COVID-19 POST-PANDEMIC LIFE SAVING AID: ANIOT-BASED SYSTEMF OR AUTOMATED HEALTH MONITORING AND TRACKING SYSTEM

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Abstract- In the early months of the COVID-19pandemic with no designated cure orvaccine,theonlywaytobreaktheinfectionchainiss elf-isolationandmaintainingthephysicaldistancing.Inth issystem,wepresentapotentialapplication of the Internet of Things(IoT)inhealthcareandphysicaldistancemonit oringforpandemicsituations.Theproposedframewo rkconsistsoftwoparts:alightweightandlow-costIoTnode,asmartphoneapplication (app). The IoT node trackshealthparameters,includingheartrate,PPG (photoplethysmogram) and GPSlocation, then updates the smartphoneapptodisplaytheuserhealthconditions.

Index Terms:COVID-19, Earlyidentificationorprediction, Internetof Things, Real-time monitoring

I. INTRODUCTION

TheCoronavirusDisease2019(COVID-19)firstrecognizedinDecember 2019 in Wuhan, China, isthe latest respiratory disease pandemiccurrentlyplaguingglobalhealth.Ithasbeen shown to be caused by a novelcoronavirus, severe acute respiratorysyndrome coronavirus-2 (SARS-CoV-2), that is structurally related to thevirusthatcausesSARS.Lietal.definedasuspecte dCOVID-19caseaspneumonia that matched the followingfour criteria: (1) fever, with or withoutarecordedtemperature;(2)radiographicevi denceofpneumonia;(3) low or normal white-cell count orlowlymphocytecount;andnoreductioninsympto msafterantimicrobial treatment for 3 days (1).Asitsnamesuggests,theleadingcauseof fatality from COVID-19 is hypoxicrespiratoryfailure(2–4).COVID-19hasposedsignificantchallengesforthe medical and civilian communitiesanalogoustowhatwasexperiencedint wo preceding instances of the SARS-CoV virus outbreak in 2002 and 2003andtheMiddleEastRespiratorySyndrome (MERS) in 2012 (1, 5, 6).Importantly,Lietal.studied425patients with confirmed COVID-19 inWuhanandestimatedthatthe basicreproduction number (R_0) for SARS-CoV-2, at the time, to be

2.2 (1). Thissuggests that each infected person, onaverage, can spread the infection to anaverage of 2.2 other people. The viruswill likely continue to spread unlessthisnumberfallsbelow1.0(5).Moreover,timelyandeffectivecontainmentstrategieshavebeenacornerstoneofmanagingtheCOVID-19outbreakandreducingviraltransmission.ReturntoDailyLivingPost-COVID-19:FromTestingtoDigitalHealthImplementation. Mostplans for recovery and the return to"normal," every-day life are centeredon testing—namely determining thosewho currently have an infection andthose who have developed antibodiesagainstthevirus,indicatingapossiblerecovery. With any test, there may befalse positive or false negative results(7). Of note, an antibody test, whileusefulin quantifyingthe numberofcasesthathaveoccurredinapopulation,istypicallynotsuitablefor *early* diseasedetectionanditsassociation with immunity to the virushasbeenputintoquestion(8).Additionally,thereisconsiderablecross-reactivitybetweenSARS-CoV-2andfourothercoronaviruses,includingthoseassociatedwiththecommoncold(9). Polymerase chainreaction (PCR)-based tests are highlysensitive and specific in the laboratorysetting;however,highcostsandlimitedavailabilitymakethesetestsdifficulttosuitpopulationhealthneeds. In the face of a pandemic, timeis of the essence and researchers mustthink of new ways to improve diseasediagnosisandmonitoringofdiseaseprogression.

