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Automatic Tablet Dispenser for Patients with Health Monitoring System

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Abstract - *The main theme of this paper is to automate the tablet dispensing process for older and sick patients who can easily forget their medicine intake or mistakenly take the wrong medicine at the wrong time. This project will ensure the tablet dispensing process is carried out at the right time whenever it is required and the right tablet is dispensed to the patients with correct dosage. Additionally the health monitoring system by increasing the scalability with the power of the internet of things.*

Key Words: **Internet Of Things**,

1. INTRODUCTION TO AUTOMATIC MEDICINE DISPENSER

An automatic medicine dispenser is used usually in the area where the Alzheimer patients need assistance. In this kind of system the medicine will be automatically dispensed based on the prescribed or preprogrammed interval of time. This system of medicine dispenser will be more helpful for elder persons and the persons with different disabilities. The main threat in automatic medicine dispenser is that the medicine will be dispensed only based on the pre programmed interval of time without being analyzing the current health condition of the patient the medicine will be dispensed. This forms the major threat for the medicine consuming persons endangering their life when the patient is in really critical condition and requires the different medication, but the medicine dispense will only dispense the regular routine medicine that too in the predefined interval of time.

1.1 EXISTING SYSTEM

In the existing system, the pill dispenser is made available for dementia patients and hence the pill will be dispensed automatically for the patients in the predefined time. In this system of process, there lies the high risk in medical error since the medicine will be dispensed based on the regular interval of time. In this scenario, the patient health condition is not monitored and the medicine based on the patient health condition is not implemented.

1.2 PROPOSED SYSTEM

In the proposed system Integration of wireless sensor to measure the patient health periodically/continuously and send the data to cloud is performed. By using machine learning technique, the commands are sent to the robotic vehicle. The output of the sensor is communicated to the controller of the robot and is compared with the standard health values, if is abnormal then the robot provides medicine to the patient. The patient medication details can also be communicated to family member/doctor when it required emergency. Robotic arm is used to serve the pills.

2.1BLOCK DIAGRAM

In our project we have used NODE MCU which is the evolved IoT development board from the raw ESP8266 WIFI core chip. In this module the programming of ESP8266 is made possible without any additional external components. It has in build USB to Serially controller CH340G which supports to retrieve data from ESP8266 serially and hence it forms easy to view the data thus obtained from sensors. The power supply to the NODEMCU can be powered externally through VIN and GND pin or through the UNIVERSAL USB pin.

The sensors like PULSE sensor and temperature sensor is connected to the NODE MCU GPIO pin and ADC pins respectively. The data achieved from the pulse sensor is digital data and hence thus obtained data can read by the digital pin itself. The pulse sensor consists of one optical transmitter and one optical receiver in which the patient finger is kept. Once the patient keeps the finger in the sensor, based on the blood stream that passes through the finger, the pulse sensor gives the pulsated output which is further processed by the NODE MCU and pulse obtained from the patient body is calculated and displayed as a pulse/min.

The temperature sensor LM35 is connected to the A0 pin of NODE MCU which is the only one analog pin available in the NODE MCU. The temperature sensor used here in our project is capable of monitoring the temperature from -55 degree centigrade to 150 degree centigrade. Additionally the main choice of us to choose this type of sensor is it draws only 60 microampere for its operation and hence it produces very less heat dissipation. Finally thus obtained data from heartbeat sensor and temperature sensor is transferred to the THINKSPEAK cloud platform with the help of NODE MCU through the preconfigured SSID and PASSWORD. THINKSPEAK server we have chosen in our project mainly because of its reliability, scalability and it is an open source platform that can be accessed from anywhere in the world.

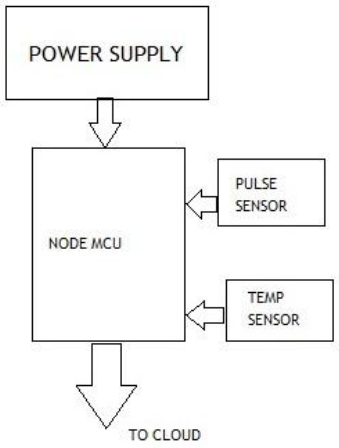

Figure 1: Data Acquisition

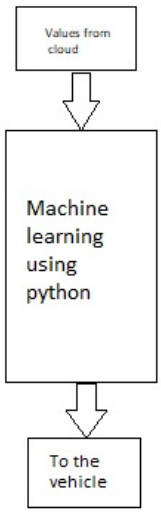

Figure 2: Machine using KNN

The second stage of our project is decision making process. Since the sensor data is made available in the cloud platform, it can be monitored, manipulated and visualized through the graphical representation with live time stamp. The machine learning algorithm is used in our project to classify and make decision when the patient has to treat with the appropriate tablet based on their health condition and the data is transferred to the robotic arm vehicle.

