POINT-OF-CARE KIDNEY FUNCTION HEALTH MONITORING SYSTEM

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ABSTRACT

In conjunction with health technologies, point-of-care testing (POCT), which is carriedout at the patient's home, presents a plethora of opportunities for the creation of individualized, empowering clinical pathways. An ideal patient group for such initiatives is the non-dialysis- dependent chronic kidney disease (CKD) patient who is at risk for or already suffers from a number of CKD-associated complications. The flow Covid sickness pandemic and drive towards safeguarding weak people have additionally featured the requirement for home testingpathways. We present the evidence for remote patient management and the various POCT- specific technologies in this narrative review. Then, we look at the devices that patients can use at home in five important areas of renal medicine: biochemical, anemia, monitoring of blood pressure (BP), anticoagulation, anddiabetes Home POCT is currently supported by few devices and little evidence in CKD. Whilehome testing in BP, anticoagulation and diabetes checking is somewhat advanced, the fields of sickliness and biochemical POCT are still in their earliest stages. However, both patients' and physicians' perceptions of eHealth and home POCT are consistently favorable. The administrative and translational difficulties engaged with the improvement of new locally established care pathways are critical.

To provide these novel new pathways that our patients desire and deserve, pragmatic and adaptable trials using a hybrid effectiveness– implementation design as well as ongoing technological advancements in POCT devices are required.

1. INTRODUCTION

In healthcare, "point-of-care testing" (POCT) is the analysis of patient samples near or beside the patient. There are three applications for POCT: by the patient in their own home, by an HCP in the patient'shome, or by an HCP in a healthcare setting.In the first two settings, POCT is used to speed up the decision-making process(primarily in emergency/acute medicine,where it is used to speed up the decision- making process). POCT has been demonstrated to be effective in this regard, at least in the emergency room and ambulatory care clinic. However, meaningful changes for patients do not consistently result from process enhancements in healthcare; The effects of incorporating POCT into a clinical procedure can be complicated and frequently do not receive adequate follow-up evaluation. The horizon scanning reports provide a summary of thesignificance of the technology, go over the most recent evidence, and evaluate whetheror not it could be implemented in the NHS,as well as the prerequisites for doing so. Inorder to facilitate adoption and identify additional research requirements, thesereports are freely accessible and distributed to the NIHR Health Technology Assessment Programmed (HTA), the National Institute for Health and Clinical Excellence (NICE), and commissioners of health care services. Contrast-enhanced computed tomography imaging may increase the risk of post-contrast acute kidney injury in patients with low estimated glomerular filtration

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rates. For patients referred without a recent estimated glomerular filtration rate result, point-of- care devices make it possible to quickly measure estimated glomerular filtration rates. Kidney failure is one of the human diseases that can be identified by the presence of a high concentration of ammonia (NH3) in human breath.

2. LITERATURE REVIEW

V.Tripathi and F.Shakeel, "Monitoring Health Care System Using Internet of Things - An Immaculate Pairing," 2017 International Conference on Next Generation Computing and Information Systems (ICNGCIS), 2017, pp.153-158,doi:10.1109/ICNGCIS.2017. 26.

XBee modules are embedded solutions that provide wireless communication standardswith self-healing mesh networks. The have a longer range than Bluetooth and useless power than Wi-Fi, making them one of the common wireless communication modules. nRF24L01+ radio modules, which are highly integrated, ultra-low- power (ULP) 2Mbps RF transceiver ICs forthe 2.4GHz ISM (Industrial, Scientific, andMedical) band, are an alternative to the XBee radio modules. A group of nodes that connect in an AD-HOC fashion without requiring a permanent or overseeing infrastructure is referred to as a wireless ad-hoc network. Surveillance, widespread environmental sampling, security, and health monitoring all make use of wireless ad hoc sensor networks. They find specific applications in situationswhere foundation based networks won't bequickly conveyed, because of requirementsof the climate; terrain, or locations where the network infrastructure that is already inplace cannot be quickly deployed, particularly if the nodes are mobile. Ad-hocnetwork solutions are typically served by Bluetooth and ZigBee technologies. Other technologies offer a limited range but can be utilized in conjunction with these, particularly in applications for the Internet of Things. Albeit very hearty, the Zig honey bee modules are likewise costly when contrasted and different principleslike Bluetooth, RFID**.**

