# Vehicle parameter detection in Cyber Physical System

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**Abstract:** ***A Cyber Physical System(CPS) integrates physical devices(i,e. sensors) with cyber(I,e. informational) components to form sensitive environmental system that responds quickly to vibrant changes in environmental situations. Such a system has wide applications in the scenarios of traffic control, battlefield surveillance, space resources. environmental monitoring and so on. A core factor of the CPS is the collection and assessment of information from noisy, dynamic and uncertain physical environments integrates with many type of cyber space resources. The potential of this integration is unbounded. Reach to this potential, the rare data acquired from physical world must be transformed into usable knowledge in real time. Intrumine first analyzes the trustworthiness of sensor data, then detect the motion and measure the temperature of vehicle also detects the intruders(obstacle).Verifies the obstacle detection based on graph model of relationship between sensor and intruders and sending the mail to the user.***

***Keyword:-*** *Cyber physical system; data trustworthiness.*

## 1.Introduction:

A Cyber-Physical System (CPS) is an integration of sensor network with cyber resources. The CPS collects sensor data from physical world and links them to various information sources for real time analysis. Such a system has many promising applications in both military and civilian fields, including missile defense, battlefield awareness, traffic control, neighborhood watch, environment monitoring, and wildlife tracking. The key task in such a scenario is to mine the real intruder information from a large set of untrustworthy sensor data..

- Complex requirements: Many intruder detection algorithms rely on prior knowledge of the number of intruders, movement speed, and so on. However, the users often cannot provide such attributes of intruders in real applications. In contrast, they would like to obtain fine-grained situational awareness of the battlefield and require the system to generate this information automatically.
- Big data: A typical CPS includes hundreds, even thousands of sensors. Each sensor generates a reading every few minutes, and the readings form a huge data stream. Furthermore, many applications require immediate action against intruders. The mining must be efficient to process the huge data stream and find intruders in real time.
- problem that impacts CPS performance. It is difficult to filter out untrustworthy data records solely based on the data values, since most faulty records have values similar to real ones

In this paper, we introduce the framework of IntruMine to find real intruders from untrustworthy data. IntruMine iteratively models the relationship between sensors and intruders via Mail, and estimates the attribute values of the intruders based on the relative information on such a mail. The confidence of intruder detection is computed based on the difference between the real sensor readings and the estimated ones. This measurement is used to verify the detected intruders and filter out false positives.

## 2.Related Works:

The research problems of CPS are relatively new. However, many related topics, such as detecting faulty sensor signals or target tracking, have been studied extensively in the past decades. The community of data management and data extracting also proposes some methods to find outliers for sensor network applications. It classified into three categories:

- Statistical model-based approaches:- A large category of statistical models have bee proposed to detect faulty sensor data. The faulty data are defined as the ones that do not follow the distribution of those models.
- Spatial and temporal similarity-based methods:- On the assumption that there are strong correlations between the sensor data and their neighbors (spatial similarity), as well as their histories (temporal similarity) . Krishnamachari

and Iyengar exploited spatial and temporal relations of faulty sensor data[4]. Jeffery et al. attempted to take advantage of both spatial and temporal relations to correct faulty records [5]. Their methods assume that all data within each spatial and temporal granule are homogeneous. The fault recognition programs treat any value exceeding a high value threshold as faulty.

- Feature retrieving techniques:- Feature retrieving techniques detect faulty data by comparing distinguishing features. Such methods first exploit several data features like environmental type, connecting degree, and temporal patterns, and then construct classifiers to distinguish different types of faults must be transformed into useable knowledge in real-time.

Scalability and adaptiveness are the major problems that prevent their application in a wider range of CPS.

## 3.Background and Preliminaries:-

Recent advances in sensor technology have produced many types of sensors for area-monitoring and intruder detection purposes. Such sensors can be roughly classified into two categories:

(1) active sensors (e.g., infrared sensors and radar sensors): These sensors radiate signal pulses and detect objects by the echo bouncing off the intruder.

(2) passive sensors (e.g., acoustic sensors, seismic sensors, and magnetic sensors): These sensors only receive signals from the environment. Active sensors achieve higher accuracy, but require significant more power to operate and drain batteries quickly.

Furthermore, when active sensors radiate signal pulses, they are at high risk of being detected by the intruders. As a result, the CPS is usually deployed with a large number of low-cost, energy saving passive sensors.