The third stage of our project is nothing but data retrieving from cloud storage with the help of NODE MCU and hence with the help of acquired data from the cloud platform, desired decision of tablet dispensing is made possible. Once the decision is finally made, the servo motors that has been connected to the PWM pins of NODE MCU unit is activated to dispense the tablet.

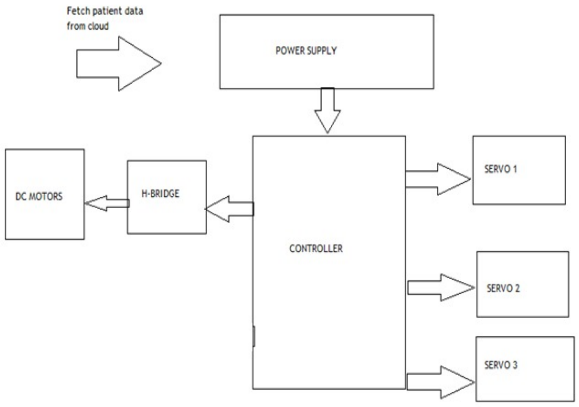

Figure 3: Robotic ARM Control System

2.2 DESIGN METHODOLOGY

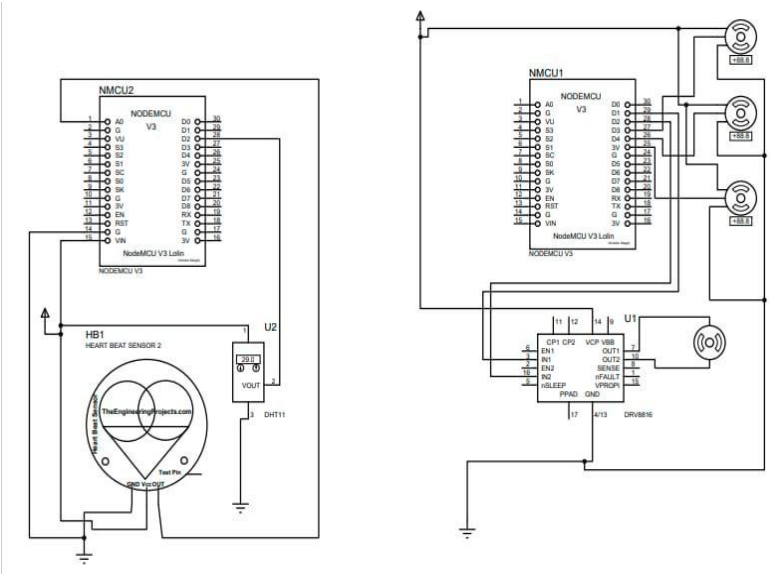

Figure 4: Circuit Diagram

The above design describes the entire circuit diagram of this project "Automatic Tablet Dispenser for Patients with Health Monitoring System". As shown in the above figure, the circuit diagram is classified into transmission and reception side. In the transmission side, the temperature sensor and the pulse sensor is connected to the NODE MCU and hence the data acquired from the sensor is sent to the cloud platform. And hence from the reception side thus acquired data from the cloud platform is decoded and based on the decision made by the machine learning algorithm in Python the appropriate tablet is dispensed to the patient with the help of three servo motors used to control the robotic arm. The H-Bridge motor driver is used in this project in order to move the robotic ARM vehicle from one place to another. H-Bridge driver is made with the help of L293D motor driver which can be able to rotate the geared DC motor of the robotic vehicle clockwise and anti-clock wise based on the input pulse given to the motor driver. One of the unique feature of this driver is breaking operation. Once the input terminal of the motor terminal is idle i.e - 0,0 or 1,1 the breaking pulse is applied to the motor preventing the robot from sliding even in the slanting surface.