Z. Rebolledo-Nandi, A. Chávez-Olivera,R. E. Cuevas-Valencia, A. Alarcón-Paredes and G. A. Alonso, "Design of a versatile low cost mobile health care monitoring system using an android application," 2015 Pan American Health Care Exchanges (PAHCE), 2015, pp.1-4,doi:10.1109/PAHCE.2015.7173334

This "network of networks of autonomous objects" is becoming a reality thanks to a robust cloud computing strategy and a seamless integration of sensors andactuators with the environment. The Internet of Things (IoT) is extending its reach into a wide range of industries, smart cities, and smart wearables. Gartner Inc. claims that the installed units will be part ofthe IOT. Smart health care, smartwearables, smart security solutions, and so on. Are popular IOT applications, and in thenear future, expect to see its use in smart power grids or a city's transportation system. This approach discusses the IOT's effects on our day-to-day lives and provides a concise overview of various IOT trends. In the context of the Internet of Things, it also discusses the significance of autonomous control, artificial intelligence,and cloud computing. Finally, it concludeswith the requirement for Internet synchronization, wireless sensors and actuators, and distributed computing in order to successfully enable IOT technologies. The Internet of Things, orIOT, is a network of physical object networks that can include, but are not limited to, health monitoring devices, buildings, construction equipment, andvehicles. To accomplish its goal, such a network would make use of electronic devices like sensors and actuators: exchange and update information, and as aresult, negotiate, in order to ensure that the system as a whole performs at its best. In his discourse, that's what he expressed "TheWeb of Things, or IOT, is the reconciliation of individuals, cycles and innovation with connectable gadgets and sensors to empower remote observing, status, control,and assessment of patterns of such gadgets". The Auto-ID Centre at MIT helped spread awareness of the IOT concept. One of the Auto-ID Center's founders, Kevin Ashton, once thought thatradio- frequency identification (RFID) was necessary for the IOT because it allowed for the tagging of everyday objects

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with identifiers so that a computer could manageand inventory them..

M. A. Kumar and Y. R. Sekhar, "Android based health care monitoring system," 2015 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), 2015, pp. 1-5, doi: 10.1109/ICIIECS.2015.7192877

Our information society is undergoing a radical transformation as a result of theproliferation of mobile computing and communication devices. Network connections and the data services that go along with them are without a doubt the services that mobile users demand the mostout of all the applications and services thatare run by mobile devices. A MANET is ideal for the current situation because it is an infrastructure-free, continuously reconfigurable network of mobile devices connected without wires. However, MANET's security is extremely vulnerable due to the absence of any centralized infrastructure and access to reputable authorities. Most of the well-known routing protocols were made for situations in whicha network's nodes are not malicious.

Numerous security threats impede themobile ad hoc network's development because of its vulnerability. We propose the"Administrator and Fidelity Based Secure Routing Protocol" (AFSR) for MANETs, which guarantees secure network routing: by choosing an Administrator node based on trustworthiness and willingness, and then only communicating with that secure Administrator node. Diverse threats are reduced as a result of this selection of secured admin nodes simulated and compared our proposed protocol for evaluation. Wireless devices that can communicate and may be mobile make up an ad hoc network, which does not require a fixed infrastructure.

U.Dhanaliya and A.Devani, "Implementation of E-health care system using web services and cloud computing," 2016 International Conference on Communication and Signal Processing (ICCSP),2016,pp.1034- 1036,doi:10.1109/ ICCSP.2016.7754306

There are a number of drawbacks with traditional wearable devices, including insufficient accuracy and long-term wear. As a result, traditional wearable health monitoring is difficult to sustain. We develop "Smart Clothing," which enables the unobtrusive collection of various physiological indicators of the humanbody, in order to obtain healthcare big data through sustainable health monitoring. Themobile healthcare cloud platform is built with mobile internet, cloud computing, and big data analytics to provide pervasive intelligence for smart clothing systems. The smart clothing system's design details, key technologies, and practical implementation strategies are presented in this method.Real-time tactile interaction, emotional care, disease diagnosis, and medical emergency response are just a few of the typical applications supported by big data clouds and smart clothing. In particular, mood monitoring and emotion detection are made possible by the electrocardiogramsignals that are collected by smart clothing. Last but not least, draw attention to some ofthe open issues and design challenges that remain unresolved in order to make smart clothing ubiquitous for a wide range ofapplications. According to a World Health Organization (WHO) report on aging and health, the issue of an aging global population is becoming increasingly serious. When it comes to the ever-increasing number of elderly people, the situation is worse in Asian nations. Forinstance, the proportion of Japan's elderly population has surpassed.

