e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:04/April-2022 Impact Factor- 6.752 www.irjmets.com

AN IMPLEMENTATION PAPER ON INFORMATION FUSION FOR MULTI-SENSORY DATA: WOMEN SECURITY AS AN APPLICATION

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ABSTRACT

This concept shows a women's safety device that uses a GPS and GSM module to give women with 24-hour security. GPS, GSM, a buzzer, and other components are all part of the system. When a woman is in distress, a call and a text message with her specific position are sent to registered emergency contact numbers such as the police station, guardian, and so on. This technology will be extremely beneficial in terms of saving lives and averting crimes against women. A GPS sensor, a GSM modem, an LCD display, LEDs, and a microcontroller-based circuit enable this system. The major focus of interest, according to application requirements, is precise intelligent decision making by reducing unreliability and disorganised sensory data in real time.

I. INTRODUCTION

Information fusion is a technique for combining data from a variety of heterogeneous or homogeneous sources to get a better result than the sum of their individual outcomes. Artificial Intelligence, Cognitive Computing, Neural Networks, Machine Learning, and Soft Computing all employ the Information Fusion or Sensor Fusion technology to solve problems. The problem is broken into four pieces in general: a) Gather data or observations from a variety of diverse or homogenous sources. b) Make a list of the information you'll need (data analysis, filtering and estimation). c) Draw some logical conclusions (based on certain comparisons and evaluations) and d) Make some appropriate and sound decisions.

Processed data is fed into the information fusion process, and the sources of the data might range from sensors, pictures, databases, and even human-generated data. Sensor fusion is a subtype of information fusion that uses sensory resources to get data.

As we've seen, information fusion input sources can range from sensory input to visuals. The major goals of information fusion are to increase accuracy and make intelligent decisions. The unprocessed data from the sensor is used as input for information fusion, which converts it into knowledge. This helps to take intelligent decisions.

As the threat of violence against women grows, we offer a method to provide a safety net so that women never feel helpless when confronted with social difficulties. Women's security is very important nowadays, and it has always been a worry for many individuals and committees all around the world. This model can be built in such a way that it detects the victim's location and allows the rescue system to respond appropriately using electrical devices such as GPS and a buzzer. A prototype that is simple to use and beneficial to the sufferer. When a woman does not scan her fingerprint for more than 5 minutes, the system uses GPS services to trace the victim's whereabouts and sends the information to essential emergency contacts and the police control centre. As a result, the victim can defend himself against the aggressor.

II. MODULE DESCRIPTION

Hardware Requirements:

Arduino UNO:

Arduino is an open source microcontroller-based electronic prototyping board that can be programmed using the Arduino IDE. Arduino is made up of two parts: a physical programmable circuit board and an IDE (integrated development environment). The Arduino IDE makes learning C++ easier by using a simplified version of the language. The Arduino UNO is an excellent choice for beginners and one of the most popular

boards in the Arduino series.

The following are the primary components of the Arduino UNO board:

1. USB Connector

This is the printer USB port, which is used to load a programme into the Arduino board from the Arduino IDE.

This connection can also be used to power the board.

2. Power port

An AC to DC adapter or a battery can be used to power the Arduino board. A 2.1mm center-positive plug can be plugged into the board's power jack to connect the power supply. The Arduino UNO board runs on 5 volts, although it can handle up to 20 volts. A voltage regulator (which sits between the power port and the USB connector) safeguards the board from burning out if it is supplied with a greater voltage.

3.Microcontroller

It is the most visible black rectangular chip, with 28 pins. Consider it to be the Arduino's brain. On the UNO board, an Atmega 328 P microcontroller is used. The Atmel (a major microcontroller manufacturer) Atmega 328P microprocessor has the following components. Flash memory of 32 KB The Arduino IDE programme is saved in this folder. RAM of 2 KB This is the runtime memory of the CPU: It's in charge of everything that happens inside the device. The programme instructions are read from flash memory and executed in RAM. 1KB EEPROM (Electrically Erasable Programmable Read Only Memory) This is a type of non-volatile memory that keeps data even if the device is restarted or reset.

The Atmega 328P is pre-programmed with a bootloader, allowing you to load a new Arduino programme straight into the device without the need for an external hardware programmer, making the Arduino UNO board simple to use.

4. Anolog input pins :

The Analog 0 to 5 pins on the Ardunio UNO board are labelled Analog 0 to 5. For system comprehension, these pins can read the signal from an analogue sensor, such as a temperature sensor, and convert it to a digital value. Because of their high internal resistance, the pins only measure voltage and not current. As a result, only a very small amount of current passes through these pins. Despite the fact that these pins are designated analogue and are by default analogue inputs, they can also be utilised for digital input or output.

5. Digital pins

Pins labelled Digital 0 to 13 can be found. These pins can function as input or output.

