

FACE MASK AND BODY TEMPERATURE WITH GATE CONTROLLING USING ATmega8A AND LAPTOP

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ABSTRACT

The data obtained from different sources such as the World Health Organization, the Wikipedia, Government Health Ministries, The New York Times, and other sources show that COVID-19 has sickened more than 127 million people worldwide and has killed more than 2 million people. The two main protocols that need to be followed in public places in order to prevent the further spread of the virus is by wearing face masks and following safe social distancing. To create a safe, COVID-19 free environment, we propose a dynamic Computer Vision based automated solution system focused on the real-time face monitoring of people to detect both face masks and body temperature in public places by using Host Computer to detect face mask protocol violations through an integrated VGA camera and to monitor body temperature with the help of MLX90614 sensor. A security clearance system is deployed that will allow that person to enter if they are wearing a face mask and their body temperature is in check with WHO guidelines. Thus, the above said system will help the society by saving time and also helps in contaminating the spread of coronavirus. This can be implemented in public places such as colleges, schools, offices, shopping malls, etc. to inspect people.

Keyword : - Covid -19, Temperature sensor, Face mask detection, open CV, Python IDLE

1. INTRODUCTION:

Since the COVID-19 outbreak, it has been a great challenge to identify people who are affected by COVID-19, because so many people with COVID-19 showed no symptoms. COVID-19 ICMR antibody kits produced high rate of false negatives that incorrectly show a person isn't infected. One notable symptom of COVID-19 is high body temperature. So, WHO has advised for body temperature screening to identify COVID-19. It is also necessary to wear face mask in public places, as numerous researches show the effectiveness of wearing facemask that reduces the spread. There are many temperature guns available but they are not smart enough to check temperature and facemask at the same time and alert the respected authorities to take necessary actions if the protocol is not followed. In many parts of the world many humans have been employed at public places of interest such as shops, cinemas, shopping malls, schools, colleges, railway stations etc. to ensure people wearing facemask and to screen body temperature. This could be one of the worst and risky jobs that anyone can land into, asking people to wear facemask and to check their body temperature. It could also lead to the transmission of COVID-19 from the common people to the concerned person who is in charge of monitoring facemask and body temperature. The

solution to this problem is to deploy an automated facemask and body temperature detection system powered by ATmega8 MCU, Host Computer. This setup has its own camera module through which it monitors facemask and it has a non-contact temperature sensor MLX90164 to read the body temperature and allows the person if they clear the COVID-19 protocols or it will alert the respected authorities.

2. LITERATURE SURVEY:

Various authors have proposed and discussed much advancement in educational field using technology that has helped in improving educational field. [1]S. Ge, J. Li, Q. Ye and Z. Luo, "Detection of Masked Faces in the Wild with LLE-CNNs," XXX June 2016 .The growth rate. Z., Luo studies the identification of people with full-face or partial occlusion. This approach categorizes into way, people with hand over their faces or occluded with objects. This approach is not suited to our scenario, which requires, in essentially, to detect faces that have their mouths covered with masks such as scarves, mufflers, handkerchiefs, etc. [2]Glass RJ, Glass LM, Beyeler WE, Min HJ. Targeted social distancing face mask July 2017 Compared to Open CV which is used in a number of computed components, it is unable to resolve the imbalanced workload issue experienced during the implementation of the Viola Jones face detection algorithm in GPUs. Glass et al. addressed the importance of social differencing and how the risk of pandemic growth can be slowly decreased by successfully preserving social distance without the use of vaccines or antiviral drugs. [3]Ensemble Feature Selection in Face Recognition: ICMLA 2012 Challenge Ensemble feature selection is known for its robustness and generalization of highly accurate predictive models. In this paper, we use different filter-based feature selection methods in an ensemble manner to improve face recognition. The goal is to distinguish human faces from avatar faces [4]P. Viola and M. Jones, "Rapid object detection using a boosted cascade of simple features," May 2004 Viola Jones detector optimized the features of Haar, but failed to tackle the real world problems and was influenced by various factors like face brightness and face orientation. Viola Jones could only detect frontal well-lit faces. It failed to work well in dark conditions and with non-frontal images. These issues have made the independent researchers work on developing new face detection models based on deep learning, to have better results for the different facial conditions.

