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SMART COVID-19 SAFETY MONITORING

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Abstract: **One of the most important practices in the financial world is stock trading. The act of attempting to forecast the future value of a stoc in this paper, we introduce an affordable IoT-based solution going to increase COVID-19 indoor safety, covering several relevant aspects: 1) contactless temperature sensing 2) mask detection 3) social distancing check. Contactless temperature sensing subsystem relies on Arduino Uno using infrared sensor or thermal camera, while mask detection and social distancing check are performed by leveraging computer vision techniques on camera-equipped Raspberry Pi.**

Keywords: **Arduino; computer vision; coronavirus; COVID-19; Raspberry Pi, ontology.**

I. INTRODUCTION

The market that enables people via virtual broker sponsored platforms to Since the last days of the previous year, the occurrence of novel infectious flu-alike disease COVID-19 caused by SARS-Cov-2 virus (also called corona virus) has affected almost every aspect of people's lives globally. First, ithad been discovered in China, but spread quickly to other continents in only few weeks. keep with until July 11th, 2020, the entire number of identified cases was 12,653,451, while taking 563,517 lives worldwide. Common symptoms of corona virus disease include fever, tiredness, disease, nasal congestion , loss of taste and smell. In most cases, it's transmitted directly (person to person) through respiratory droplets, but also indirectly via surfaces . period of your time would be quite long and varies (between 14 and 27 days in extreme cases). Furthermore, even asymptomatic persons (almost 45% of cases) can spread the disease making true even worse. Therefore, the usage of face masks and sanitizers has shown positive results when it involves disease spread reduction . However, the crucial problem is that the dearth of approved vaccine and medicine . **due to** these facts, many protection and safety measures were taken by overnments so on reduce the disease spread, like obligatorydoor mask wearing, social distancing, quarantine, self- olation, limiting citizens' movement within country arders of actual indisputable fact that the pandemic seemed weaker at some points, most of safety regulations are still applied due to unstable situation. From workplace behavior to social relations, sport and entertainment, corona virus disease How do i rate your overall experience? devices at the identical time. In, a dataset formasked face recognition is introduced and its application by different algorithms in context of campus and enterprise corona virus prevention discussed. Moreover, in [18], a high-accuracy method for facial mask detectionusing semantic segmentation supported fullyconvolutional networks, gradient descent and binomial cross entropy was presented. However, performance- wise, it's too heavy for low-power IoT devices, like Raspberry Pi. On the alternative side, in , a state model- based solution for mask detection hoping on Viola-Jones algorithm in context of ATM center security was described. Our solution consists of the next subsystems:

1) Temperature measurement subsystem supported Arduino Uno 2) computer vision subsystem for mask detection and social distancing check supported Raspberry Pi 3) server side 4) Smartphone application forsecurity guards. First, all folks that attempt to the enter building should pass contactless temperature check. Forthat purpose, we rely on Arduino Uno equipped with infrared thermometer (such as MLX906148) or thermal camera sensor (AMG88339 for example). Moreover, it uses ESP8266 WiFi module for communication with Edgeservers using MQTT protocol.

II. RELATED WORK

During the literature review, we gathered knowledge on the latest approaches used in the field of stock market prediction.

Recently, different types of devices have been used to measure these values. For example, a fingertip pulse oximeter, which is used to measure SpO2 and pulse rate, is commercially available in most countries [12]. The deluxe handheld pulse oximeter is also commercially available, which can measure SpO2 and heart rate; although, it is priced at approximately 299 USD [13]. A wrist-worn pulse oximeter is available across the counter and can be used to measure SpO2 and heart rate. This device, like the abovementioned devices, does not include body temperature measurement features. The wrist-worn pulse oximeter costs 179 USD, rendering it expensive. Analog and digital thermometers are currently available in the market [14], but most of them are expensive [12]. The devices mentioned earlier are not based on IoT. Some of them show values, but it is cumbersome to obtain measurements from different devices. Therefore, in Bangladesh, it is difficult fora doctor to obtain updates from all patients at once. Thereis a demand

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for rapid monitoring of COVID-19 patients with serious symptoms. With the help of technology, it is possible for patients to receive COVID-19 treatment from home using their mobile phones [15]. This system helps patients with fever, low oxygen saturation, and an increasing or decreasing pulse rate. A person's pulse rate depends on their age, body size, heart health, and emotional stability [16]. The oxygen saturation and pulse rate are related because when a patient's oxygen level falls, their pulse rate increases. The IoT-based smart healthcare system is a real-time patient monitoring system, which has significantly aided the healthcare industry [17]. Recently, IoT-based smart healthcare devices have gained increased attention from a research perspective. The development of smart healthcare monitoring systems in an IoT environment is provided in the reviewed literature [18]. In this study, we used an Android-based pulse-monitoring system with a temperature sensor, a SpO2 sensor, and a heart rate sensor. In [19], the SpO2 measurement sensor was not used, and they shared the measured data on the internet. An IoT-based lung function monitoring system for asthma patients was proposed in [20], in which the temperature, SpO2, and pulse rate were not involved. Arduino, Android, and microcontroller-based heart rate monitoring systems have been proposed in [21, 22]. The system in [23] is based on the Arduino Uno and cloud computing, in which only a hardware prototype was produced. However, there are no real-world testing data available. In [24], a mobile application-based heart rate monitoring device was demonstrated. The patient's pulse rate was measured using a pulse rate sensor in this system, and the data were analyzed using Arduino. The measured information was delivered to the Android application. In the investigation, the number of sensors used was limited [24]. Different authors have presented different IoT-based wireless health-monitoring systems. However, presumably, IoT-based smart systems for measuring temperature, heart rate, and SpO2 for COVID-19 patients in one device have not been presented so far.