6. Reset switch

When this switch is pressed, it sends a logical pulse to the microcontroller's reset pin and restarts the programme from the beginning.

7. Crystal oscillator

This is a quartz crystal oscillator that ticks 16 million times per second and executes one action for each tick.

8. USB interface chip

Consider it a signal translator. It transforms USB signals to a level that the Arduino UNO board can recognise.

9. TX RX indicator

The letter T stands for transmit. RX stands for receive. These indicator LEDs flicker when the UNO board is transmitting or receiving data.

GSM/GPRS Module:

A GSM GPRS MODEM includes a GSM GPRS Module as well as other components such as a communication interface (such as Serial Communication – RS-232), power supply, and indicators. We can connect the GSM GPRS Module on the GSM GPRS MODEM with an external computer using this communication interface (or a microcontroller).

Microcontrollers can communicate wirelessly with other devices and equipment using GSM / GPRS Modules. Home automation, home security systems, disaster management, medical assistance, vehicle tracking, online banking, and e-commerce, to name a few, can all benefit from wireless connectivity of microcontrollers.

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LCD:

Liquid Crystal Display is the abbreviation for liquid crystal display. It is a flat panel display technology that is mostly used in televisions and computer displays, but is also also found in mobile phones. These LCDs are not like old CRT displays in that they employ liquid crystals instead of cathode rays as their primary mode of operation. An LCD display is made up of millions of crystal pixels arranged in a rectangular grid. Backlights provide light to each pixel in an LCD display. A red, green, and blue (RGB) sub-pixel can be switched on or off in each pixel. It is black when all of the sub-pixels are turned off, and it is white when all of the sub-pixels are turned on 100%.

LED:

When an electric current passes through a light-emitting diode (LED), it emits light. LEDs allow current to flow in one direction but prevent it from flowing in the opposite way. P-n junctions in light-emitting diodes are extensively doped. When forward biassed, an LED will emit a coloured light at a specific spectral wavelength depending on the semiconductor material employed and the amount of doping.

Fingerprint Scanner:

A fingerprint scanner is a form of technology that uses an individual's fingerprints to identify and authenticate them in order to permit or refuse access to a computer system or a physical location. It is a sort of biometric security system that identifies an individual's fingerprint scans using a combination of hardware and software algorithms. Typically, a fingerprint scanner records the fingerprint scans of all authorised individuals for a certain system or facility. The results of these scans are recorded in a database.

Power Supply:

A power supply is a component that provides electrical power to at least one load. It usually transfers one sort of electrical power to another, but it can also convert another form of energy into electrical energy, such as solar, mechanical, or chemical energy. A power supply gives electric power to components. The word usually refers to devices that are built into the component that is being powered. A power supply, also known as a power supply unit, power brick, or power adapter, is a device that converts electrical energy into electrical energy.

Push Button:

A push button switch is a type of switch that uses a basic electric or air switch mechanism to turn things on or off. They may have a momentary or latching action, depending on the model. Typically, the button is constructed of a durable, long-lasting material such as metal or plastic. Push-button switches come in a wide range of sizes and shapes.

Buzzer:

An auditory signalling device, such as a beeper or buzzer, can be electromechanical, piezoelectric, or mechanical. The fundamental goal is to convert an audio signal into a sound signal. It's typically found in DC-powered clocks, alarm devices, printers, alarms, laptops, and other electronic gadgets. Depending on the various designs, it may emit various sounds such as alert, melody, bell, and siren.