3. BLOCK DIGRAM

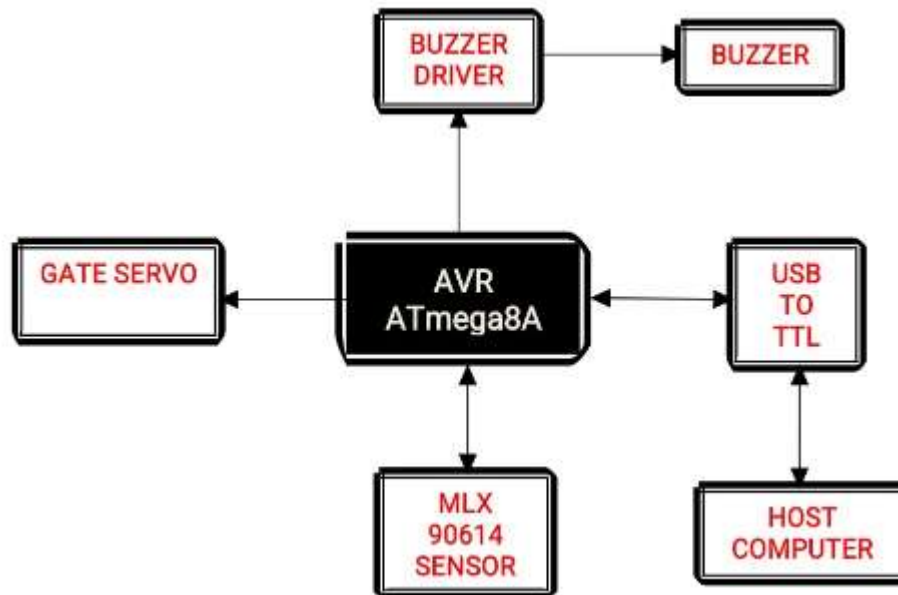


Fig. 1: Block Diagram of Proposed System

3.1 Hardware Components

1. AVR Microcontroller (ATmega8A)
2. DC SMPS (12v 1.5A)
3. DC Jack (DC Jack Mountable)
4. IR Temperature Sensor (MLX90614)
5. BJT (BC547)
6. Micro Servo (SG-90)
7. USB-TTL (PL2303)
8. Regulator IC (LM7805)
9. USB Data Cable V3
10. PCB
11. 2 LEDs (RED, GREEN)
12. Micro Switch (2-Leg Push-To-On)
13. Wire Bundle (Flex Wires)
14. Resistors (100E, 10K, 1.8K)
15. Capacitors (1000uF)
16. Buzzer (5v Small)
17. Heat Sink Stamped (for LM7805)
18. IC Base (28-Pin).

4. PROPOSED METHODOLOGY:

It is evident from the dataset description that there are a limited number of samples due to the government norms concerning security and privacy of the individuals. Whereas deep learning models struggle to learn in presence of a limited number of samples. Hence, over-sampling can be the key to address the challenge of limited data availability. Thereby the proposed methodology is split into two phases. The first phase deals with over-sampling with image augmentation of the training data whereas the second phase deals with the detection of face mask using Python IDLE.

4.1 FLOWCHART

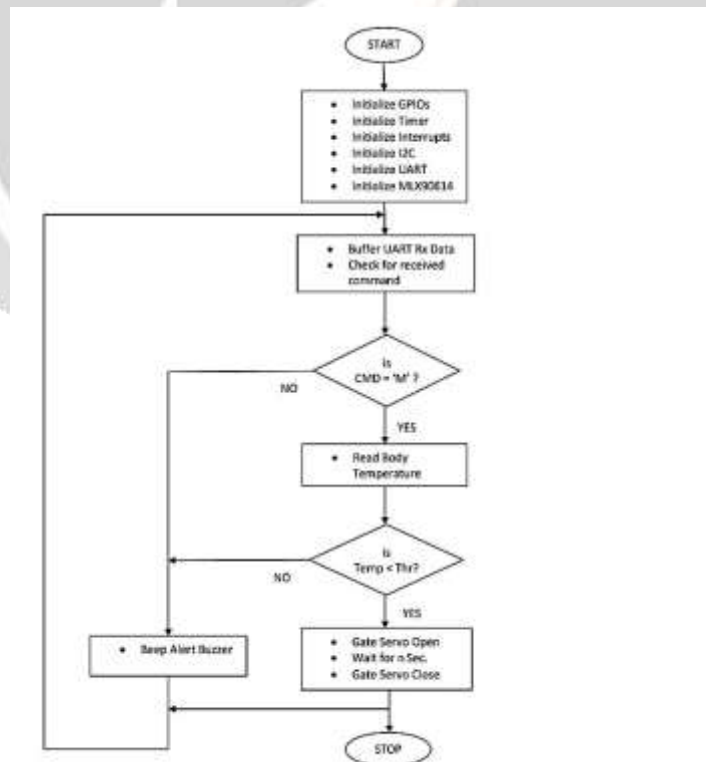


Chart 1: Flow Chart of Proposed system

4.2 ALGORITHM

1. Place your hand in front of the system of the temperature sensor
2. IR Sensor detects hand when it is close enough
3. Temperature sensor checks body temperature
4. Simultaneously the camera checks for mask
5. Gate opens only if you are wearing a mask and have normal body temperature
6. Buzzer goes off if body temp above normal
7. Gate remains shut for all cases except for [5]