2.3 FLOW CHART

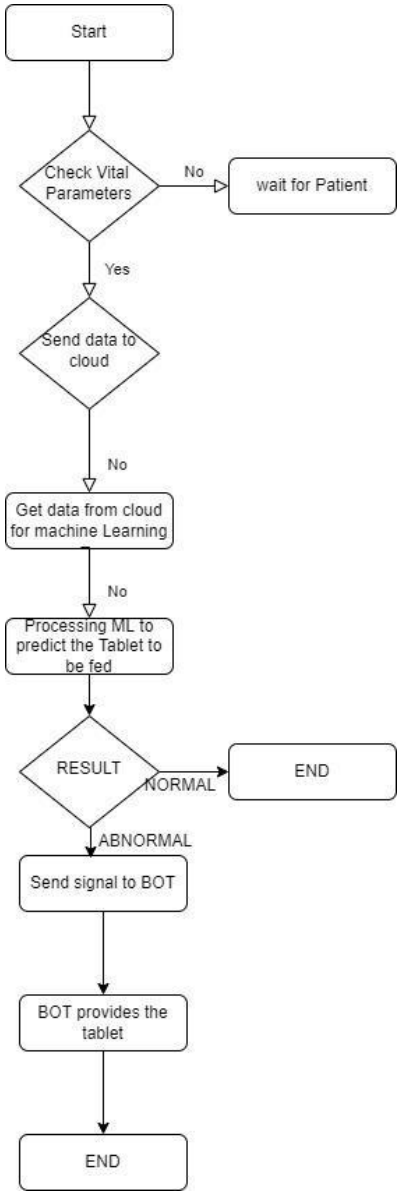

Figure 5: Flow Chart

As shown in the above figure the system gets initialized and it is described in the start block. The diamond block followed by the start block is used to check vital parameters of the patient and once the data acquired thus acquired data is sent to the cloud server. If the data is not acquired, the system will wait for the data until the data receives. Thus the data made available in the cloud server is retrieved and processed through machine learning algorithm and the result is processed which is represented by the diamond box. If the result is normal, the overall process comes to end and it is represented by the end terminal block. Once the result is found to be abnormal, the signal is sent to the robot and it is represented by the process box of flowchart, further robot will provide appropriate medicine to the patient and the process is finally terminated.

2.4 SIMULATION RESULTS

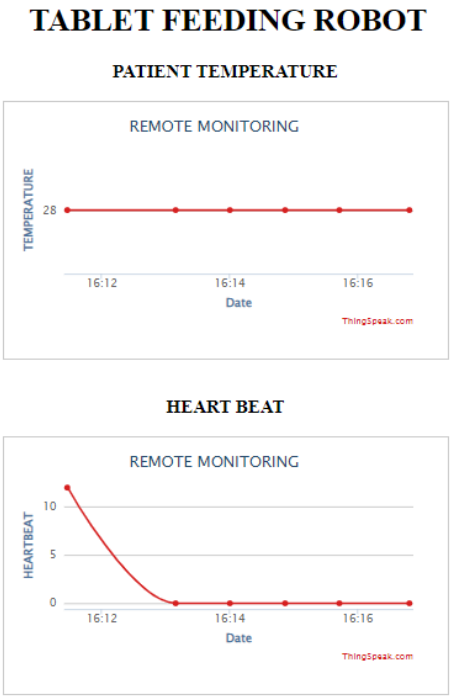

Figure 6: Simulation Result 1

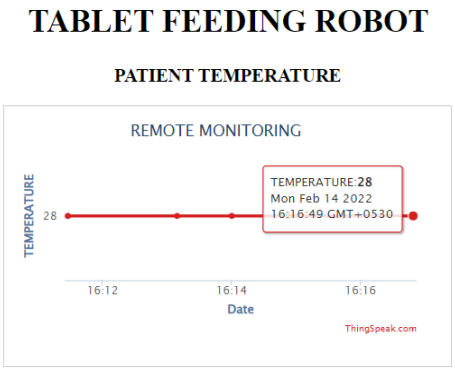

Figure 7: Simulation Result 2

The above figure(fig 6) represents the output data of the sensor from the patient body which has been displayed in the live web server. The above figure(fig 7) represents live temperature data logged to the web server which is showing the temperature value as 28 degree Celsius and along with that data date and time is displayed in the web server.

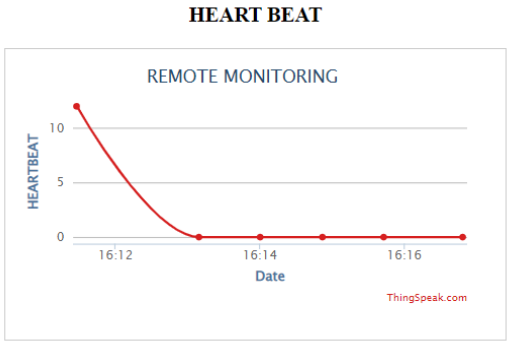

Figure 8: Simulation Result 3

The above figure represents live heartbeat data logged to the web server which is showing the heartbeat value above 15 along with that data date and time is displayed in the web server.

3. CONCLUSIONS

Thus by the help of our project, the patient vital parameter like heartbeat and temperature is continually monitored in the cloud platform and hence the patient health is analyzed through KNN machine learning algorithm and overall tablet dispensing process for the needy patient is fully automated and the desired tablet is dispensed to the patient whenever it is required by the patient automatically with the help of robotic arm. This system also prevents the manual tablet errors since entire process is carried out by the predefined set of instructions..

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