II. LITERATUREREVIEW

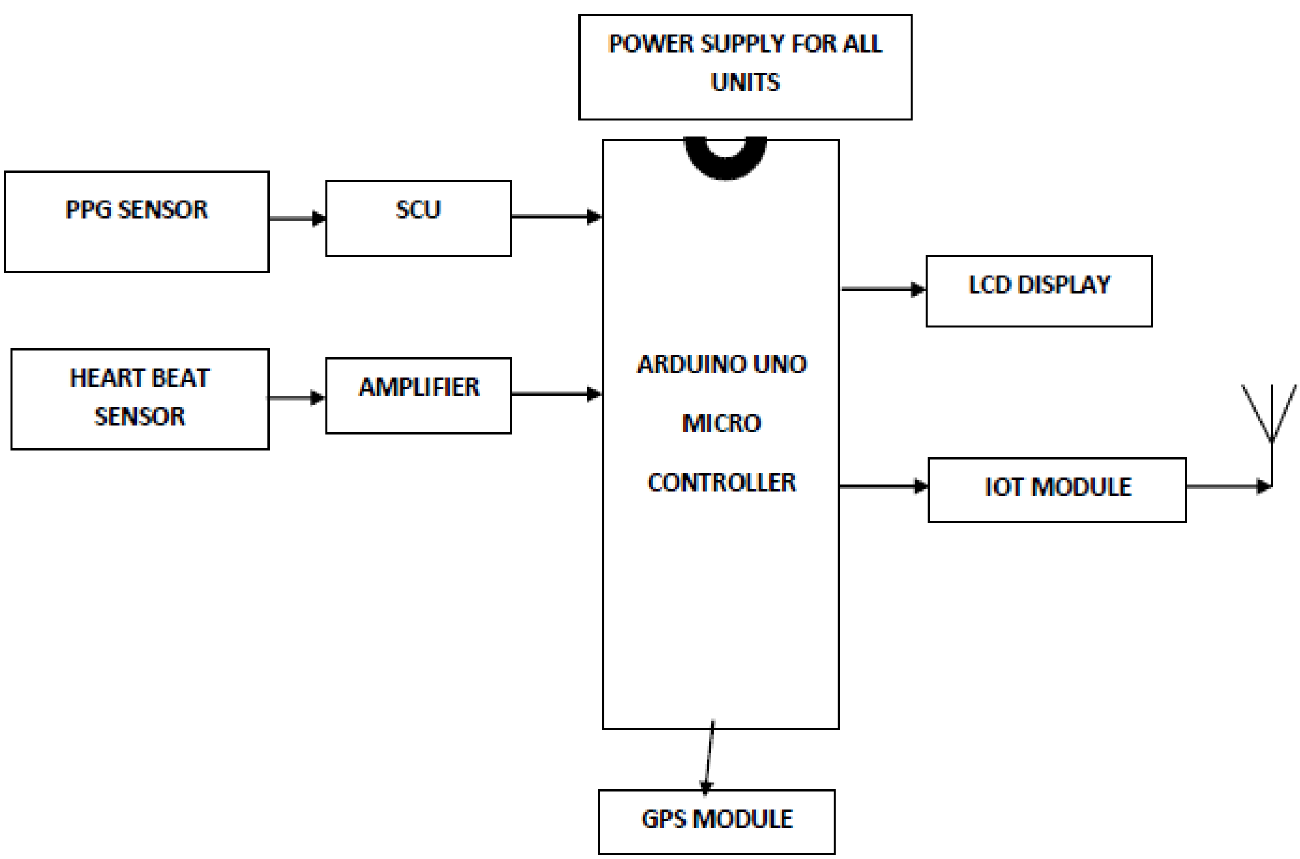
Thereisconsiderableworkintheliteratureregardingtheuseofthe InternetofThings(IoT)todeliverhealth services. Usak et al. conducteda systematic literature review of theuseofIoTinhealthcaresystems.Thatwork also included a discussion of themainchallengesofusingIoTtodeliverhealth services, and a classification ofthereviewedworkintheliterature[8].Wu et al. proposed a hybrid IoT safetyandhealthmonitoringsystem.Thegoal was to improve outdoor safety.The system consists of two layers: oneis used to collect user data, and theother to aggregate the collected dataovertheInternet.Wearabledeviceswere used to collect safety indicatorsfromthesurroundingenvironment,and healthsignsfromtheuser[9].Hamidi studied authentication of IoTsmarthealthdatatoensureprivacyandsecurity ofhealthinformation.Theworkproposedabiometric-basedauthenticationtechnology[10].RathandPattanayakproposedasmarthealthcarehospitalinurbanareasusingIoTdevices,inspiredbytheliterature.Issuessuchassafety,securityandtimelytreatment ofpatientsinVANETzonewerediscussed.

