I. INTRODUCTION:

With over a decade of intensive research and development, wireless sensor network technology has been emerging as a viable solution to many innovative applications. Early works on sensor networks and cyber physical systems have been focused on the development of enabling technologies by addressing a myriad of technical challenges such as multihop routing, communication abstractions, middleware and operating systems (OS), and semantic abstractions and sharing of data. Most of the early testbed systems have been built using early stage sensor network research platforms such as CrossBow (now MEMSIC) motes and TinyOS software framework1. The sensor network hardware platforms are basically low-power embedded microcontroller systems with some onboard sensors and analog I/O ports to connect sensors. A suite of software components also need to be developed, including OS, sensor/hardware drivers, networking protocols, and application-specific sensing and processing algorithms.
Wireless sensor networks (WSN), sometimes called wireless sensor and actuator networks (WSAN), are spatially distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, pressure, etc. and to cooperatively pass their data through the network to a main location. The more modern networks are bi-directional, also enabling control of sensor activity. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance; today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on.

Once out on the sea, the fishermen are subject to various oceanographic and climatic conditions, even in this situation some of their time is not productive which they spend searching for the target. Another problem faced by the fisherman is unknowingly sailing to the international waters which is very dangerous as when borders of international water are subjected to unauthorised intrusion may lead to the disturbance of nation peace. So in this project we are trying to the overcome the above mentioned scenarios to some extent.

II. OBJECTIVE:

We propose to use Wireless sensor networks to have a distributed collection of sensor nodes networked together in some fashion so that they send the raw or processed sensed data to some central location called base station or database server through Transceiver Module. Every sensor node will have a microcontroller, some sensors and a radio transceiver for communication. This microcontroller can be used for in-network processing, so that only the necessary information can be transmitted instead of plain raw data. As the sensor nodes are battery-powered, any reduction in the number of bits transmitted will save power expensed on transmission, thereby extending battery life. There is a lot of research activity in this area addressing problems like sensor node placement for optimal coverage, topology formation, routing, in-network data processing techniques to reduce communication costs, operating system design etc.

Once a network like that is in place, it can also be used for applications like Tsunami Warning using sensors that are planted on the ocean bed, and connected to a surface wireless transmitter.
III. METHODOLOGY:

We propose the automatic system for checking unauthorised intrusion. (Fig.3.1 shown below) The system consists of two modules which are transmitter station and receiver station with personal computer as an analyzing center or monitoring center or on shore user system.

Our Idea of implementing WSN is a 3 node based in star topology, the system consists of two modules which are transmitter station (End node) and receiver station (Base node) with personal computer as an analyzing center or monitoring center or on shore user system.

![Fig 3.1: Three node based WSN in STAR topology](image)

Base Node Architecture

We are to setup the receiver node as base station which would gather the information from the other nodes, process the information and send the warnings or message to the on shore user system.

The main components used in this node are power supply, Raspberry Pi computer, Raspberry Pi camera module, PIR motion detection sensor and an nRF24L01 transciever module.
End Node Architecture

We propose to use proximity sensors in transmitter station to monitor intruder detection which would send the data accordingly to the base station for the further actions to be taken.

Fig 3.3: End Node Architecture

The transmitter node (End node) consists of: Proximity Sensor nodes, NRF24L01 Transceiver Module, Microcontroller (Arduino Uno).
The acquired data by the proximity sensor is first processed by the microcontroller i.e. Arduino Uno in this case and further communication of this node to the base node is carried on by another nRF24L01 transceiver module.

The above routing scheme provides higher value of scalability i.e sensor nodes can be easily added or removed from the network based on the applications requirement by mere adjustment in the software part of the system.

IV. RESULTS AND CONCLUSION

- We interfaced sensor module with the Arduino board.
- Next we interfaced the RPi Camera module with the Raspberry Pi computer and captured some random images.
- We then communicated between RPi computer and the Arduino board using nRF24L01 transceiver module by sending a small text.
- Next we successfully captured the image by camera module to which we have made adjustment such that above action is to be triggered using PIR motion sensor.
- We have also communicated the sensor reading from Arduino board to RPi computer.
- The data communicated to the base node by the end node is then processed to check whether any further actions required and if yes, it is forwarded to the email as a notification.
- The image captured while triggering the PIR sensor is then uploaded to the Database (We have used Dropbox as database).

This system was mainly designed and implemented with three nRF transceiver modules: two for transmitter and one for receiver. Microcontroller is used to read measured data from IR sensing module. After obtaining data from sensing module, the data can be transferred to database by the Raspberry Pi computer through GSM modem.

The system has a number of attractive features, including low-cost, compact, scalable, easy to customize, easy to deploy, and easy to maintain. One major advantage of the design lies in the integration of the gateway node of wireless sensor network, database server, and web server into one single compact, low-power, credit-card-sized computer Raspberry Pi, which can be easily configured to run headless (i.e., without monitor, keyboard, and mouse). Such a design is useful in many environmental monitoring and data collection applications.
V. SCOPE FOR FUTURE WORK

As future work, the system design presented in this project can be expanded in a number of different aspects. For example, additional sensing modalities can be integrated on sensor nodes to meet the needs of various monitoring applications. Also, the web interface can be further developed to implement more functionality in data visualization, management, and analysis among many others to provide better user interface and better user experience. Considering the limited storage space on the Raspberry Pi, it is also useful to integrate a second database server on the Internet or on the cloud storage service, and then upload and/or synchronize the data tables between the two data storage servers. A cloud storage is also useful in the scenarios where the base station (i.e., Raspberry Pi) resides in a private IP intranet, and it is not directly accessible from Internet.