (forward == 0 && backward == 0
    && left == 0 && right == 0) carStop();
Serial.println(“carstop”); } } void loop()
{ Blynk.run(); smartcar(); } void carforward ()
{ analogWrite (ENA, Speed);
    analogWrite(ENB, Speed); digitalWrite
    (IN1, LOW);
digitalWrite (IN2, HIGH); digitalWrite (IN3,
HIGH); digitalWrite (IN4, LOW); } void
carbackward() { analogWrite(ENA, Speed);
analogWrite(ENB, Speed);
digitalWrite(IN1, HIGH); digitalWrite(IN2,
    LOW);
digitalWrite(IN3, LOW); digitalWrite(IN4,
    HIGH);
 } void carturnleft() { analogWrite(ENA,
    Speed);
 analogWrite(ENB, Speed); digitalWrite(IN1,
    HIGH);
digitalWrite(IN2, LOW); digitalWrite(IN3,
    HIGH);
25 digitalWrite(IN4, LOW)}
void carturnright ()
{ analogWrite(ENA, Speed);
 analogWrite(ENB, Speed);
 digitalWrite(IN1, LOW);
digitalWrite(IN2, HIGH);
digitalWrite(IN3, LOW);
digitalWrite(IN4, HIGH); }
void carStop() { digitalWrite(IN1, LOW);
digitalWrite(IN2, LOW); digitalWrite(IN3,
    LOW);
digitalWrite(IN4, LOW); }
```

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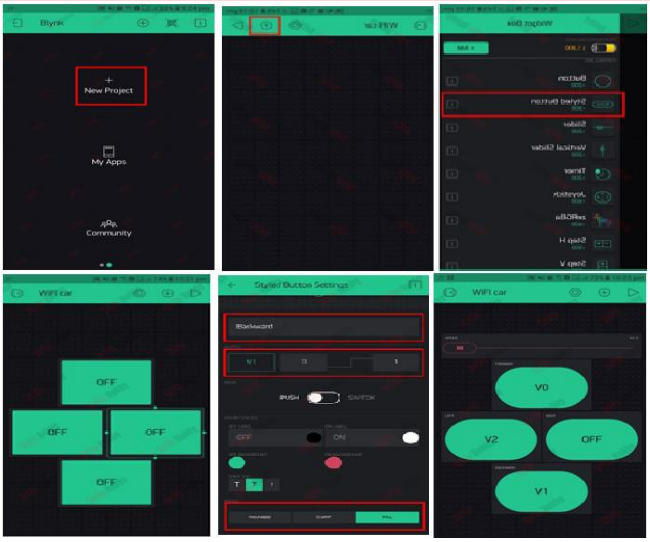

5. Testing and Debugging

System Testing is a level of testing that validates the complete and fully integrated software product. The purpose of a system test is to evaluate the end-to-end system specifications. Usually, the software is only one element of a larger computer-based system. Ultimately, the software is interfaced with other software/hardware systems. System Testing is actually a series of different tests whose sole purpose is to exercise the full computer-based system. There are different types of Tests performed on Software Code, some of the important types of testing and their hierarchy are:

Types of Testing:

Software Testing Hierarchy:

As with almost any software engineering process, software testing has a prescribed order in which things should be done. The following is a list of software testing categories arranged in chronological order. These are the steps taken to fully test new software in preparation for marketing it:

- Unit testing performed on each module or block of code during development. Unit Testing is normally done by the programmer who writes the code.
- Integration testing done before, during and after integration of a new module into the main software package. This involves testing of each individual code module. One piece of software can contain several modules which are often created by several different programmers. It is crucial to test each module's effect on the entire program model.
- System testing done by a professional testing agent on the completed software product before it is introduced to the market.
- Acceptance testing - beta testing of the product done by the actual end users.

Unit Testing:

Unit Testing is a level of software testing where individual units/ components of a software are tested. The purpose is to validate that each unit of the software performs as designed. A unit is the smallest testable part of any software. It usually has one or a few inputs and usually a single output. In procedural programming, a unit may be an individual program, function, procedure, etc. In object-oriented programming, the smallest unit is a method, which may belong to a base/ super class, abstract class or derived/ child class. (Some treat a module of an application as a unit. This is to be discouraged as there will probably be many individual units within that module.) Unit testing frameworks, drivers, stubs, and mock/ fake objects are used to assist in unit testing.

