IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Special Issue 3, November 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 11, Special Issue 3, November 2023 ||

Longitude and Latitude Detector using STM 32 ARM Processor

Mr.K. Rajesh Kumar[1], T.R.Akshay[2], V.Kalki Ruban[3], Y.Kavin[4], S.Kengaraj[5]

Associate Professor, Department of Electronics and Communication Engineering, Adhiyamaan College of Engineering, Krishnagiri District, Tamil Nadu, India [1],

U.G Scholars, Department of Electronics and Communication Engineering, Adhiyamaan College of Engineering, Krishnagiri District, Tamil Nadu, India. [2, 3, 4]

ABSTRACT: This paper designs a low-cost embedded GPS/INS integrated navigation module using STM32 as control processing unit and GPS receiver. The GPS receiver is easily to be derived of navigation function because of the lock-losswhen vehicles run in tunnels, high-rise buildings and forest environments, and solved this problem effectively. This paper discusses the design and implementation of hardware and software about the integrated navigation module. The experiment results show that the integrated navigation module can accurately locate the position in 20s when lost GPS signals; it has reached design requirements and has good practicality. STM32 CUBE IDE is one of many tools used to build the chip usage and it is used to develop user friendly with generating code and manage the UART pin. And its C and C ++ are also used to make functioning of chip. Further it can be developed to manage NEO N8M module, location information in NMEA format. We are using a TinyGPSPlus GPS library which extracts all the required information from the NMEA sentence, and we just need to write a simple line of code to get the latitude and longitude

KEYWORDS: - GPS or Integrated navigation system, STM32controller, NEO M6N Module.

I.INTRODUCTION

GPS stands for Global Positioning System and used to detect the Latitude and Longitude of any location on the Earth, withexact UTC time (Universal Time Coordinated). This device receives the coordinates from the satellite for each and every second, with time and date. GPS offers great accuracy and also provides other data besides position coordinates. It's a GY- NEO6MV2 XM37-1612 GPS Module. This GPS module has four pins +5V, GND, TXD and RXD. It communicates usingthe Serial pins and can be easily interfaced with the Serial port of the STM32F103C8.GPS module sends the data in NMEAformat (see the screenshot below). NMEA format consist several sentences, in which we only need one sentence. This sentence starts from $GPGGA and contains the coordinates, time and other useful information. This GPGGA is referred to Global Positioning System Fix Data.
STM32F103C8T6 Blue Pill Development Board contains a 32-bit Cortex-M3 RISC ARM core with an internal oscillatorof 4 -16 MHz It is a CMOS flash technology chip. This chip has 37 GPIO pins and 10 Analog pins. It has some modern communication interfaces like a CAN and a USB port. The peripherals give outstanding control of the board as it operatesat very low voltage, so it is suitable for low-power applications. It also comes with an integrated watchdog and a window watchdog timer for the proper execution of instructions.

The STM32F103xx medium-density performance line family incorporates the high-performance Arm® Cortex®-M3 32-bit RISC core operating at a 72 MHz frequency, high-speed embedded memories (Flash memory up to 128 Kbytes and SRAM up to 20 Kbytes), and an extensive range of enhanced I/Os and peripherals connected to two APB buses. All devices offer two 12-bit ADCs, three general purpose 16-bit timers plus one PWM timer, as well as standard and advanced communication interfaces: up to two I2Cs and SPIs, three USARTs, an USB and a CAN. The devices operate from a 2.0 to 3.6 V power supply. They are available in both the –40 to +85 °C temperature range and the –40 to +105 °C extended temperature range. A comprehensive set of power-saving mode allows the design of low-power applications.

II. RELATED WORKS

To make it easier for blind people to read messages so they can recognise them in circumstances where they would need to, such reading the signs on cars (buses). Our project's primary motivation is to assist those who are blind or visually

impaired in better understanding all the texts that are in front of them and to enable them to go about their daily lives in thesame manner as anyone else. to enable those who are blind or visually handicapped to participate in their education by independently reading texts. to create a text reading assistance through the use of video processing.

III. EXISTING METHOD

Create a system that tracks the location of vehicles in real-time using GPS data. This can be useful for fleet management, logistics, and monitoring vehicle movements. Develop a handheld navigation device that provides turn-by-turn directions, maps, and location-based services to users. Build a solution for precision agriculture by integrating GPS data with other sensors to optimize crop planting, irrigation, and harvesting. Develop a system to track valuable assets like equipment, tools, or shipments as they move through different locations.

IV. PROPOSED SYSTEM

Build a device that can transmit GPS coordinates in emergency situations to aid in search and rescue operations.Build a wearable device that tracks the route, distance, and performance metrics for outdoor sports like running, cycling, hiking, etc.Create a device that captures GPS coordinates and timestamps for various purposes, such as geotagging photos or logging locations for scientific research.Design a wildlife tracking system that uses GPS to monitor the movement patternsof animals for research and conservation purposes.

BLOCK DIAGRAM

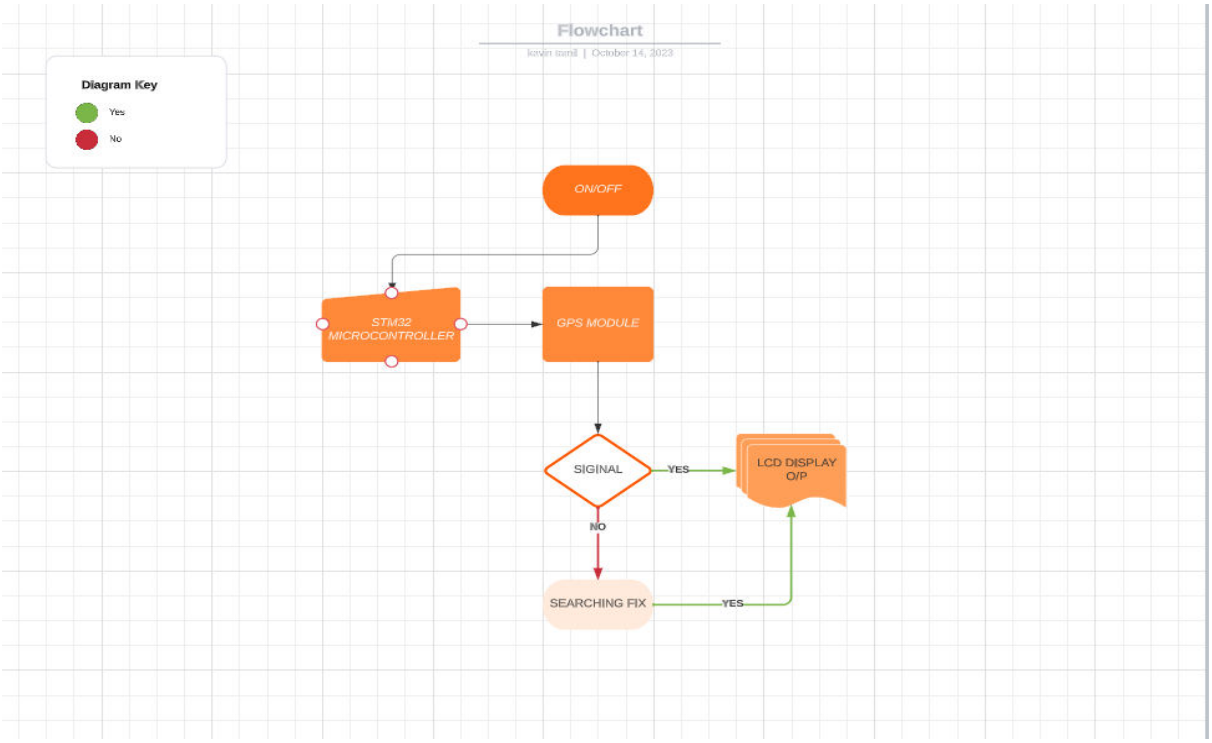


Fig 1. Flow diagram for proposed method

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 11, Special Issue 3, November 2023 ||

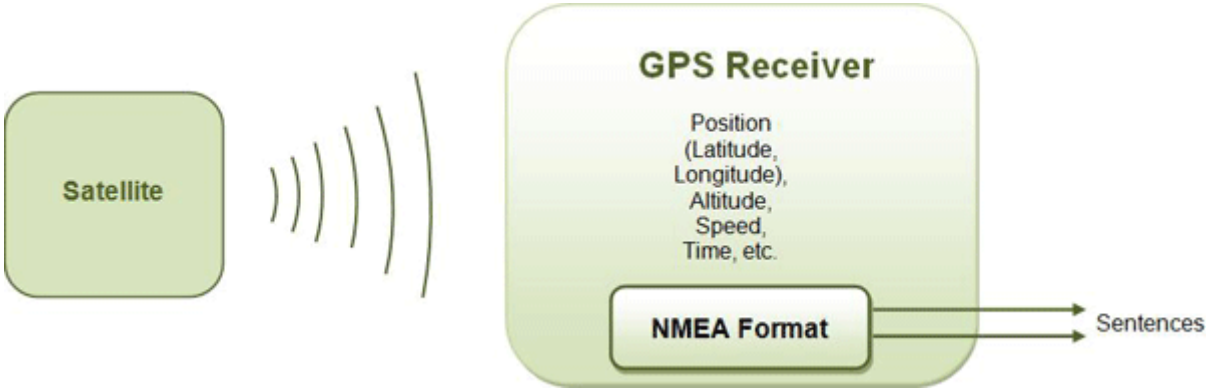
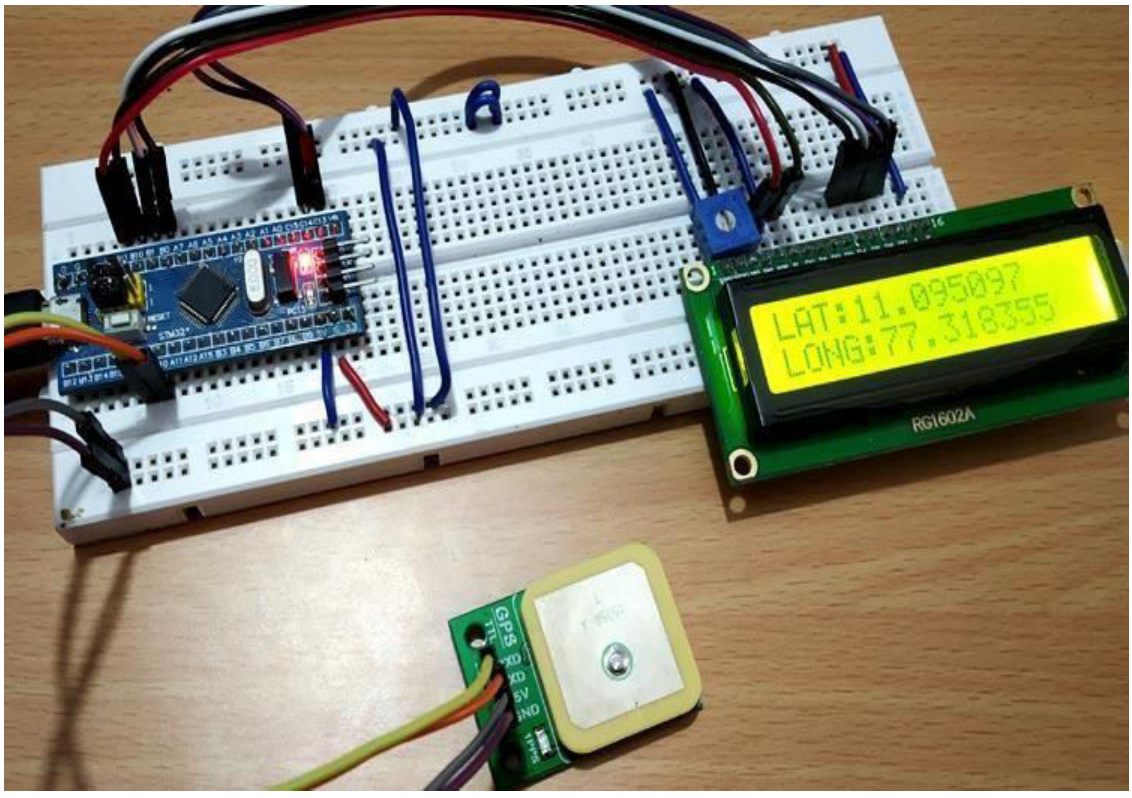


Fig 2. Sample of NMEA Format Extract

we here use the GPS module to receiver the signal data by the module and the gathered data is in the NMEA format. And in the format used for the position, altitude, speed, time etc; And the date will be in the sentences. If the signal is not detected the module will search the fix until the signal is gathered by the satellite.

V. EXPERIMENTAL RESULTS

After building the setup and uploading the code, make sure to place the GPS module in open area to receive the signal fast. Sometimes it takes few minutes to receive signal so wait for some time. The LED will start blinking in the GPS module when it starts to receive signal and location coordinates will be displayed on the LCD display.You can verify the latitude and longitude of location by using Google maps. Just Go to Google maps with GPS turned ON and click on the blue dot.It will show the address with the latitude and longitude as shown in the picture above.



VI. FUTURE SCOPE

Improving the accuracy and precision of the longitude and latitude detection can be a significant area of development. Thiscould involve using more advanced sensors, better signal processing algorithms, or integrating other sensors (like GPS orGLONASS) for more accurate location information. you can integrate the project with mapping and navigation services. This would enable it to provide real-time navigation assistance, calculate distances, offer route suggestions, and more. Store the longitude and latitude data over time and develop analytics tools to gain insights into movement patterns, trends,and behaviours. This can be valuable for various industries, including transportation, agriculture, and environmental monitoring. Incorporate the project into AR or VR applications. This can be used for gaming, educational purposes, or immersive experiences that involve real-world coordinates. Utilize the device to monitor environmental conditions in specific locations. For instance, it could be used to collect data on temperature, humidity, air quality, or other environmentalvariables and help in weather forecasting.

VII. CONCLUSION

This design of integrated navigation module uses a low-cost chip GPS NEO 6M and GPS chips to STM32 processor controller module small, lightweight meet the requirements of car navigation. The experiment proved that the integratednavigation system GPS signal is lost in a short time can be precise navigation. And the LCD display will display the output data will be given. The project will help to be used to make the people find their location's latitude and longitude of the uses for them. This is inspired by the navy , google map and other way ;this is used in this may in up coming developmentsof your projects.

REFERENCES

[1]. Songlai Han, and Jinling Wang, " Quantization and Colored Noises Error Modeling for Inertial Sensors for GPS/INS Integration," IEEE SENSORS JOURNAL, vol. 11, no. 6, June 2011.
[2]. Jau-Hsiung Wang, "Intelligent MEMS INS/GPS Integration For Land Vehicle Navigation," PhD thesis, Calgary: Department of Geomatics Engineering, University of Calgary, 2006.
[3]. Hwang D H , Oh S H , et al. Design of a low -cost atti-tude determination GPS/ INS integrated navigation sys-tem[J] . GPS Solutions(S1080-5370), 2005, 9(4): 294-311.
[4]. Markley F Landis, Sedlak Joseph E. Kalman filter for spinning spacecraft attitude estimation[J] . Journal ofGuidance Contorl and Dynamics (S0731 - 5090),2008, 31(6) : 1750-1760.
[5]. Venckauskas A, Morkevicius N, KulikanskasK. Study of finger vein authentication algorithms for physical access control[J]. Elektronika IR Elektrotechnika, 2012 , 121 (5): 101 – 104.
[6]. Lijun Wang, Huichang Zhao, Xiaoniu Yang2008 International Conference on Microwave and Millimeter Wave Technology 4, 1991-1994, 2008
[7]. Chunmei Huang, Yantao Tian, Lihua Liu, Zhilong MaSixth International Symposium on Instrumentation and Control Technology: Sensors, Automatic Measurement, Control, and Computer Simulation 6358, 256-262, 2006
[8]. Jun Zhou, Hamidreza Bolandhemmat2007 International Conference on Mechatronics and Automation, 694-699, 2007
[9]. Lijun Wang, Huichang Zhao, Xiaoniu Yang2008 International Conference on Microwave and Millimeter Wave Technology 4, 1991-1994, 2008.
[10]. Xiao Yu Zhang, Chun Lei SongApplied Mechanics and Materials 278, 1719-1722, 2013
[11]. Hao Wen, Da Ke HuApplied Mechanics and Materials 291, 2537-2542, 2013
[12]. Yang Xu, Peng Chen2015 3rd International Conference on Machinery, Materials and Information Technology Applications, 1655-1659, 2015
[13]. Xiaobing Zhang, Xuanchi Zhou, Yunhai Xia, Xing Wang, Hongfeng ZhangJournal of Sensor Technology and Application 5 (1), 1-9, 2017

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 11, Special Issue 3, November 2023 ||

BIOGRAPHY

Mr .K. Rajesh Kumar, Associate Professor, Electronics and CommunicationEngineering Department, Adhiyamaan college of Engineering, Hosur

Akashy.T. R, Electronics and Communication Engineering Department, Adhiyamaan college of Engineering, Hosur

Kalki Ruban.V, Electronics and Communication Engineering Department, Adhiyamaan college of Engineering, Hosur

Kavin.Y, Electronics and Communication Engineering Department, Adhiyamaan college of Engineering, Hosur

Kengaraj.S, Electronics and Communication Engineering Department, Adhiyamaan college of Engineering, Hosur

INNO SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 8.379

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details