## 4.Design vehicle parameter detection in cyber physical system:-

Today speed is more important while drive the vehicles, but speed is very harmful for human life. When obstacle is available on the way of vehicle then we have to change the speed and root of the vehicle and maximum possibilities of the accident. To protect from accident here, we develop two model of sensor network. These two modules placed in different locations and it will send data to the one receiver. In this we develop the module of PC, RFID, three sensors. The sensors used are Temperature sensor, Accelerometer sensor and IR sensor. Initially all sensors send the vehicle condition and it will send to the system board i,e AVR microcontroller. In this we are burn different forecasting algorithm for accurate comparison of real data and estimated data. It will send accurate data to the RF module (Transmitter) then transmitter send data to the RF module (Receiver) it will display data to the PC using VB 6.0. Displayed data send to the user one through mail. Any one transmitter send data to the one receiver. Through this we can recognize the condition of the vehicle at any time. Design of this system is shown in Fig.1

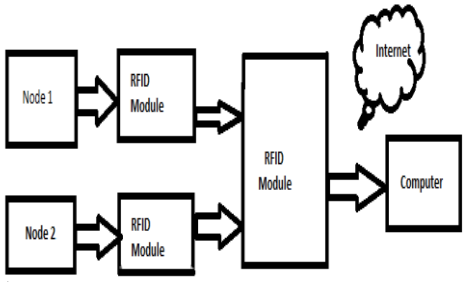


Fig 1

## 5. Sensors Used:-

Here we use 3 sensors for efficient and effective working of the vehicle parameters detection system. They are 1) Temperature Sensor, 2) Accelerometer Sensor & 3) IR Sensor.

1) Temperature Sensor:- This sensor senses the temperature of vehicle and send data to the controller.
2) Accelerometer Sensor:- Accelerometers can be used to measure vehicle acceleration. They allow for evaluation of overall vehicle performance and response.[4] This information can then be used to make adjustments to various vehicle subsystems as needed. Accelerometers can be used to measure motion of cars, machines, buildings, process control systems and safety installations. They can also be used to measure seismic activity, inclination, machine vibration, dynamic distance and speed with or without the influence of gravity. Applications for accelerometers that measure gravity, wherein an accelerometer is specifically configured for use in gravimetry, are called gravimeters.
3) IR sensor:- Infrared Rays can be used to detect the obstacle on the root of vehicle and protect the vehicle from accident. IR sensors are active low when obstacle is detected that time it is active high signal and data send to controller obstacle is detected.

Infrared rays are not visible to the eye. IR sensor continuously emitted infrared rays from one LED, when obstacle is between the ray that time rays are reflected and that rays come on the second LED that time we say obstacle is detected. It is shown in fig2. Using this sensor we can avoid accident of vehicle.

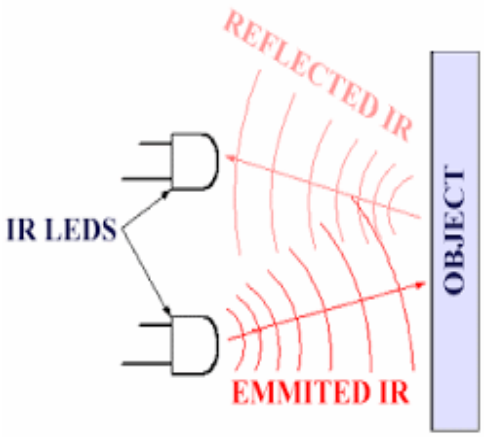


Fig2.

## 6. RFID Module:-

RFID transceiver is the main hardware module used in this paper for communication purpose. We have three RFID modules two on transmitter side, one at receiver side. The RF transceiver is integrated with a highly configurable baseband modem. The modem supports various modulation formats. The communication range can be increased by enabling a Forward Error Correction option. We can controlled this module using SPI interface. Here we need some external component for configure this module. So we can use this Rf modules anywhere. When we use this module as a transmitter or receiver there are different commands give to the RF module through controller. The transmitter RF transmits the data obtained from transmitter side controller it transmits without having delay. Then receiver side RF receives the signal and automatically receives data transmitted from transmitter. In this we don't have data loss so it is safe and useful by using RF modules. In this RF there is no need of human intervention to send or receive data it automatically sends and receives data.

## 7. Microcontroller:-

Here we use AVR microcontroller. The ATmega16 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC Architecture. There are 8 channel 10 bit ADC. In this controller high endurance non-volatile memory segments. There are 32 I/O lines. It provides a highly-flexible and cost-effective solution to many embedded control applications.