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Unit Testing Method:

- It is performed by using the White Box Testing method.
- Unit testing is the first level of software testing and is performed prior to Integration Testing.
- It is normally performed by software developers themselves or theirpeers. In rare cases, it may also be performed by independent software testers.

Integration Testing:

Integration Testing is defined as a type of testing where software modules are integrated logically and tested as a group. A typical software project consists of multiple software modules, coded by different programmers. The purpose of this level of testing is to expose defects in the interaction between these software modules when they are integrated Integration Testing focuses on checking data communication amongst these modules. Hence it is also termed as 'I & T' (Integration and Testing), 'String Testing' and sometimes 'Thread Testing'.

Example of Integration Test Case: Integration Test Case differs from other test cases in the sense it focuses mainly on the interfaces & flow of data/information between the modules. Here priority is to be given for the integrating links rather than the unit functions which are already tested.

Sample Integration Test Cases for the following scenario: Application has 3 modules say 'Login Page', 'Mailbox' and 'Delete emails' and each of them is integrated logically. Here do not concentrate much on the Login Page testing as it's already been done in Unit Testing. But check how it's linked to the Mail Box Page.

2 Top-down Integration:

In Top to down approach, testing takes place from top to down following the control flow of the software system. Takes help of stubs for testing.

System Testing:

The various Different Types of System Testing include:

1. Usability Testing- mainly focuses on the user's ease to use the application, flexibility in handling controls and ability of the system to meet its objectives
2. Load Testing- is necessary to know that a software solution will perform under real-life loads.
3. Regression Testing- involves testing done to make sure none of the changes made over the course of the development process have caused new bugs. It also makes sure no old bugs appear from the addition of new software modules over time.
4. Recovery testing - is done to demonstrate a software solution is reliable, trustworthy and can successfully recoup from possible crashes.
5. Migration testing- is done to ensure that the software can be moved from older system infrastructures to current system infrastructures without any issues.
6. Functional Testing - Also known as functional completeness testing, Functional Testing involves trying t think of any possible missing functions. Testers

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might make a list of additional functionalities that a product could have to improve it during functional testing.

7. Hardware/Software Testing - IBM refers to Hardware/Software testing as "HW/SW Testing". This is when the tester focuses his/her attention on the interactions between the hardware and software during system testing.

Acceptance Testing:

Acceptance Testing is a method of software testing where a system is tested for acceptability. The major aim of this test is to evaluate the compliance of the system with the business requirements and assess whether it is acceptable for delivery or not.

4.1 Types of Acceptance Testing:

1. User Acceptance Testing (UAT):

User acceptance testing is used to determine whether the product is working for the user correctly. Specific requirements which are quite often used by the customers are primarily picked for the testing purpose. This is also termed as End-User Testing.

2. Business Acceptance Testing (BAT):

BAT is used to determine whether the product meets the business goals and purposes or not.
BAT mainly focuses on business profits which are quite challenging due to the changing market conditions and new technologies so that the current implementation may have to being changed which result in extra budgets.

3. Contract Acceptance Testing (CAT):

CAT is a contract which specifies that once the product goes live, within a predetermined period, the acceptance test must be performed and it should pass all the acceptance use cases.
Here is a contract termed as Service Level Agreement (SLA), which includes the terms where the payment will be made only if the Product services are in-line with all the requirements, which means the contract is fulfilled.
Sometimes, this contract happens before the product goes live. There should be a well-defined contract in terms of the period of testing, areas of testing, conditions on issues encountered at later stages, payments, etc.

4. Operational Acceptance Testing (OAT):

OAT is used to determine the operational readiness of the product and is a non-functional testing.
It mainly includes testing of recovery, compatibility, maintainability, reliability etc.
OAT assures the stability of the product before it is released to the production.
All these testing processes either do validation or verification hence we include these two.

Verification and Validation:

Verification and validation are independent procedures that are used together for checking that a product, service, or system meets requirements and specifications and that it fulfils its intended purpose.

Verification is the process of checking that software achieves its goal without any bugs. It is the process to ensure whether the product that is developed is right or not. It verifies whether the developed product fulfils the requirements that we have.

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Software Validation is a process of evaluating software product, so as to ensure that the software meets the pre-defined and specified business requirements as well as the end users/customers' demands and expectations.

Both, the verification and validation is a software testing activity, and verification is followed by the validation. Validation is usually carried out at the end of the software development.