Evaluation of the proposedsystemwasconductedusingsimulators such as NS2 and NetSim[11].Darwishetal.proposedaCloudIoT-Healthparadigm,whichintegratescloudcomputingwithIoTinthe health area, based on the relevantliterature.Thepaperpresentedthechallenges of integration, as well asnew trends in CloudIoT-Health. Thesechallengesareclassifiedatthreelevels:technology,communicationand networking, and intelligence [12].Zhong and Li studied the monitoringofcollegestudentsduringtheirphysical activities. The paper focusedonaPhysicalActivityRecognitionandMonitoring(PARM)model,whichinvolves data pre-processing. Severalclassifiers,suchasdecisiontree,neuralnetworks,andSVM,weretestedanddiscussed[13].DinandPaulproposedanIoT-basedsmarthealthmonitoringandmanagementarchitecture.Thearchitectureiscomposedofthreelayers:(1)datagenerationfrombattery-operatedmedicalsensorsandprocessing,(2)Hadoopprocessing,and(3)applicationlayers.Becauseofthelimited capacity of batteries to powerthesensors,theworkemployedanenergy-harvestingapproachusingpiezoelectric devicesattached to thehumanbody[14].Otoometal.developed an IoT-based prototype forreal-timebloodsugarcontrol.ARIMAandMarkov-basedstatisticalmodelswereusedtodeterminethe appropriateinsulindose[21].Alshraidehetal.proposedanIoT-basedsystemforCardiovascularDiseasedetection.Several machine learning algorithmswereusedforCVDdetection[22].NguyenpresentedasurveyofArtificialintelligence(AI)methodsbeingusedintheresearchofCOVID-19.Thisworkclassifiedthesemethodsinto several categories, including theuseofIoT[15].Maghdidproposedtheuseofsensorsavailableonsmartphonestocollecthealthdata,suchastemperature[16].RaoandVazquez proposed the use of machinelearningalgorithmstoidentifypossibleCOVID-19cases.Thelearningisdoneoncollecteddatafrom the user through web survey accessedfromsmartphones[17].AllamandJones discussed the need to developstandardprotocolstoshareinformationbetweensmartcitiesinpandemics, motivated by the outbreakofCOVID-19.Forinstance,AImethodscanbeappliedtodatacollectedfromthermalcamerasinstalledinsmartcities,toidentifypossibleCOVID-19cases[18].Fatimaet al. proposed an IoT-based approachtoidentifycoronaviruscases.Theapproachisbasedonafuzzyinferencesystem [19]. Peeri et al. conducted acomparisonbetweenMERS,SARS,andCOVID-19,usingtheavailableliterature.Theysuggestedth euseofIoTinmappingthespreadoftheinfection [20]. To our knowledge, noonehasdevelopedacompleteframework for using IoT technologyfortheidentificationandmonitoringof COVID-19.

III. PROPOSEDSYSTEM

In our system various sensors are usednamely PPG sensor, spo2 Weareusingarduinocontroller.Itisusedforcontrolling and monitoring the entireunit.Itissuppliedby5vDCsupply.LCDisusedtodisplaytherequiredparametersofcovidpatients andbuzzerisusedforalertifthesituationisabnormal. Alltheinformations will be updated throughIoT.Sothatwecanmonitorthepatientsby24*7periodoftime.

sensor.Theheartbeatsensorisusedtomeasuretheheartbeatofthecovidpatient.Therespiration sensor is used to measurethe respiration level if it is abnormal itwill turn on the nebulizer pump foroxygen supply.Temperature sensor isusedtomeasurethebodytemperature.Spo2sensorisusedtomeasuretheoxygencontentintheblood and if the oxygen content is lessit will turn on the relay drive circuit for oxygen supply.



IV. RESULT

INITIALIZINGPULSEOXIMETER

CHECK YOURHEART BEATANDSPO2 LEVEL

YOURHBISBELOW80 UARENORMAL

YOURHEARTBEATISABOVE80 YOUAREABNORMAL

IF YOU ARE ABNORMAL YOUR LOCATION SHOULD BE TAKING BY GPS

YOUR LOCATION'S LATITUDE AND LONGITUDE VALUESENTTO HEALTHCAREDEPARTMENTTHROUGHCAYENNEAPPLICATION

V. CONCLUSION

IoTimplementationimpactsonreducing healthcare cost and improvetreatmentoutcomeoftheinfectedpatient. Therefore, this present studybasedresearchisattemptedtoexplore,discuss ,andhighlighttheoverallapplicationsofthewell-provenIoTphilosophy by offering a perspectiveroadmaptotackletheCOVID-19pandemic. IoT provides an extensiveintegratednetworkforhealthcaretofight with COVID-19pandemic.All medical devices are connected totheinternet,andduringanycriticalsituation, itautomatically conveysamessage to the medical staff. Infectedcasescanbehandledappropriatelyinaremotelocationwithwell-connectedtele-devices.Ithandlesallcasessmartlytoprovideultimatelystrengthened service to the patient andhealthcare.IoTseemstobeanexcellent way to screen the infectedpatient. In healthcare, this technologyishelpfultomaintainqualitysupervision with real-timeinformation.By using a statistical-based method,IoTgetshelpfultopredictanupcomingsituationofthisdisease.Withproperimplementationofthistechnology,researcher,doctors,government,academicianscancreateabetter environment to fight with thisdisease.

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