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DETECTION OF TEMPERATURE IN A SERVER ROOM USING WSN

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Abstract. The goal of this project was to design and build a wireless sensor network. Following an exploration of personal area networks and mesh networking, a system was implemented to detect physical intrusion. To that end, our network employed sensor nodes equipped with motion sensors and accelerometers. The network communicated with a generic infrastructure, adaptable to future wireless sensor projects, which stored sensor data in a database. Also included was a user interface to monitor the status of the entire system.

1 Introduction

Wireless sensor networks consist of distributed, wirelessly enabled embedded devices capable of employing a variety of electronic sensors. Each node in a wireless sensor network is equipped with one or more sensors in addition to a microcontroller, wireless transceiver, and energy source. The microcontroller functions with the electronic sensors as well as the transceiver to form an efficient system for relaying small amounts of important data with minimal power consumption.

The most attractive feature of wireless sensor network is their autonomy. When deployed in the field, the microprocessor automatically initializes communication with every other node in range, creating an ad hoc mesh network for relaying information to and from the gateway node. This negates the need for costly and ungainly wiring between nodes, instead relying on the flexibility of mesh networking algorithms to transport information from node to node. This allows nodes to be deployed in almost any location. Coupled with the almost limitless supply of available sensor modules.

1 Literature Review

In reference [1] the network must possess self-organizing capabilities since the positions of individual nodes are not predetermined. Cooperation among nodes is the dominant feature of this type of network, where groups of nodes cooperate to disseminate the information gathered in their vicinity to the user.

In reference [15] sensor networks have different requirements than other wireless networks. The need for robustness and scalability leads to the design of localized algorithms, where sensors only interact with other sensors in a restricted vicinity and have at best an indirect global view.

In reference [23] there is a need for delivering queries to nodes that have observed particular events in the network and getting the data back to the point where the interest was expressed. One way to achieve this is to establish a global coordinate system and perform geographic routing. Another simpler approach would be to just flood the query or the event.

In reference [18] the authors present a 2-level hierarchical routing protocol (LEACH) which attempts to minimize global energy dissipation and distribute energy consumption evenly across all nodes. This is achieved by the formation of clusters with localized coordination, by rotating the high-energy cluster.

In reference [13] a desired property of such an environment would be the ability to discover resources and locate services dynamically based on an assigned "name" which describes application-specific attributes of the service. However, to make such a system useful in a highly dynamic environment.

In reference [9] the authors examine how CSMA based medium access can be adapted for sensor networks. CSMA strategies include listening to the channel before transmission, using explicit positive or negative acknowledgments to signal collision, relying on time synchronized slotted channels or performing collision detection.

In reference [11] provide support for secure transient association between a master and a slave device or between peers in a wireless ad-hoc network. Consider, as an example, a universal remote that controls most appliances in your home which are networked in a wireless ad-hoc fashion.

In reference [17] a RFID based system has been developed to keep a track of the patient and creates a database which is updated on each visit of the patient to a hospital. The device simultaneously records all the vital information from the sensors on the patient and updates them in the database.

3 Proposed System

We will implement a wireless sensor network using the Tmote sky platform, including all supporting infrastructure, for a monitoring application. In doing so, we will show that wireless sensors networks are indeed a viable emerging technology available to engineers for a wide range of applications. We will document our process from start to finish, enumerating the requirements for building a functional wireless sensor network and all supporting architecture. By establishing this example we will expose the benefits and drawbacks of moving sensing applications onto an embedded.

The system deals with the following points:

1. Measuring the temperature of the server room.
2. Acquiring and logging all the information onto a local database.
3. Keeping a record of the temperature and alerting the staff for action.
4. Avoiding obstacles such as double reading of same temperature.
5. Uses own wifi module atmega360p for its course of sending information.

The current undertaking work centers to execute equipment to demonstrate the idea of wireless sensor network. In this wireless network two hubs are thought of; hub 1 is outfitted with a wireless correspondence module of 2.4GHz recurrence and WiFi module to transfer natural information The worker utilized in this task is Thingspeak worker given Mathswork. Hub 2 is furnished with 2.4GHz correspondence modem used to move data to hub 1. Hub 1 is actualized utilizing

NODEMCU moduleng inbuilt arduino regulator and WiFi.