It is basically, performed with the intent to check that whether the developed software is built as per pre-decided software requirement specifications (SRS) and if it caters to fulfil the customers' actual needs in the real environment.

Validation - Types of Tests:

During the process of software validation, the team performs three types of tests on the software to ensure that their meets the requirements of the users as well as the other stakeholders of the product.

Black Box Testing

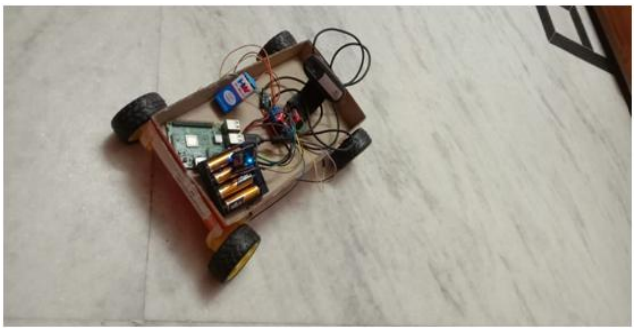
- It is a technique of assessing the software's working, on the basis of available specifications only, and being unaware of knowledge and understanding of the internal features and structure of the software.

White Box Testing

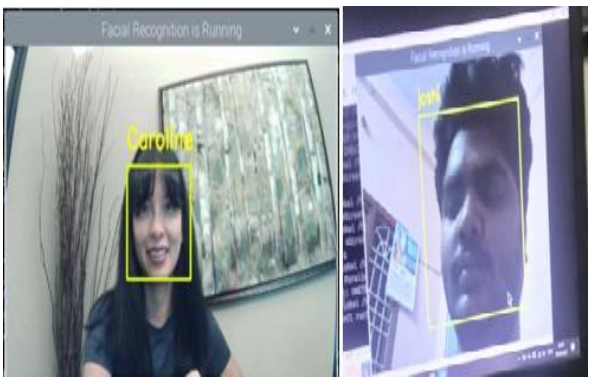
- It involves testing of software's functionality, with the knowledge of internal working and structure of the software, by the testers. Gray Box Testing
- Gray-Box Testing is a combination of black-box testing and white-box testing approach, that enables to evaluate the functionality of the software, externally, from users-perspective, by executing test plans and cases, prepared from limited knowledge of the internal features, functionality or details of software.
- Apart from above testing methodologies, testing may also includes smoke Testing, regression Testing, functional Testing, system Testing and user acceptance Testing.

Output:

After following the above circuit diagram and system design the robot looks like this



After running the code, the facial recognition, the output is as follows:



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6. Technologies

Machine Learning:

Machine learning is behind chat bots and predictive text, language translation apps, the shows Netflix suggests to you, and how your social media feeds are presented. It powers autonomous vehicles and machines that can diagnose medical conditions based on images. When companies today deploy artificial intelligence programs, they are most likely using machine learning — so much so that the terms are often used interchangeably, and sometimes ambiguously. Machine learning is a subfield of artificial intelligence that gives computers the ability to learn without explicitly being programmed.

"In just the last five or 10 years, machine learning has become a critical way, arguably the most important way, most parts of AI are done," said MIT Sloan professor Thomas W. Malone, the founding director of the MIT Center for Collective Intelligence. "So that's why some people use the terms AI and machine learning almost as synonymous … most of the current advances in AI have involved machine learning."

6.1 Different Algorithms Used For Machine Learning:

Recommendation Algorithms. The recommendation engines behind Netflix and YouTube suggestions, what information appears on your Facebook feed, and product recommendations are fueled by machine learning. "[The algorithms] are trying to learn our preferences," Madry said. "They want to learn, like on Twitter, what tweets we want them to show us, on Facebook, what ads to display, what posts or liked content to share with us."

Image analysis and object detection. Machine learning can analyze images for different information, like learning to identify people and tell them apart — though facial recognition algorithms are controversial. Business uses for this vary. Shulman noted that hedge funds famously use machine learning to analyze the number of cars in parking lots, which helps them learn how companies are performing and make good bets.

Fraud detection. Machines can analyze patterns, like how someone normally spends or where they normally shop, to identify potentially fraudulent credit card transactions, log-in attempts, or spam emails.