S. Pawar and H. R. Deshmukh, "A Survery on e-Health Care Monitoring for Heart Care Using IOT," 2018 International Conference on Inventive Research in Computing Applications (ICIRCA), 2018, pp. 1043-1046, doi: 10.1109/ICIRCA.2018.8597320.

The next generation of healthcare has benefited greatly from the promising potential of the emerging Internet of Things (IOT) technologies for connecting medicaldevices and sensors. A real-time health monitoring infrastructure for analyzing patient healthcare data and preventing preventable deaths is urgently required dueto the rising number of elderly and disabled individuals. For the implementation of such monitoring, Healthcare Industrial IOT (Healthy

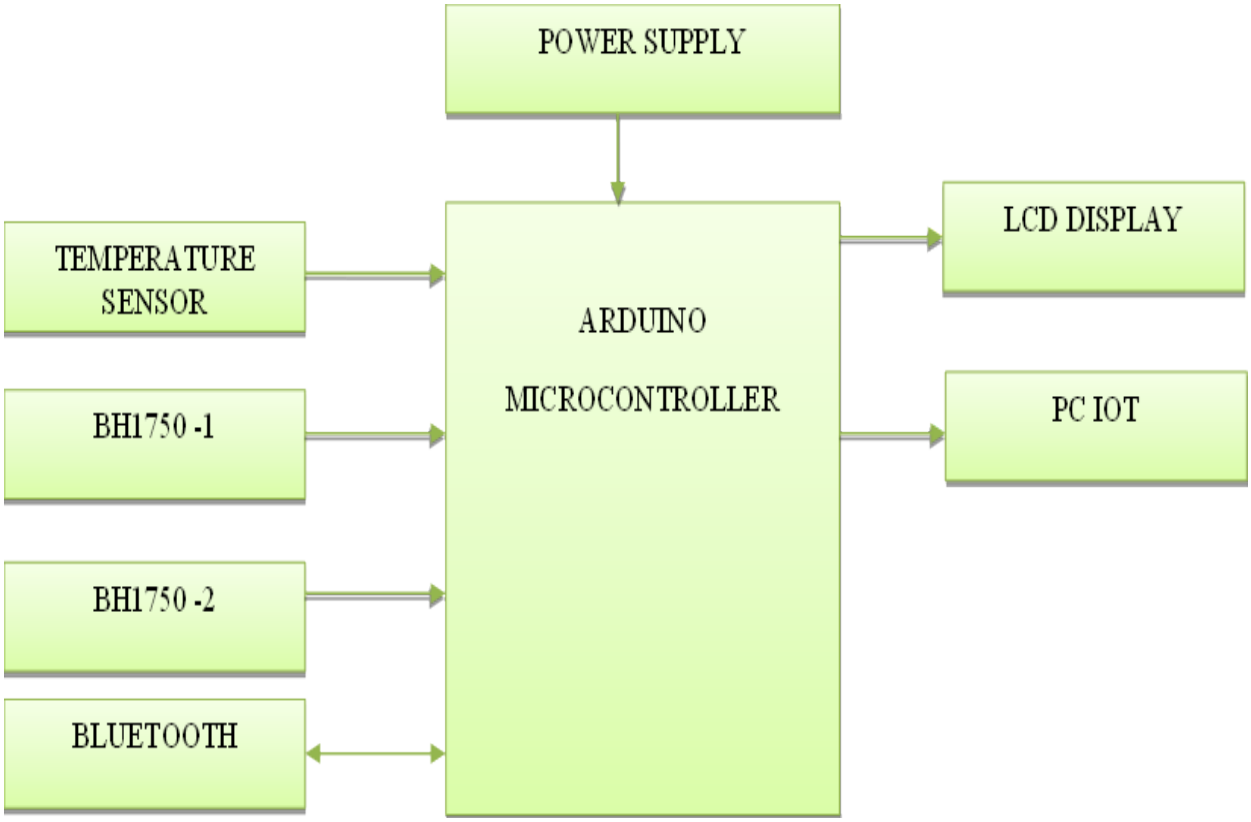
IOT) has significant potential. In order to monitor, track, and store patients' healthcare information for ongoing care, healthy IOT is a combination of communication technologies,interconnected apps, Things (devices and sensors), and people that would function together as one smart system.This is a Healthy IOT-enabledmonitoring method in which mobile devices and sensors collect ECG and other healthcare data and securely send it to the cloud for healthcare professionals to easily access. Healthcare professionals will use signal enhancement, watermarking, and other related analytics to prevent identity theft and clinical error. Today, we are witnessing the increased use of smart devices and communication apps in healthcare monitoring, as well as their influence on the activities of healthcareprofessionals (doctors, nurses, and hospitaladministrators).