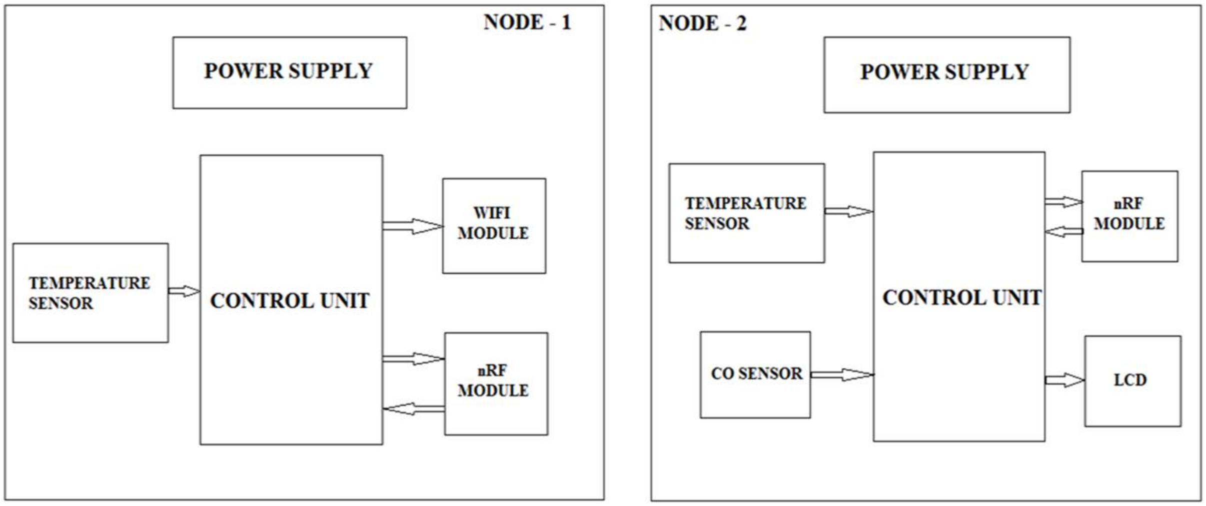

Fig 1: Block Diagram of the Wireless Sensor network diagram

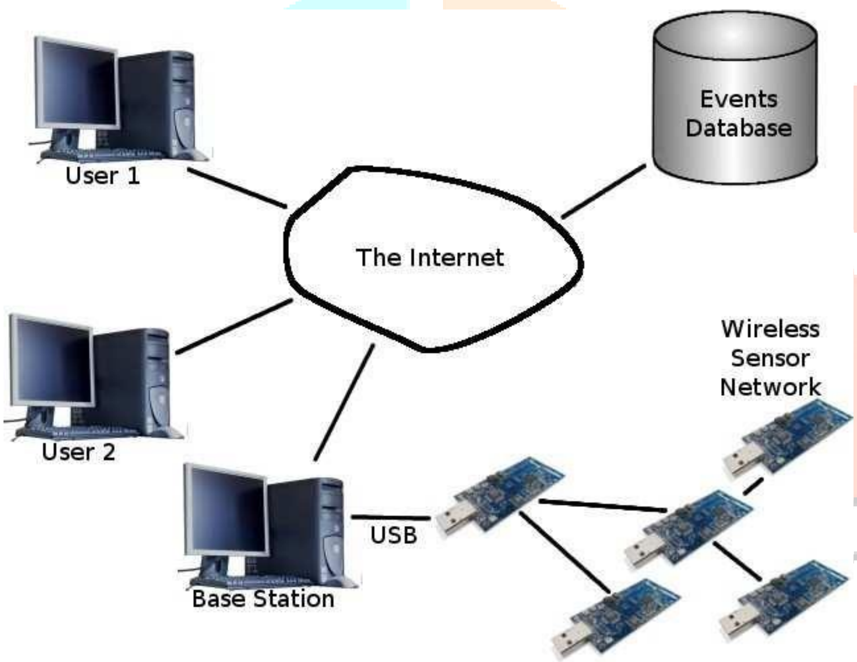

Fig2 Wsn architecture

4 System Architecture

Fig. 1 describes the architecture of the proposed low power mesh network wireless sensor system. This system is designed to monitor the water level in gully pots connected to the sewer network. Zigbee based short ranged WSN was selected for this application because of its low cost, low data rate, low power consumption, simple communication infrastructure, low latency and capability to support one master and up to 65000 slave control units [15-17]. The system consists of sensor nodes, a data gatherer and a remote user terminal. Each sensor node comprises of a radio transceiver, data acquisition board and acoustic sensor probe. Communication between the sensor nodes and the data gatherer is via the Zigbee protocol. The data gatherer communicates with the remote user terminal via either the Ethernet connection or WiFi/GPRS access, depending on the type of user terminal being used. Apart from providing the interface between the sensor nodes and the user terminal, the data gatherer also acts as a web-server. Once the sensor nodes received the digital sensor signal via the interface circuit board, by implementing a mesh network communication configuration, this WSN allows for continuous connections and reconfigurations around blocked paths. This results in hopping from sensor node to node until a connection can be established with the data gatherer. It should be noted that the mesh networks posses the self-healing capability that will operate even when a node breaks down or a connection fails. As a result, it forms a very reliable network. As soon as the data arrived at data gatherer, it is stored in the web-server database. The data is then retrieved by the user terminal and a graphical output of the water level and the battery level are displayed through an application interface.

