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### Enhanced Security System with Image Feature Identification

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## ABSTRACT

Open source hardware and software will be used to acquire camera images and recognize and identify objects of interest in the image that would be used in new or existing personal security system. The mechanism of this system rotates either automatically or manually to track a face when a human is within view of the camera. The biometric security recognition system is a real world applications with complex effects of illumination and imaging conditions on live images.

## INTRODUCTION

Face recognition security system is a category of biometric hardware/software which uses Raspberry Pi mini computer and additional peripherals. It captures one face image at a time by using digital camera. It is capable of identifying the person when the face is centered in front of the camera. It can be a challenging task by reason of changing facial expressions according to mood changes, head orientation and pose. The path to the final project success would be many different combinations of different ideas with their own benefits and drawbacks.

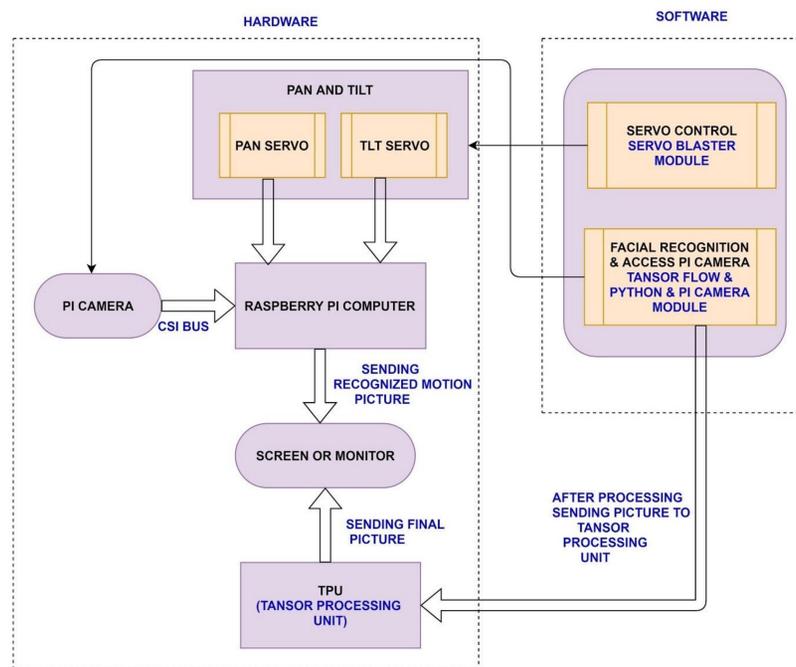
## HARDWARE & SOFTWARE

Install the tensorflow software in Raspberry Pi computer to realize image processing and face recognition tasks by using OpenCV library. Attach Pi camera to Raspberry Pi board through CSI interface to access face images. To track face movement attach the Pan-and-Tilt module which has two built-in servo motors to control the camera movements within a 'safe area'. Fix a screen module to display the face recognition result.

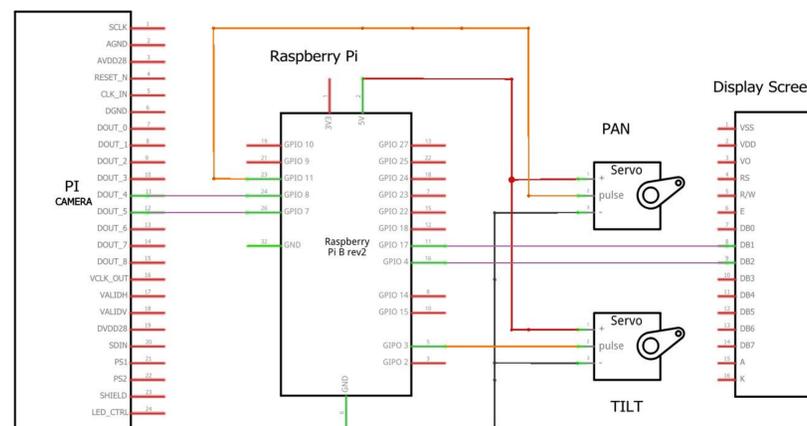
## PARTS LIST

1. Raspberry pi computer
2. Pi camera
3. Pan/tilt camera mount
4. Screen or monitor

## BLOCK DIAGRAM



## ELECTRICAL CIRCUIT



## ACKNOWLEDGEMENTS

I would like to thank first and foremost, Professor Zia for helping me throughout this project and providing the resources to make this project possible.

## PROGRAM CODE

```

camera.start_preview()
sleep(5)
camera.capture('/home/pi/Desktop/image.jpg')
camera.stop_preview()

camera.start_preview()
for i in range(5):
    sleep(5)
    camera.capture('/home/pi/Desktop/image%s.jpg'%i)
camera.stop_preview()

```

## CONCLUSION

This project focuses on person detection and tracking. Tracking of human beings can be used as a prior step in biometric face recognition. This can be very useful in the case of anomaly detection as the person may not face towards the camera when an anomaly is detected. So with the help of tracking, person's identity can be revealed.

## FUTURE WORK

This developed system can also be used in personal and commercial applications such as home assistant, self driving car and pair of smart glasses for the blind.

## REFERENCES

- <https://dzone.com/articles/object-detection-tutorial-in-tensorflow-real-time>
- <https://www.makeuseof.com/tag/image-recognition-tensorflow-raspberry-pi/>