5. PROJECT OUTPUT

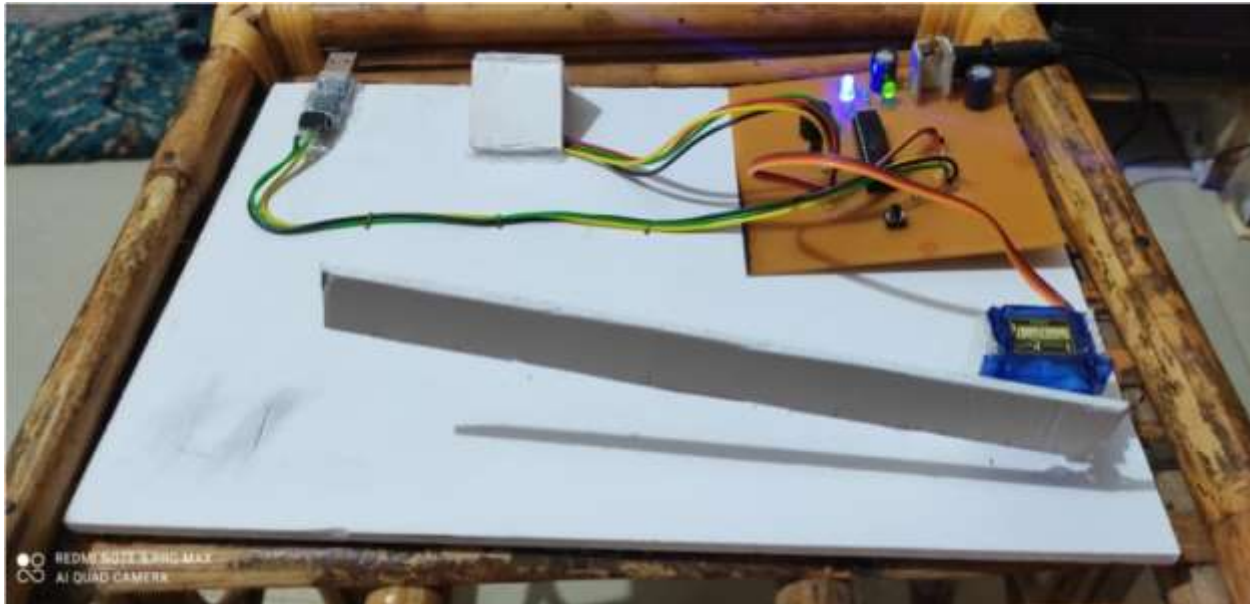


Fig. 2: Output of proposed system

5.1. RESULT AND DISCUSSION

We have tested the model for different scenarios, We have used Average Pooling for capturing Smooth image. Comparison of different hyper parameters and situations, Model Learning best compared to all the models. Loss, validation loss, training accuracy and validation accuracy from the plot that as the number of increase the training and validation accuracy increase and the training and validation accuracy decreases. And also the validation accuracy is higher than the training accuracy which proves that the model is not suffering through overrunning

6. CONCLUSIONS

Capturing the image from camera and applying techniques face detection and recognition can decrease the manual work from human and increase the security safety, taking the decision from this recognition result. The temperature is measured using the IR thermometer is a sensor that consists of a lens to focus the infrared energy on to detector, which converts the energy to an electrical signal that can be displayed in units of temperature after being compensated for ambient temperature variation.

6.1 FUTURE SCOPE

There are a number of aspects we plan to work on shortly: Currently, the model gives 5 FPS, inference speed on a CPU. In the future, we plan to improve this up to 15FPS, making our solution deployable for HD camera. The use of Machine Learning in the field of mobile deployment is rising rapidly. Hence, We plan to port our models to their respective TensorFlow versions. Our architecture can be made compatible with Media pipe, which will increase the interference performance on edge devices and make our models efficient on multithreading CPUs .Stage 1 and Stage 2 modules can be easily replaced with improved models in the future that would give better accuracy and lower latency.

5. ACKNOWLEDGEMENT

We would like to express our gratitude to the management of Priyadarshini JL college of engineering Nagpur, for the support and encouragement to carry out this work and we are grateful to all the staff members of department of Electronics and Telecommunication of Engineering for their cooperation and assistance..

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