NFC Health Monitoring System

Karthik Shekar[1], Sunil Kumar Gupta[2], Shariff [3], Madhusudhan K.N.[4]

[1, 2, 3] *Students of ECE Department, B.M.S. College of Engineering, Bengaluru, Karnataka*
[4]*Assistant Professor, Department of ECE, B.M.S. College of Engineering, Bengaluru, Karnataka*

Abstract— **Elderly care is one of the many applications supported by real-time activity recognition systems. We have slightly modified the project based on suggestions of the previous examiner and replaced the RFID Card with NFC. Studies show that aged persons experience steady decline in cognitive, visual and physical functions caused by different age-related diseases. New applications are under active development to provide daily support for elderlies with different types and degrees of impairments.**

Index Terms— **NodeMCU, NFC, ThingSpeak, JSP.**

I. INTRODUCTION

In this project, we are using 4 sensors to monitor the activity of the patient. All the sensors are connected to a microcontroller called Node MCU NodeMCU is an opensource IoT platform. The Node MCU is programmed using Arduino Software. The data which is collected from the sensors is then uploaded to ThingSpeak which is an opensource IOT application and API to store and receive data. The data then can be collected from Thingspeak using a JSP application

II. PROBLEM DEFINITION

In this project, we are using 4 sensors to monitor the activity of the patient.

All the sensors are connected to a microcontroller called Node MCU

NodeMCU is an opensource IoT platform.

The Node MCU is programmed using Arduino Software.

The data which is collected from the sensors is then uploaded to ThingSpeak which is an opensource IOT application and API to store and receive data. [2]

The data then can be collected from Thingspeak using a JSP application

III. NFC

Near-field communication (NFC) is a set of communication protocols that enable two electronic devices, one of which is usually a portable device such as a smartphone, to estab-lish communication by bringing them within 4 cm (1.6 in) of each other. [3]

The NFC tags require no power.

It has a range of less than 20cm.

The bit rate is around 424 kbits/second

It's frequency is around 13.56 Mhz

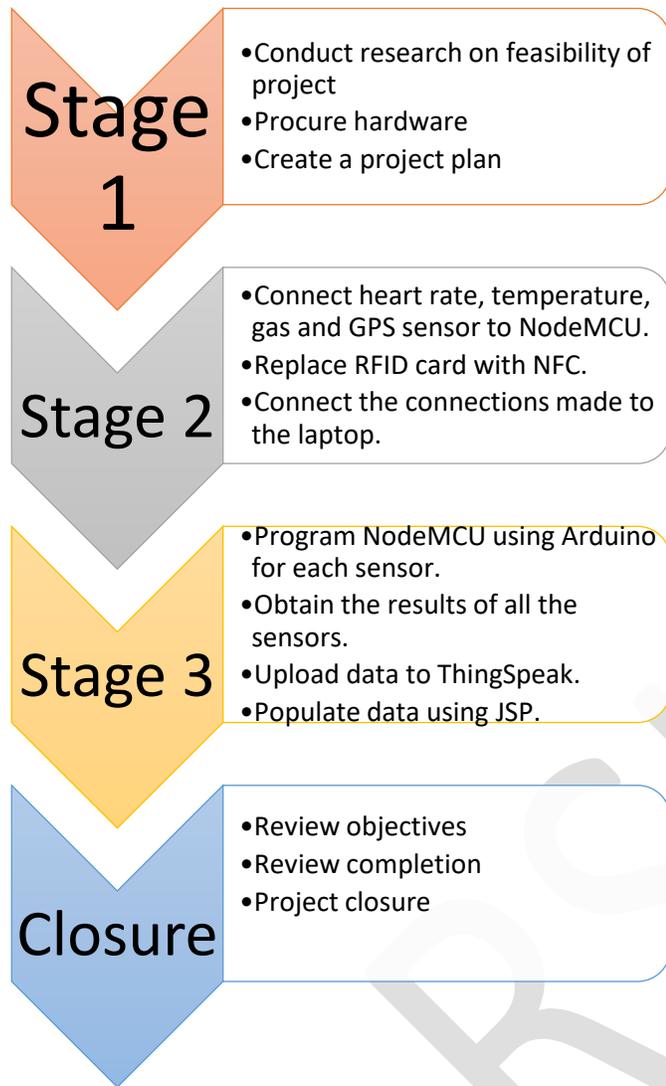The current consumption is less than 15mA.

IV. THINGSPEAK

According to its developers, ThingSpeak is an open source Internet of Things (IoT) application and API to store and retrieve data from things using the HTTP protocol over the Internet or via a Local Area Network. ThingSpeak enables the creation of sensor logging applications, location tracking applications, and a social network of things with status updates. [2]

V. PROJECT EXECUTION STEPS

- Initiation
  - ✓ Project team formation
  - ✓ Problem definition, proposed solution
- Planning
  - ✓ Hardware requirement
  - ✓ Cost calculation
  - ✓ Research on open source IoT cloud provid-ers
- Implementation
  - ✓ Programming
  - ✓ Hardware configuration
  - ✓ Testing, Re-configuration
  - ✓ Documentation
- Closure
  - ✓ Project review
  - ✓ Presentation

VI. PROJECT FLOW CHART

Stage 1
- Conduct research on feasibility of project
- Procure hardware
- Create a project plan

Stage 2
- Connect heart rate, temperature, gas and GPS sensor to NodeMCU.
- Replace RFID card with NFC.
- Connect the connections made to the laptop.