The main objective of this research is to develop and implement a novel IoT-based smart health monitoring system for COVID-19 patients based on human body temperature, pulse, and SpO2.The system can display measured human body temperature, oxygen saturation level, and pulse rate through a mobile application, which has been developed so that the patient can seek medical attention even if the specialist is physically unavailable. To treat a COVID-19 patient, a doctor requires the patient's oxygen saturation level and pulse rate. By using our proposed system, patients can inform doctors about their health conditions. This device can benefit COVID-19 patients as well

as those suffering from other diseases, such as chronic obstructive pulmonary disease (COPD) and asthma. In 2005, COPD caused 5% of total deaths worldwide and could be a worldwide open health concern in the future [25]. Therefore, this system could be beneficial for such patients. If a patient's oxygen saturation and pulse rate is abnormal, the system immediately produces a buzz to alert the patient. Therefore, through a mobile application, patients can analyze the measured oxygen saturation level, pulse rate, and body temperature to avoid critical health conditions. This system was tested on five human test subjects. The patient and doctor can read the data throughout the day by using the mobile application. This system also has the ability to measure body temperature, which has not been included in any other research.

Existing common technological indices would support existing and well-tested prediction models significantly.

III. EXISTING SYSTEM

Hence the architecture module diagram simply explains how the system works as a whole by depicting the workflow of the system right from the start where the sensors record data, all the way to the very end where the data can be seen on the specified website. The following modules work as individual modules following the chain of events for the efficient working of the system (Warsi GG, etal., 2019). Sensor reading module: It basically consists of intricate sensors such as MAX30100 and MLX90614 that are capable of recording various vitals of the user such as heart rate, temperature and SpO2 levels which in turn are forwarded to the microcontroller.

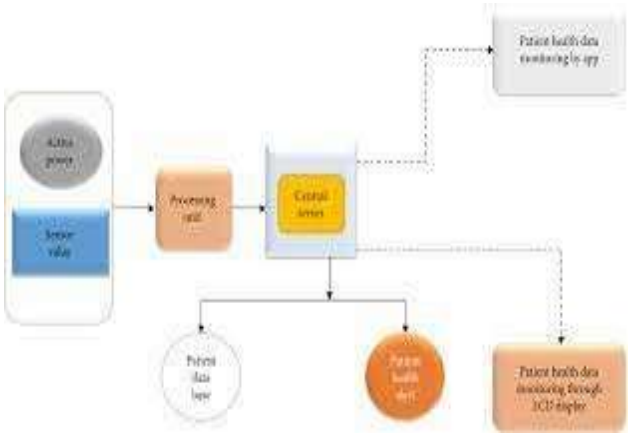

Fig 1: Existing Model Architecture. Source: Samarth (2019)

Microcontroller module: It is the Arduino UNO microcontroller that basically acts as the brain of the system as it collects all the data and pushes it to the Wi-Fi module. Wi-Fi module: It is the Nodemcu version 1.0 and it is responsible for fetching the data from the microcontroller and posting it to a dedicated cloud server each time a reading is made.

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IV. METHODOLOGY

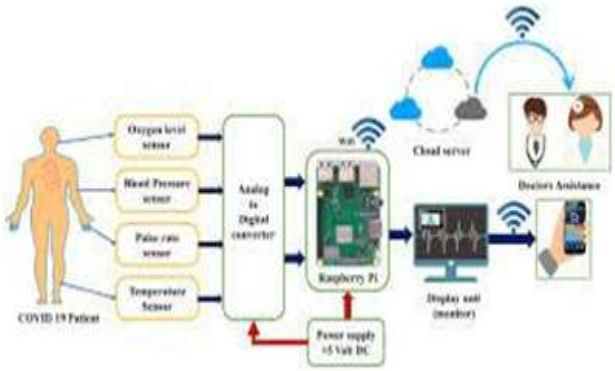

Fig 2: Proposed Architecture

When it involves temperature sensing, there are several variants of Arduino-based solutions. In, Arduino was used for real-time temperature visualization using MATLAB. However, the used sensor doesn't allow contactless temperature sensing. Moreover, in, the identical system incorporating the usage of smart phones for remote temperature monitoring using Arduino Uno was presented. The system architecture presented during this paper is inspired by our previous work on remote smart grid monitoring anomaly, power consumption monitoring and relay protection using IoT devices (smartphones and Arduino Uno) and video telecom system counting on Raspberry Pi single- board computers and Edge servers. Our main goal is to produce a comprehensive solution for COVID-19 safety monitoring which relies on IoT devices the foremost amount as possible soon be affordable at the identical time.

V. RESULT AND DISCUSSION

In a similar way as mask detection algorithm, each camera frame is converted to a gray scale image. Furthermore, body detection is applied. If over one physical structure is detected, the gap between each two persons is calculated and compared against a given threshold distance thresholdd, given in meters. However, all distances should be normalized reckoning on the camera characteristics and object position before comparison. The mapping of pixels to planet distances in meters is performed with reference to formula

VI. CONCLUSION

According to the achieved results, the proposed solution is usable for its purpose under certain performance limitations (such as number of processed frames or measurements per second). Moreover, it relies on both open hardware and free software, being definite and desirable advantage for such systems. In future, it's planned to experiment with various deep learning and computer vision frameworks for object detection on Raspberry Pi so on attain higher frame rate. Moreover, we'd like better to extend this solution with environment sensing mechanisms for adaptive building air-con and ventilation airborne protection so on cut back the spread of corona virus indoors [4, 8, 24], especially during summer. Finally, the ultimate word goal is to integrate the system presented during this paper with our framework for efficient resource planning during pandemic crisis [25] so on enable efficient security personnel scheduling and mask allocation, together with risk assessment supported statistics about respecting the protection guidelines and air quality.

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