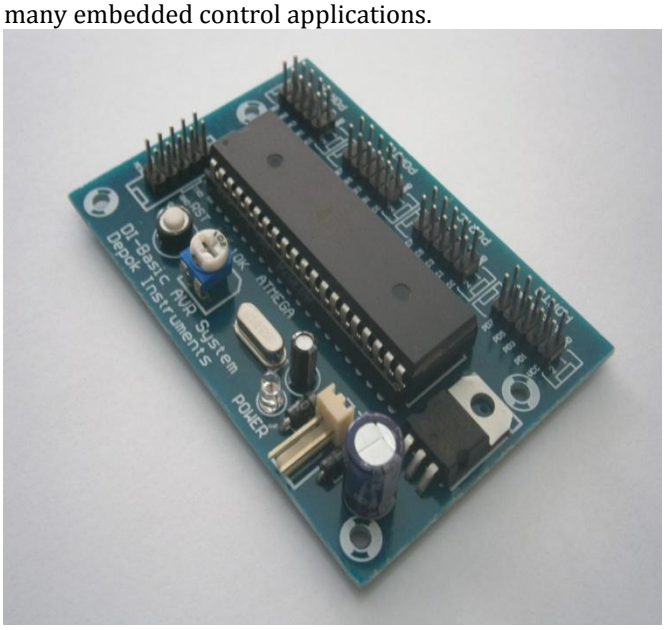


Fig3: AVR (Advance Versatile RISC) Machine.

To this microcontroller RF module is attached. Microcontroller performs the operations of collecting data from sensors and comparing with real data. Output will send to the receiver through RF module, and display the outputs on LCD screen.

## 8. Results:-

Cyber Physical System look like this.

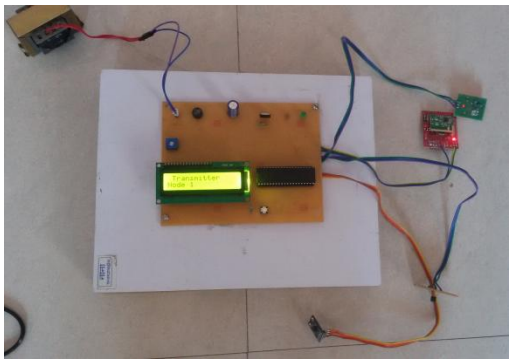

Fig4. Hardware implementation of transmitter

Fig5. Transmitting node 1

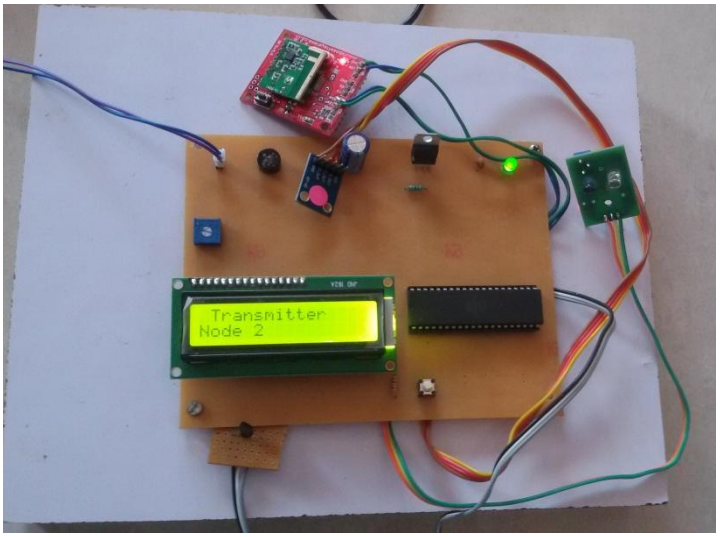


Fig6. Transmitting node 2

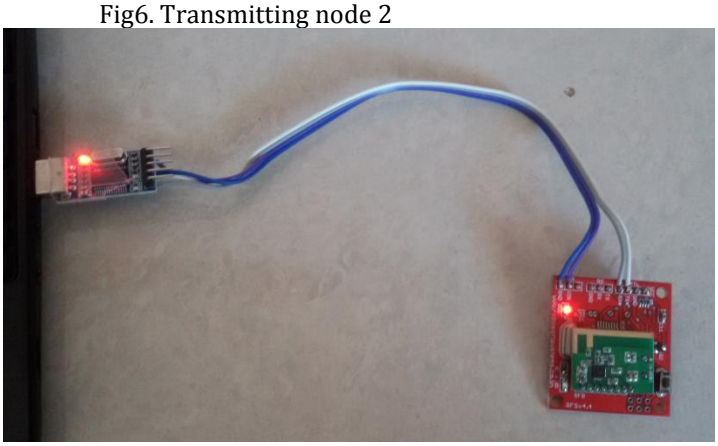

Fig7. Receiver

Outputs:-

I) LM 35 Temperature Sensor:-

Table 1.Output of temperature sensor

| Operating Voltage | Condition | Output of sensor |
|---|---|---|
| 5V | Normal | 30°C |
| 5V | Extreme | 50°C |

II) ADXL335 Accelerometer Sensor:-

Table 2.Output of sensed gravity during rotation around X-axis.

| Degree | X -axis | Y -axis | Z -axis |
|---|---|---|---|
| 0/360 | 0.5g | 0.5g | 1.0g |
| 90 | 0.5g | 1.0g | 0.5g |
| 180 | 0.5g | 0.5g | 0.0g |
| 270 | 0.5g | 0.0g | 0.5g |

III) LM358 Digital IR Sensor:-

Table 3.Output of IR Sensor.

| Operating Voltage | Condition | Output of sensor(LED) |
|---|---|---|
| 5V | Normal | Low |
| 5V | Extreme | High |

1.Temperature Sensor and Accelerometer Sensor value on LCD.


Fig8.

2.IR sensor value on LCD:-

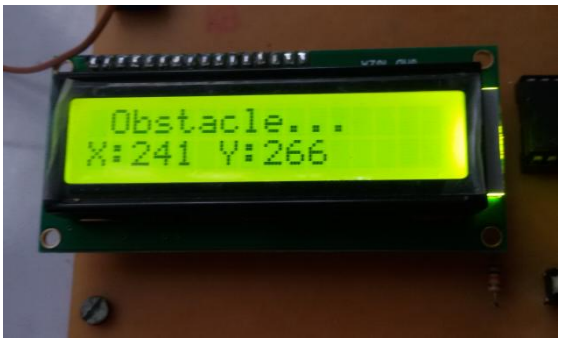


Fig9.

3.Obstacle detected then graph going to high position.

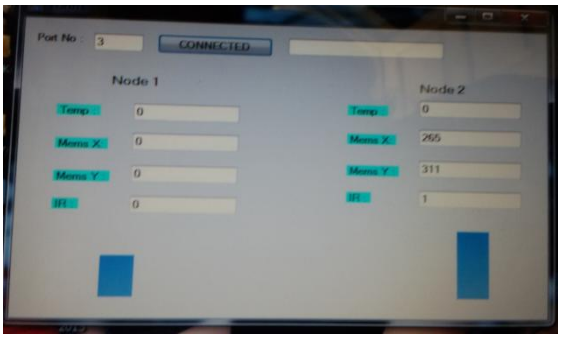


Fig10.

1. Sending mail to the user.

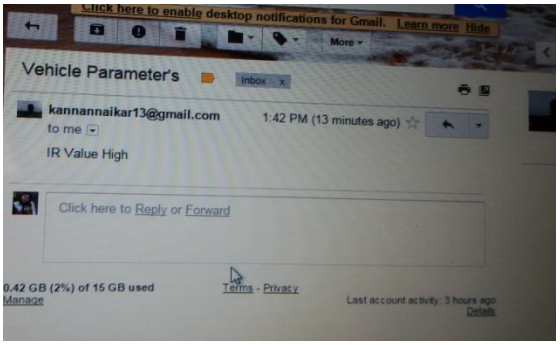


Fig11.

## 9. Conclusion : -

We have designed, developed, and deployed a multi-sensor network for monitoring vehicle parameters. This paper studies the problem of sensor data of vehicle parameter in cyber-physical systems. A method called IntruMine's proposed to detect and compare the intruders(data) from undependable sensor data. The system constructs the monitoring graph and estimates the data of vehicle with the link information. This technology has a wide range of applications across different domains, such as patient healthcare, battlefield surveillance, traffic monitoring, and other cases in science, engineering, education, society, and any field with massive, dynamic, heterogeneous, and interrelated physical and virtual data. It is important to integrate the algorithms with real applications to improve system performance.

## ACKNOWLEDGMENTS:-

I wish to thank Professor Miss R.R.Jagtap for many of her ideas which are included in this paper, and for her continuous support. Further acknowledgements go to my colleagues in our communication Systems Laboratory.

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## BIOGRAPHIES

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