Stage 3
- Program NodeMCU using Arduino for each sensor.
- Obtain the results of all the sensors.
- Upload data to ThingSpeak.
- Populate data using JSP.

Closure
- Review objectives
- Review completion
- Project closure

VII. IMPLEMENTATION STAGE

NFC CARD

Product Specification MF RC522 is applied to the 13.56 MHz non-contact card chip.

MF RC522 takes advantage of advanced concept of modulation and demodulation, fully integrates all types of passive under 13.56 MHz contactless communication mode and protocol.

MFRC522 support MIFARE contactless communication series It has a high-speed, bidirectional data transfer rate as high as 424 kbit/s

Near-field communication (NFC) is a set of communication protocols that enable two electronic devices, one of which is usually a portable device such as a smartphone, to estab-lish communication by bringing them within 4 cm (1.6 in) of each other.

NFC devices are used in contactless payment systems, similar to those used in credit cards and electronic ticket smartcards and allow mobile payment to replace/supplement these systems. NFC is used for social networking, for sharing contacts, photos, videos or files.NFC-enabled devices can act as electronic identity documents and keycards. NFC offers a low-speed connection with simple setup that can be used to bootstrap more capable wireless connections.

NODE MCU
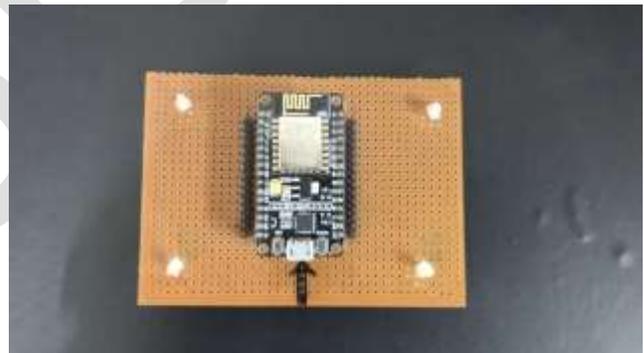
Wi-Fi Module: ESP-12E module similar to ESP-12 module but with 6 extra GPIOs

USB: Micro USB port for power, programming and debug-ging

Headers: 2x 2.54mm 15-pin header with access to GPIOs, SPI, UART, ADC and power pins

Miscellaneous: Reset and flash buttons

Dimensions: 49 x 24.5 x 13mm

NodeMCU is an open source IoT platform. It includes firm-ware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the dev kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson, and spiffs.

HEART RATE SENSOR

Power supply: 3V~5V

Pulse rate sensor is used to detect hearbeats

It can be worn on the finger or earlobe and connected to Arduino via cables

It can also carry an open-source program to display heart rate via diagrams in real time

It is an optical heart rate sensor integrated with amplyfing circuit and noise-cancellation circuit.

The heartbeat sensor is based on the principle of photo phlethysmography. It measures the change in volume of blood through any organ of the body which causes a change in the light intensity through that organ (a vascular region). In case of applications where heart pulse rate is to be monitored, the timing of the pulses is more important. The flow of blood volume is decided by the rate of heart pulses and since light is absorbed by blood, the signal pulses are equivalent to the heart beat pulses.

GAS SENSOR

Power supply: 3V~5V

Pulse rate sensor is used to detect hearbeats

It can be worn on the finger or earlobe and connected to Arduino via cables

It can also carry an open-source program to display heart rate via diagrams in real time

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The heartbeat sensor is based on the principle of photo phlethysmography. It measures the change in volume of blood through any organ of the body which causes a change in the light intensity through that organ (a vascular region). In case of applications where heart pulse rate is to be monitored, the timing of the pulses is more important. The flow of blood volume is decided by the rate of heart pulses and since light is absorbed by blood, the signal pulses are equivalent to the heart beat pulses.

GPS SENSOR
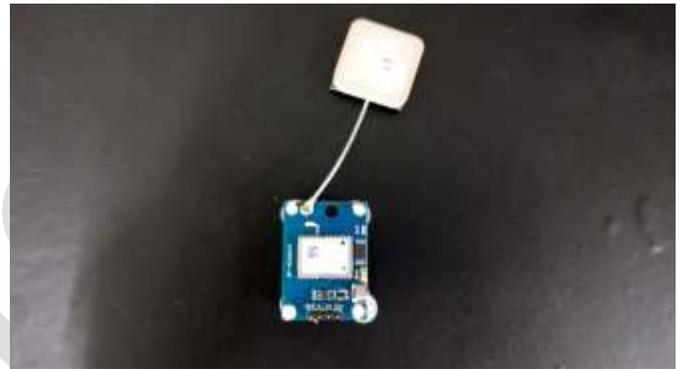
Brand:N/A. Model:GY-NEO6MV2

Color:Blue. Material:CCL

Features: With ceramic antenna; EEPROM power off data save; With data save battery; With LED signal indicator lamp. Specification:Antenna size: 25 x 25mm; Module size: 25 x 35mm; Install hole dia.: 3mm; Default baud rate: 9600; Compatible with different flight controller module

Packing List:1 x GPS module. Dimensions: 1.38 in x 0.98 in x 0.12 in (3.5 cm x 2.5 cm x 0.3 cm).