3. EXISTING SYSTEM

In the design of a Zig-Bee-based wireless sensor network using the current method. The most basic means of treating and preventing most diseases are medications. With the right medication, many dangerousdiseases can be cured or avoided. The primary goal of our proposed system is to create a design that is easy to use and can be used by patients as a reminder to take their medications on time. The heart rate can be tracked with a wearable device. Theuser is notified via vibration to take the prescribed medication whenever there are unambiguous changes.

4. PROPOSED SYSTEM

Ammonia concentrations of Normal persons and CKD patients were observed. The candidates without CKD has lower breath ammonia concentrations what's more, applicants with CKD has higher breath smelling salts fixations. As a result, breath ammonia analysis can accurately and effectively diagnose kidney failure. Medical professionals can use breath ammonia analysis to accurately diagnose kidney failure and provide CKD patients with treatment. The boundaries of the sensors were utilized in this model were given to Arduino UNO. The received inputs were sent to the server after being continuously analyzed by the Arduino UNO. After receiving emergency information about the patient, physicians will act promptly and may be able to save the patient's life. The message is then transmitted to their concerned doctor via IOT using serial USB communication



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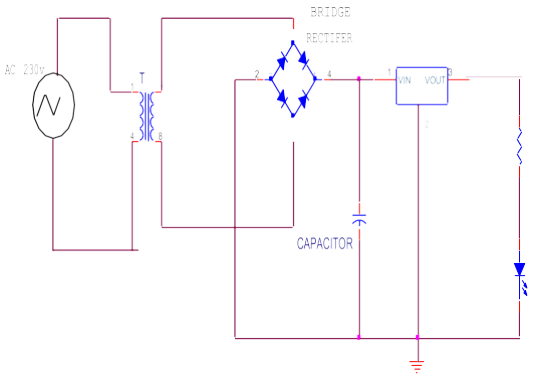
POWER SUPPLY

Due to economic considerations, electrical power is almost exclusively generated, transmitted, and distributed in the form of AC. However, DC supply is required for the operation of the majority of electronic devices and circuits. For this purpose, dry cells and batteries can be utilized. They are portable and free of ripples, but their voltages are low, they need to be replaced frequently, and they cost more than traditional DC power supplies. A circuit that converts ac supply into dc supply is now included in nearly all electronic devices. The DC power supply is the component of the equipment that converts ac to dc. A power transformer is typically found at the power supply's input. A voltage regulator circuit, a smoothing filter, and a rectifier (a diode circuit) come next.

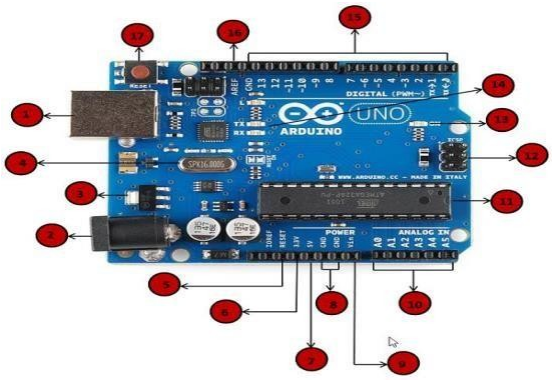
The basic power supply is shown in the block diagram as a combination of four components: a transformer, a rectifier, a filter, and a regulator. A constant dc voltage is applied to the load through the DC power supply's output. Let's quickly talk about what each component of the dc power supply does. Depending on the requirements of the solid-state electronic devices and circuits that need to be supplied by the dc power supply, the transformer is utilized to step up or step down (typically to step down) the supply voltage. It can isolate you from the supply line, which is important for safety. Internal shielding may also be included to keep unwanted electrical noise signals from the power line out of the power supply and out of the load.