Automatic helplines or chatbots. Many companies are deploying online chatbots, in which customers or clients don't speak to humans, but instead interact with a machine. These algorithms use machine learning and natural language processing, with the bots learning from records of past conversations to come up with appropriate responses.

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Self-driving cars. Much of the technology behind self-driving cars is based on machine learning, deep learning in particular.

Medical imaging and diagnostics. Machine learning programs can be trained to examine medical images or other information and look for certain markers of illness, like a tool that can predict cancer risk based on a mammogram.

5.2 Internet of Things

Defining Iot

The internet of things is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer over a network without requiring human-to-human or human-to-computer interaction it means taking all the things in the world and connected to the internet. We all know that IOT is changing industries across the broad- from agriculture to healthcare to manufacturing and everything in between.

Phases of Iot Life Cycle

Design: In this phase we design the project according to the user requirements and it is the fundamental role to a adequate the client.

Deploy: Deploying the project along with SRS to the client if any maintenance needed it will be maintained in the next phase.

Manage: The project will be refurbished and maintained.

Decommision: The last and final stage of an IOT product lifecycle it is very important that OEM's (Original Equipment Manufactures) this enables end users and stakeholders to remove a device from the system and deploy a new one.

6.2.1 Characteristics of Iot

1. Intelligence

IOT comes with the combination of algorithm of algorithms and computations, software and hardware that makes it smart. Ambient intelligence in IOT enhances its capabilities which facilitates the things to respond in an intelligent way to a particular situation and supports them in carrying out specific tasks. In spite of all the popularity of smart technologies, intelligence in Iot is only concerned as means of interaction between devices, while user and device interactions is achieved by standard input methods and graphical user interface.

2. Connectivity

Connectivity empowers Internet of Things by bringing together everyday objects. Connectivity of these objects is pivotal because simple object level interactions contribute towards collective intelligence in IOT network. It enables network accessibility and compatibility in the things. With this connectivity, new market opportunities for Internet of things can be created by the networking of smart things and applications.

3. Dynmic Nature

The primary activity of Internet of Things is to collect data from its environment; this is achieved with the dynamic changes that take place around the devices. The state of these devices change dynamically, example sleeping and waking up, connected and/or disconnected as well as the context of devices including temperature, location and speed. In addition to the state of the device, the number of devices

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also changes dynamically with a person, place and time.

4. **Enormous Scale**

The number of devices that need to be managed and that communicate with each other will be much larger than the devices connected to the internet. The management of data generated from these devices and their interpretation for application purposes becomes more critical. Gartner (2015) confirms the enormous scale of IOT in the estimated report where it stated that 5.5 million new things will be in use worldwide in 2016, which is up by 30 percent from 2015. The report also forecasts that the number of connected devices will reach 20.8 billion by 2020.

5. Sensing

IOT wouldn't be possible without sensors which will detect or measure any changes in the environment to generate data that can report on their status or even interact with the environment. Sensing technologies provide the means to create capabilities that reflect a true awareness of the physical world and the people in it. The sensing information is simply the analogue input from the physical world, but it can provide the rich understanding of our complex world.

SCOPE OF IOT

The scope of IOT includes:

- Embedded devices which manage and collect data from sensors or other inputs.
- Cloud storage of data
- Aggregation and analysis of data
- Applications which present data to users in meaningful ways

7. Conclusion

Presently we designed a robot which is easy to control and sends live video footage and also detected the faces of the people who are captured in the camera if the captured face matches from the database than the robot takes a photo with its camera and immediately mails it to the recipient mails that are mentioned in the program so that if there is any thief in the public than there are more number of chances for getting captured with the help of this robot

This robot can be used in many places such as open field, for making sure the corp is not being feeded by the animals and also in the bank vault in which only few people has the access so that it immediately sends the information if any of the unauthorized person enters the bank vault.

This can also be used in the eradication of hunting and deforestation in the deep forests by the features of being controlled from any where and also by being handled having live video transmission so that the controller can observe what's happening in the froestes just by placing in the control room.

Future Scope:

In future the following things can be done in the robot:

- RECORDING THE LIVE TRANSMITTED VIDEO
- SENDING THE GPS LOCATION OF THE ROBOT

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- TRACKING THE RECOGNISED FACE
- TRANSMITTING THE AUDIO SOURCE OF THE VIDEO\
- SENDING A MESSAGE TO THE NEAR BY COPS REGARDING THE CRIME TAKING PLACE

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