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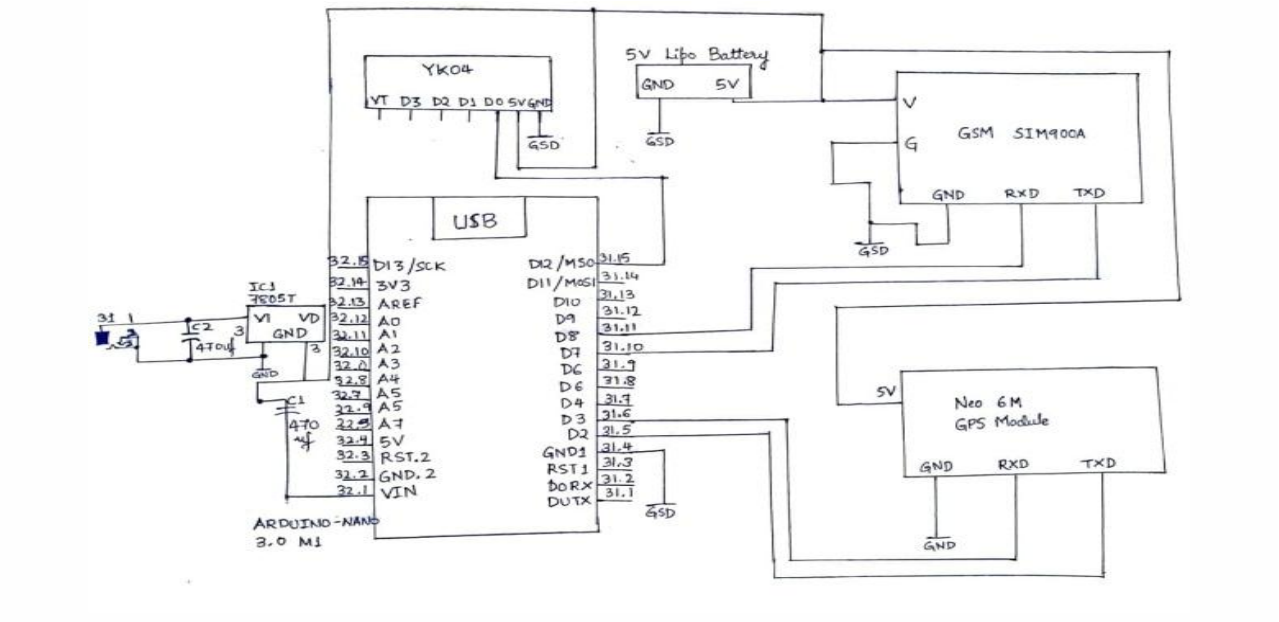
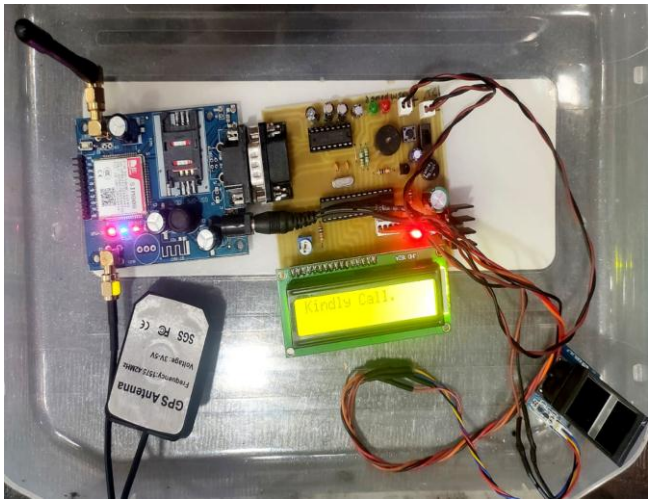
Connection Diagram:



Implementation kit:



Pseudocode:

```
//Pseudocode for connecting GSM module
while gsm not connected
        Print Connecting Gsm
  if  gsm connected
        Print Gsm Connected Successfully
  else
        Print Gsm not Connected
End if
End while

//Pseudocode for fingerprint verification
If fingerprint registered
        Print Kindly Call
        config_number();  //Number registered
```

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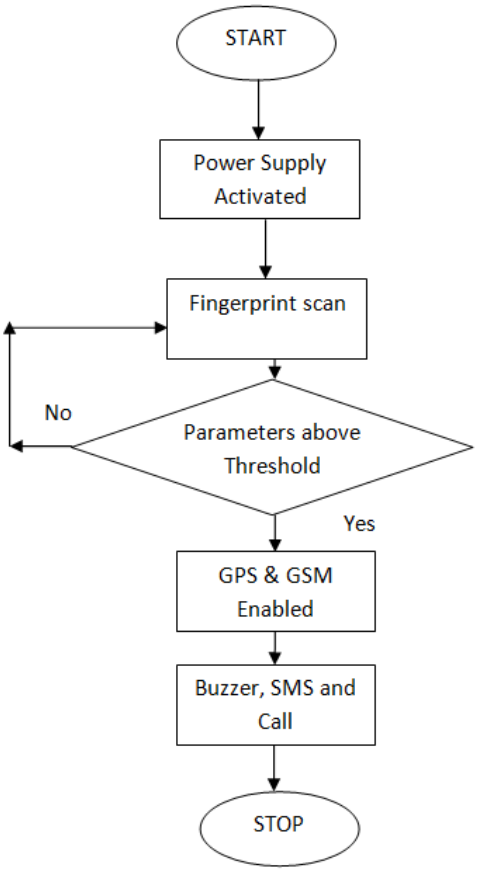
```
Fingerprint scan
if fingerprint verified
        Print Sensor Found
 else
        Print Sensor Not Found
End if
```

Flowchart:



III. CONCLUSION

It was argued that the information fusion method is used to solve problems in several fields such as artificial intelligence, cognitive computing, machine learning, soft computing, and neural networks. It provides a higher level of precision in the outcomes. Thus, we've finalised our project's implementation by completing hardware connections, and the product is now beneficial in avoiding crimes against women.

IV. REFERENCES

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