ARDUINO CONTROLLER PIN

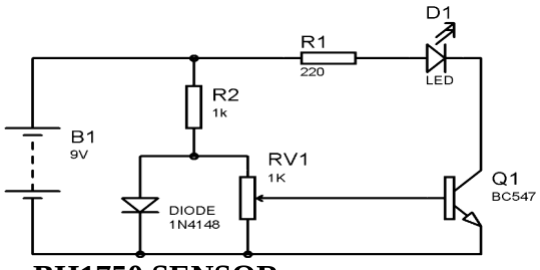
DIAGRAM DESCRIPTION

We will gain knowledge of the various Arduino board components through this approach. We'll focus on the Arduino UNO board because it's the most widely used Arduino board. Additionally, it is the best board for beginning coding and electronics. Although some boards differ from the ones listed below, the majority of Arduinos share most of these components.



TEMPERATURE SENSOR

Temperature sensors of this kind range from simple ON/OFF thermostats that control a home's hot water heating system to highly sensitive semiconductors that can control furnace plants with complex process control. We learned in our science classes that the motion of molecules and atoms generates heat (kinetic energy), and that the more they move, the more heat is produced. Temperature sensors enable us to "sense" or detect any physical change in that temperature by measuring the amount of heat energy or even coldness that is generated by an object or system and producing either an analog or digitaloutput. There are a lot of different kinds of temperature sensors out there, and each one has its own set of characteristics that change depending on the situation.



BH1750 SENSOR

This is the BH1750 16-bit Encompassing Light sensor from Rohm. Sensing the amount of light in an environment is a common starting point for learning to work with microcontrollers and sensors due to its significance to humans and most other living things. Should we dim our

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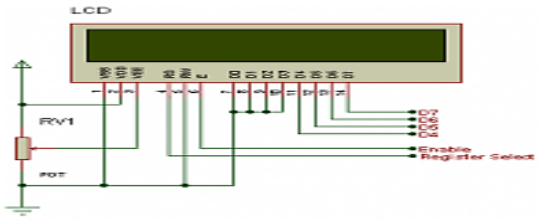
display to conserve power or increase its brightness? Which course should your robot move to remain in a space with themost light? Is it night or day? These inquiries can be addressed with the assistance of the BH1750. It is a light sensor that you can incorporate into your next project to add the detection and measurement of light. It is small, capable, and inexpensive. The BH1750 is one of those sensors that comes in a small package as is typical. This handy light sensing friend, which is about the size of a grain of rice, needs some help to be used by people who are experimenting but don't want to or have the tools to work with surfacemount parts. We are here to assist! The BH1750 is included with a voltage regulator and level shifting circuitry so that it can be used with 3.3V devices like a Feather M4 or 5V devices like an Arduino. It is packaged on a PCB in our Stemma QT form factor. The PCB that the sensor is packaged on breaks out all of the pins to a standard 0.1 inch/2.54mm pitch header rather than working with the tiny contacts on the sensor.

LCD

The supplied voltage reading is displayed on the LCD. The application name is displayed in the initial messages that flash when the project is powered on. The street light's voltage is shown on the LCD screen after the controller sketch initializes the circuit. By connecting the 16X2 LCD's data pins to the controller board's pins 3 to 6, the LCD is connected to the board. The LCD's RS and E pins are connected, respectively, to the Micro Controller's pins 13 and 12. The LCD's RW pin is grounded.



5. CONCLUSION

For real-time monitoring of the protein to creatinine ratio in human urine, we describe the design and development of a POCT device that is portable, quick, dependable, and inexpensive. The device's operation is based on a pair of reagent-coated paper sensors that change color intensity in response to changes in total protein and creatinine concentrations in human urine. The creatinine sensor's paper was coated with alkaline picrate solution, resulting in a lemon-yellow coloration, while the total

protein sensor's paper was coated with a mixture of alcoholic bromophenol blue and citric buffer, resulting in a chrome-yellow color. In the emergency department, acute medical unit, or critical care setting, where immediate treatment decisions must be made, point-of-care (PoC) kidney function testing is an appealing method for providing a quick result. The digitaloutput from sensor module shows the presence or absenceof smelling salts gas. When measuring the concentration of ammonia in parts per million (ppm), the analog output is more accurate. In Arduino UNO, threshold levels can be set to distinguish between the normal person and CKD patients. The ammonia level is below 1.2 ppm in a healthy person, and it is between 1.2 and 6.5 ppm in a CKD patient**.**

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