Hence the GPS sensor is used to find out the location of the patient in terms of latitiude and longitude.

TEMPERATURE SENSOR

0.5˚C accuracy guaranteeable (at +25˚C)
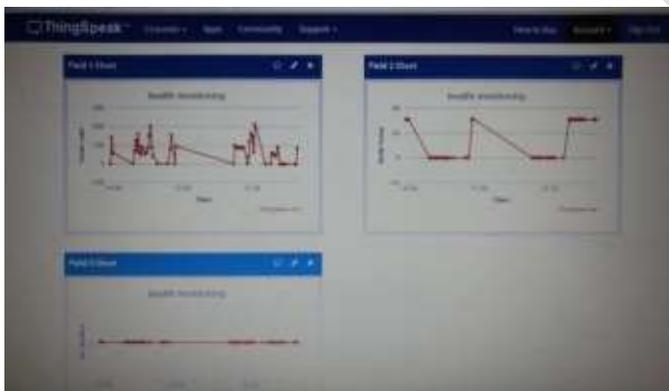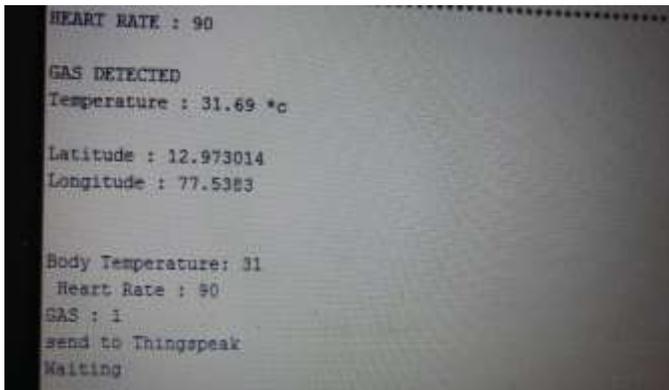
Low self-heating, 0.08˚C in still air

Rated for full -55˚ to +150˚C range

Calibrated directly in ˚ Celsius (Centigrade)

Less than 60 A current drain

The LM35 does not require any external calibration or trimming to provide typical accuracies of ±Œ°C at room temperature and ±Ÿ°C over a full -55 to +150°C temperature range.

VIII.RESULTS

IX .CONCLUSION

In this paper, we present a novel wearable RFID-based system for real-time activity recognition that aims at providing an easy-to-use solution with high detection coverage to support applications like elderly care. We implement the prototype system and conduct extensive experiments using data collected in a realistic setting.

Hence The project focuses on data collection and monitoring of patients. The data is gathered using ThingsSpeak and realtime access is done using a JSP application.

The data obtained is uploaded to the cloud and can be accessed anytime by the user using ThingSpeak.

We can also receive a notification of the obtained date through sms or email.

Many sensors have been used except the BP sensor due to its incompatiability with Node MCU.

REFERENCES

[1]. Wireless Patient Monitoring System [IEEE February 2015, Alexsis Bell, Paul Rogers, Chris Fernell, Brett Sparkmen, Scott C. Smith]
[2]. Building an IoT -aware healthcare monitoring sys-tem[IEEE February 2016, Freddy Jimenez, Romina Torres]
[3]. Wireless Patient Health Monitoring System[IEEE January 2014, Deepesh K. Rathore, Ankita Upamanyu, Deepanshu Lulla]
[4]. Body Sensor Network [Benny P.L. Lo, SurapaThiemjarus, Rachel King and Guang-ZhongYang]
[5]. Fuzzy Logic based Health Care System using Wireless Body Area Network [PrakashgoudPatil, SaminaMohsin, Karnataka, India] Contribution:
[6]. A Unique Health Care Monitoring System Using Sensors and Zig Bee Technology [EktaMadhyan Mahesh Kadam, Department of Electronics & Telecommunications, Mumbai University, India] Contribution:
[7]. Discovering Multidimensional Motifs in Physiological Signals for Personalized Healthcare. [ArvindBal Subramanian, Jun Wang, and RamakrishnanPrabhakaran] Contribution:
[8]. Coexistence of zigbee-based WBAN and wifi for Health Telemonitoring Systems [Yena Kim, Student Member, seungseob Lee, Student Member, and sukyoung Lee, Mem-ber] Contribution: