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Nautical Border Alarm System using Reverse Motor Mechanism and RSSI-based Independent Monitoring System

K. Harish Reddy, M. Chandu Venkata Mohan, G. Revanth V N S H R Raja
Department of Electronics and Communication, SRMIST, Chennai, INDIA

Abstract:- Surveillance is a serious issue for border control or the protection of commercial premises. The main cause of this cross-border brutality to fishermen is that it is difficult to identify the maritime border between the two nations. This project aims to create a user-friendly and well-understood environment that will help prevent accidents and warn fishermen about boundary areas. Here, a system will be created with the aid of a microcontroller unit that safeguards the fisherman by alerting them to the country border using the Global Positioning System (GPS). The location of the fishing boat is currently determined using a GPS receiver. The most recent latitude and longitude readings can be located via GPS and communicated to the microcontroller device. The controller unit then determines the location by comparing the current longitudinal and latitude data with the specified value. In light of the comparison's findings, this technology warns fishermen when they are getting close to the border.

Keywords:- *Arduino, RSSI Zigbee, GSM,GPS.*

I. INTRODUCTION

More than 14 million people are supported in their livelihoods and have jobs thanks to fishing. Given that this industry is crucial to the economy and jobs of all coastal regions. India and Sri Lanka are divided by their shared maritime borders. Fishing is the main source of income for those who live near the water. Over 25,000 vessels from Tamil Nadu were entering the Bay of Bengal to fish. There will frequently be conflicts between adjacent nations that share the same oceans. So, those who live close to the sea will face numerous issues. We frequently read in the newspapers and media that many people are dying as a result of these border conflicts. The governments of various nations have split these international seas into various zones, much as they have done with the land, to tackle problems of this nature. Hence, these oceans are surrounded by national borders. Even though there is a border, a lot of people cross it unintentionally and wander into other countries' territories. Fishermen who do this are sometimes imprisoned and subject to harsh punishment, so it is crucial to use modern technology to show fishermen where the border is. The significance of this operation is to prevent fishermen from crossing the border. By pinpointing the precise position, our model's RSSI (Received signal strength indicator) feature will inform the fisherman when a border is approaching. By initiating the reverse motor process, this type also aids in preventing border crossing.

II. PROJECT DESCRIPTION

The Nautical Border Alert System utilizes a Reverse Motor Mechanism and RSSI Based Independent Monitoring System that aims to improve the security and safety of watercraftpassing through or near restricted zones. This project makes use of a reverse motor system that is intended to stop boats from entering other countries borders. The reversing motor mechanism and the RSSI-based independent monitoring system make up the system's two primary parts. A mechanical device called the reverse motor mechanism is used to keep watercraft out of restricted zones. It operates by sensing when a watercraft is getting close to the restricted area and automatically reversing the watercraft's motor to move it away from the restricted area.

The RSSI-based independent monitoring system is a wireless monitoring system that tracks the location and movement of watercraft inside and outside of the restricted region using RSSI (Received Signal Strength Indication) technology.

Software that processes the data from the sensors and offers real-time monitoring and alerts to the authorities in charge of the restricted area is installed in the central monitoring station. Even if the watercraft is not equipped with its monitoring system, this technology is intended to provide an independent monitoring solution that can identify and notify authorities of any intrusions into prohibited zones.

The Nautical Border Alarm System Using Reverse Motor Mechanism And RSSI Based Independent Monitoring System is a highly effective and reliable solution for enhancing the safety and security of watercraft traveling in and around restricted areas. This system can be customized to suit the needs of different organizations and authorities and can be easily integrated with existing monitoring and control systems.

III. SYSTEM ARCHITECTURE

The Nautical Border Alarm System Using Reverse Motor Mechanism And RSSI Based Independent Monitoring System is a combination of mechanical and wireless components that work together to provide an effective and reliable solution for enhancing the safety and security of watercraft traveling in and around restricted areas.

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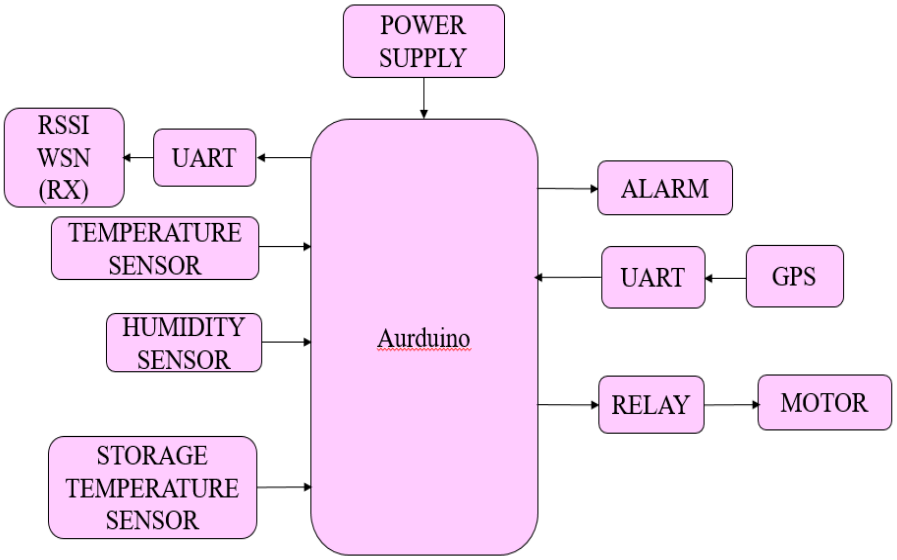

Fig. 1: Block Diagram of the transmitter section

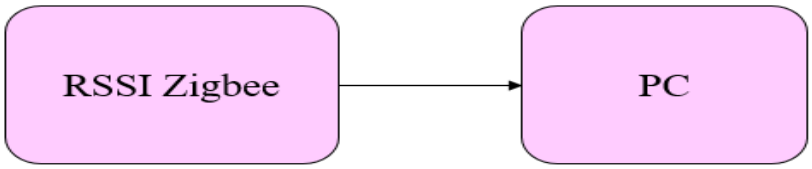

Fig. 2: Block Diagram of the receiver section

IV. COMPONENTSINVOLVED

To simulatea Nautical Border Alarm System Using Reverse Motor Mechanism And RSSI Based Independent Monitoring System, various **hardware components** are required and knowledge of Arduino **software** is required.

A. HARDWARECOMPONENTS

RSSI: Received signal strength indicatior or RSSI. NODEMCU ESP 8266 is utilized here. It can pick up a boat signal from the router or access point. Internally, the wireless network card can utilize it. The network card is ready to send when a specific threshold value exceeds the amount of radio energy in the channel.

➢ *ARDUINO UNO*

An 8-bit processor is used by an 8-bit microcontroller, which is a tiny, programmable device. The Arduino programming language can be used to program it, and it is frequently utilized in a variety of electronic projects. The simplicity and use of 8-bit Arduino microcontrollers make them a popular option among beginners and enthusiasts. They can be used to manage a range of inputs and outputs, including displays, motors, and sensors. 8-bit Arduino microcontrollers are frequently utilized in portable and battery-operated devices because of their small size and low power requirements.

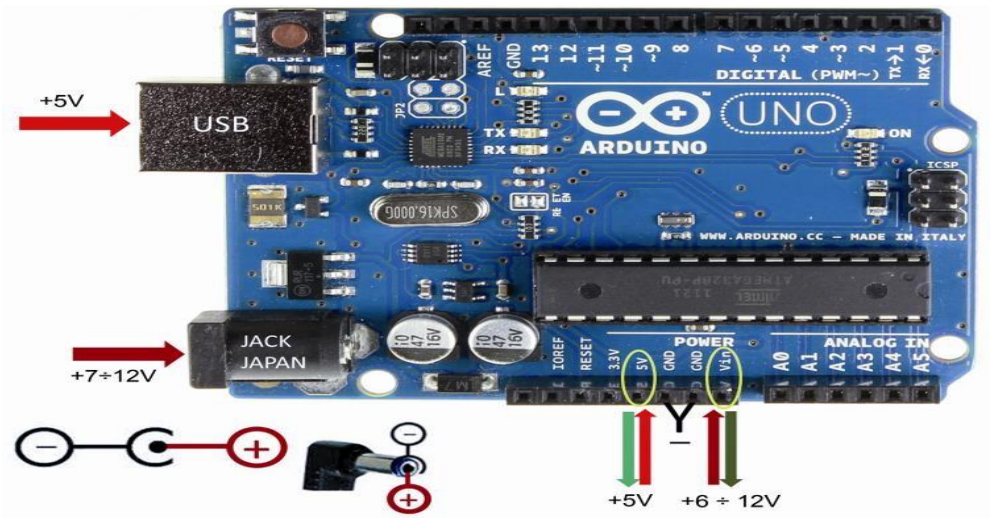

Fig. 3: Arduino UNO

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➢ *DC MOTOR:*

An electric motor that runs on electricity is a DC motor. On electromagnetism, it depends. In a magnetic field, a carrying conductor receives a force that makes it rotate concerning its starting location. The Fleming Lefthand rule is applied.

Fig. 4: DC Motor

➢ URAT

A piece of computer hardware known as a universal asynchronous receiver/transmitter, or UART, converts data between parallel and serial modes. UARTs are frequently used with protocols for communication such as EIA, RS-232, RS-422, or RS-485. The term "universal" implies that both the data format and transmission rates are programmable. A driver circuit separate from the UART manages the electric Signaling levels and techniques (such as differential signaling, etc.).

➢ HUMIDITY SENSOR:

There are many applications for temperature and relative humidity measurement and control. These days, devices are available with integrated signal conditioning, ADC, calibration, and communication interfaces, as well as temperature and humidity sensors. The design is substantially simplified and the overall cost is decreased by the employment of such intelligent sensors. We have previously talked about measuring temperature and humidity with Sensation's SHT1x/SHT7x sensors. These sensors are equipped with fully calibrated digital outputs and can measure both temperature and relative humidity.

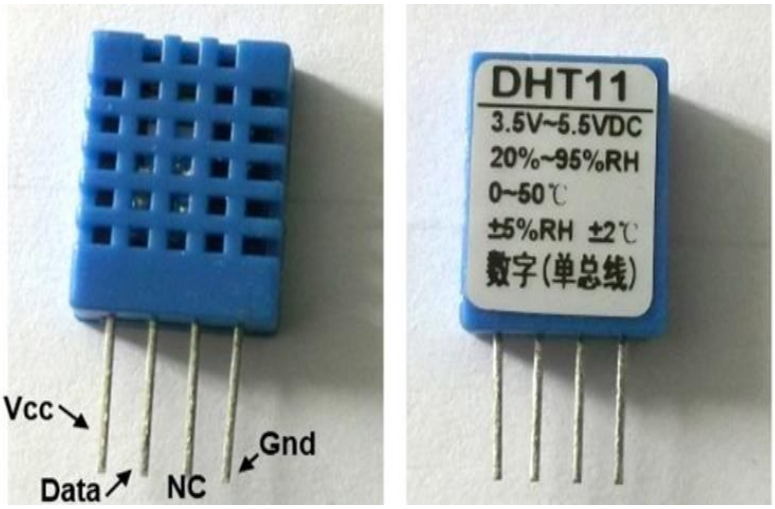

Fig. 5: Humidity sensor

➢ *TEMPERATURE SENSOR*

A temperature sensor is an electronic device that detects the environment's temperature and converts the input data into electronic data. It can be used to record, monitor, or convey temperature changes. Several configurations of temperature sensors are available.While certain temperature sensors (contact temperature sensors) must be placed close to what they are monitoring, other temperature sensors indirectly determine the object's temperature (non-contact temperature sensors).

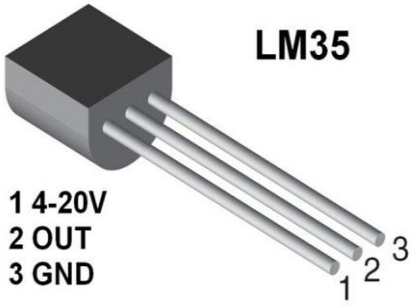

Fig. 6: Temperature sensor

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➢ *GPS:*

A GPS navigation device is a piece of equipment that uses signals from the Global Positioning System (GPS) to identify where it is right now on Earth. A few GPS systems also calculate altitude in addition to providing latitude and longitude data. The GPS industry serves the military, aviation, marine, and consumer goods industries.

Fig. 7: GPS

➢ *ALARM*

A beeper or buzzer, for example, may be electromechanical, piezoelectric, or mechanical in design. The signal is converted from audio to sound as its primary function. It is often powered by DC voltage and used in timers, alarm clocks, printers, computers, and other electronic devices. It can produce a variety of sounds, including alarm, music, bell, and siren, according to the varied designs.

Fig. 8: Alarm

B. SOFTWARE REQUIREMENTS:

➢ *ARDUINO IDE*

The open-source software package known as the Arduino Integrated Development Environment (IDE) is used to program Arduino microcontrollers. Users can develop, upload, and debug code for their Arduino projects using its user-friendly interface. The Arduino IDE has an integrated code editor, compiler, and uploader and supports several programming languages, including C and C++. Moreover, it provides a library of prewritten code, referred to as sketches, which can be altered and applied to a variety of tasks. The Arduino IDE is extensively used by amateurs, students, and professionals for designing electronic projects since it is compatible with Windows, Mac, and Linux operating systems.

➢ *Hercules setup utility*

V. METHODOLOGY

The precise distance between the boat and the border is determined by the proposed system using RSSI Zigbee technology. It uses the GPS to find the fisherman's coordinates and warn them that a border is up ahead. The technology will assist in turning on the reverse motor mechanism engine by converting the electrical energy to mechanical energy to prevent the fisherman from crossing the border if the boat continues to go forward despite the warnings issued. Arduino, RSSI Zigbee, GPS, RSSI, and temperature and humidity sensors are the main parts of this system.

The proposed system uses the RSSI Zigbee technology to communicate between the boat and the port. When we start the simulation the GPS starts and it locates the coordinates of the boat. And the sensors we have kept like the humidity sensor, temperature sensor, and storage sensor used for detecting the environment’s humidity and temperature. And the temperature sensor is used for storing the fish and keeping the fish fresh and healthy. And we have used the reverse motor mechanism.If the boat crosses the border, it indicates an alert, initializes the reverse motor mechanism, and reverses the boat to the safe coordinates.

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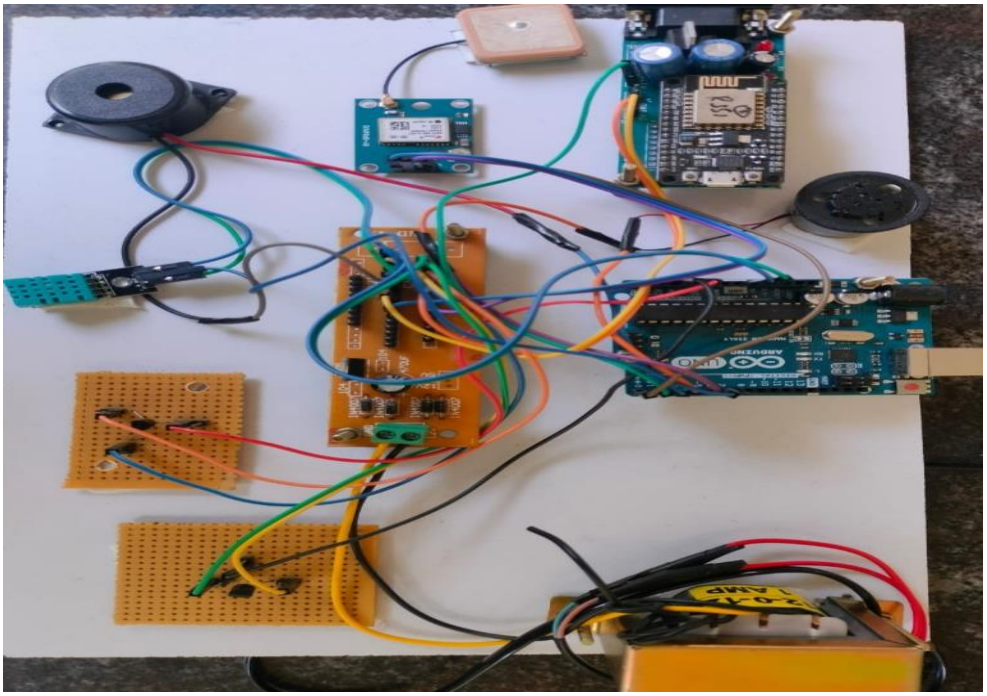

Fig. 9: Picture of Transmitter Hardware 1

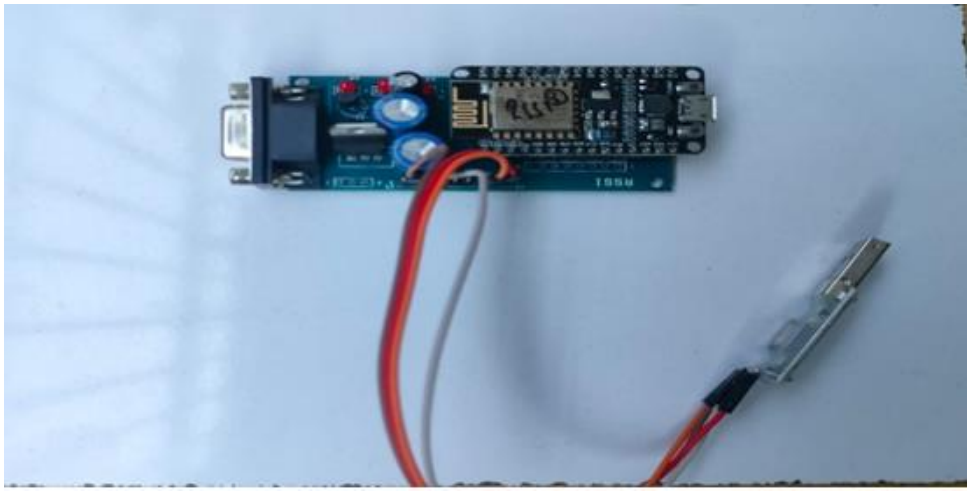

Fig. 10: Picture of Receiver Hardware 2

```
Humidity = 70.00
Temp :55.65*c
high temp
Storage Temp :-23.85*c
Location:LAT=  N , LONGI=  E
&
Humidity = 69.00
Temp :54.60*c
high temp
Storage Temp :-24.30*c
Location:LAT=  N , LONGI=  E
&
Humidity = 69.00
Temp :54.60*c
high temp
Storage Temp :-22.50*c
Location:LAT= 1249.64513 N , LONGI= 08002.62362 E
&
Humidity = 69.00
Temp :55.65*c
high temp
Storage Temp :-24.00*c
Location:LAT= 1249.64588 N , LONGI= 08002.62389 E
&
Humidity = 69.00
Temp :52.50*c
high temp
Storage Temp :-23.10*c
Location:LAT= 1249.64651 N , LONGI= 08002.62220 E
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Fig. 11: Output at the boat

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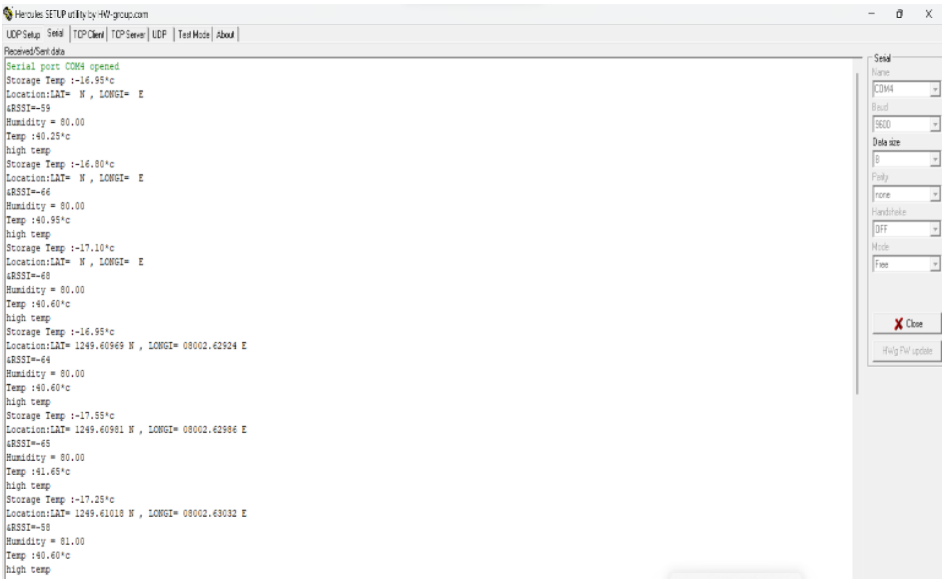

Fig. 12: Output at the Receiver

VI. FUTURE SCOPE

There are various potential areas for further development and improvement of the Nautical Border Alarm System using Reverse Motor Mechanism and RSSI-based Independent Monitoring System. Arrangements with other sensors, such as radar, sonar, and AIS (Automatic Identification System), could be connected in addition to the RSSI-based monitoring system to improve the system's detecting capabilities.

The use of machine learning and artificial intelligence could increase the autonomy of an operation. As a result, the system would be better able to detect and warn of possible border infractions by learning from previous data. Several ships in a fleet could be integrated with other vessels as well. This would allow for more extensive, coordinated monitoring and detection of suspected border infractions. The system's communication range could be expanded for greater coverage and improved detection skills.Backup and redundancy systems: To guarantee ongoing operation in the event of equipment failures or other disturbances, the system could be configured with backup and redundancy systems. Cybersecurity could be made more secure against online threats by deploying modern encryption and authentication procedures. To cut expenses and make the system more accessible, it may be changed. This would open it up to a larger range of users, such as coastal towns and small fishing boats. Overall, the Nautical Border Alarm System has a lot of room for growth and development with the ultimate aim of boosting border security and raising maritime safety.

VII. CONCLUSION

In conclusion, the nautical border alarm system suggested in this study is a novel approach to increasing marine border security. An independent monitoring system based on RSSI is used by the system to track and report any suspicious behavior in the defined region, and a reverse motor mechanism prevents unlawful entry. Extensive testing has proven the system's dependability and efficacy, proving that it can quickly and precisely identify possible threats. Furthermore, the system is a great option for marine border protection due to its user-friendly interface and simple installation. Overall, this project presents a potential strategy to improve maritime border security, and it is anticipated to make a substantial contribution to the efforts to safeguard maritime borders around the world.

REFERENCES

[1.] Design of border alert system for fishermen using GPS. International Journal of Students Research in Technology & Management, Vol 2 (02), March-April 2014, ISSN 2321-2543

[2.] Implementation of Maritime border alert system. International Journal of innovative research in electrical electronics, instrumentation, and control engineering, vol. 2, issue 3, march 2014.

[3.] Deep Sea Fishermen Patrol System for Coastal Intruder Positioning. International Journal of Scientific Engineering and Technology, Volume 2 Issue 3, 1st April 2013 (ISSN: 2277-1581).

[4.] S.Kiruthika and N. Rajasekaran "Implementation Of GPS Based Surveillance Navigation System For Fisherman" International Journal of Scientific Research and Engineering Studies (IJSRES) Volume 1 Issue 5, November 2014.

[5.] Vinothkumar C, Arunkumaran B, "Implementation of GPS Based Security System for Safe Navigation of Fisherman Autoboat", International Journal for Research and Development in Engineering (IJRDE), ISSN: 2279-0500, pp-465-469.

[6.] spvijavavardhan reddy, kerthana ram k, Niveditamaraduga, RamyaSree, Deepika Y, "Boat Localisation And Warning System for Border Identification", European Journal of Molecular and clinical medicine Vol 7, Issue 4, 2020, ISSN 2515-8260.

[7.] Aruniiay D, Yuvaraj E, "DESIGN OF BORDER ALERT SYSTEM FOR FISHERMEN USING GPS ", International Journal of Students Research in

Technology &Management, vol2, march-April 2014, ISSN 2321-2543.

[8.] Narmatha S, Roopasri D, Vinitha S, Vijayakumar S, "BORDER ALERT SYSTEM AND EMERGENCY CONTACT FOR FISHERMAN USING RSSI", International Research Journal of Engineering and Technology, Vol 7, Issue1, Jan 2020, ISSN 2395-0056

[9.] Michalski, J. Czajewski, The accuracy of the global positioning systems, IEEE Instrumentation & Measurement Magazine, vol. 7 (1), pp. 56–60, 2004.