5 System Implementation

1. Hardware implementation
2. Software implementation

- **Hardware Implementation**

The device identifies all the real components that are important for the continuation of the cycle by obtaining attributes and sending them to the controller.

This function consists of two separate sets one hub 1 and another 2. Hub 1 responds by collecting data internally and hub 2 is responsible for collecting data externally. Hub 1 has two different types of wireless IoT enabled access used for user data recovery. IoT management provides unlimited data in the library. Hub 1 and 2 have an RF wireless module to provide short-term communication between each other. The Hub 1 only collects natural heat while the harp is connected to a carbon mono-oxide sensor to check the level of pollution in the climate. The client can view the details in hub 2 on the corresponding LCD. The diagram below is presented with a block graph of the proposed model.

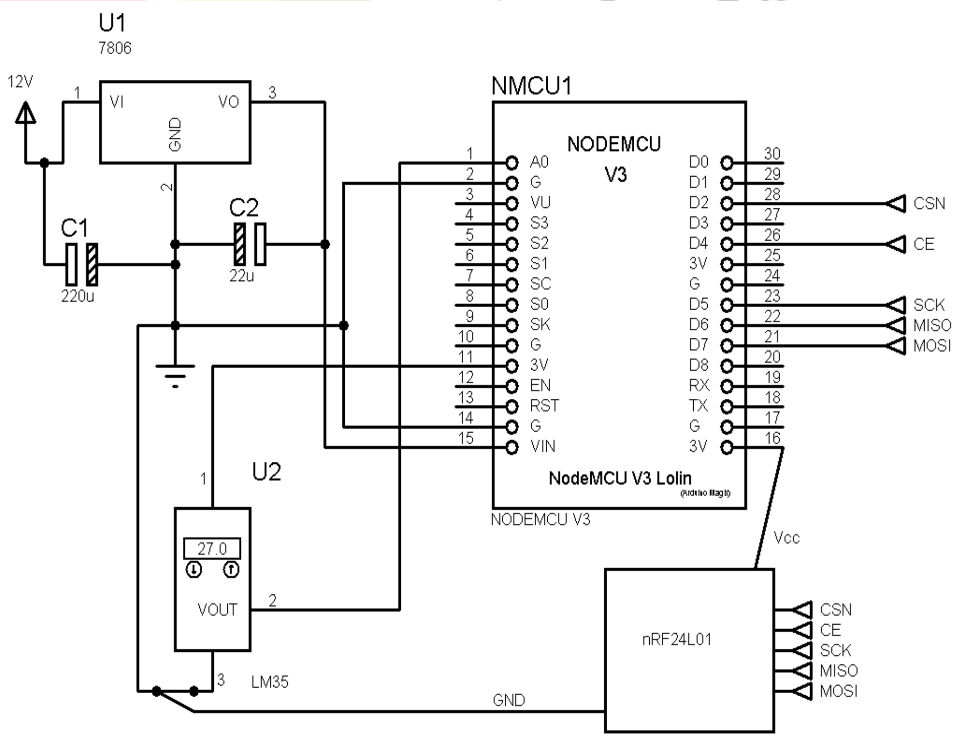

Fig3 : Circuit diagram of Node 1

ATMEGA 328P

A controller is a gadget that performs functions, balances data and controls the usefulness of the various components in the framework. The most popular controller is the microcontroller but it has a variety of options as well as a useful global chip chip, advanced signature processors, FPGA and ASICs.

For this work we have used ATmega328. Created by ATMEL under the megaAVR family. It is the only chip microcontroller built by Harvard. It has an 8-cycle RISC processor center. It has a combination of 32 KB ISP streak with reading time, 1KB EEPROM, 2 KB SRAM, 23 useful information / product lines, 32 active worldwide registers, 3 flexible clocks / counters, internal and external items, SART sequenced byte-situated 2-wire sequential interface, SPI portable port, 6-channel 10-bit A / D converter, adjustable dog clock with internal oscillator and 5 optional power options. It operates a maximum of ATmega at 1.8-5.5 volts. Its input is close to 1MIPS / MHzA number of commercial Zigbee compliant wireless sensor platforms have emerged in recent years [18]. Not all of them are suited to this work due to the inclusion of proprietary communication protocol and the lack of Ethernet IP connection from the gateway node in some of the wireless structure across .

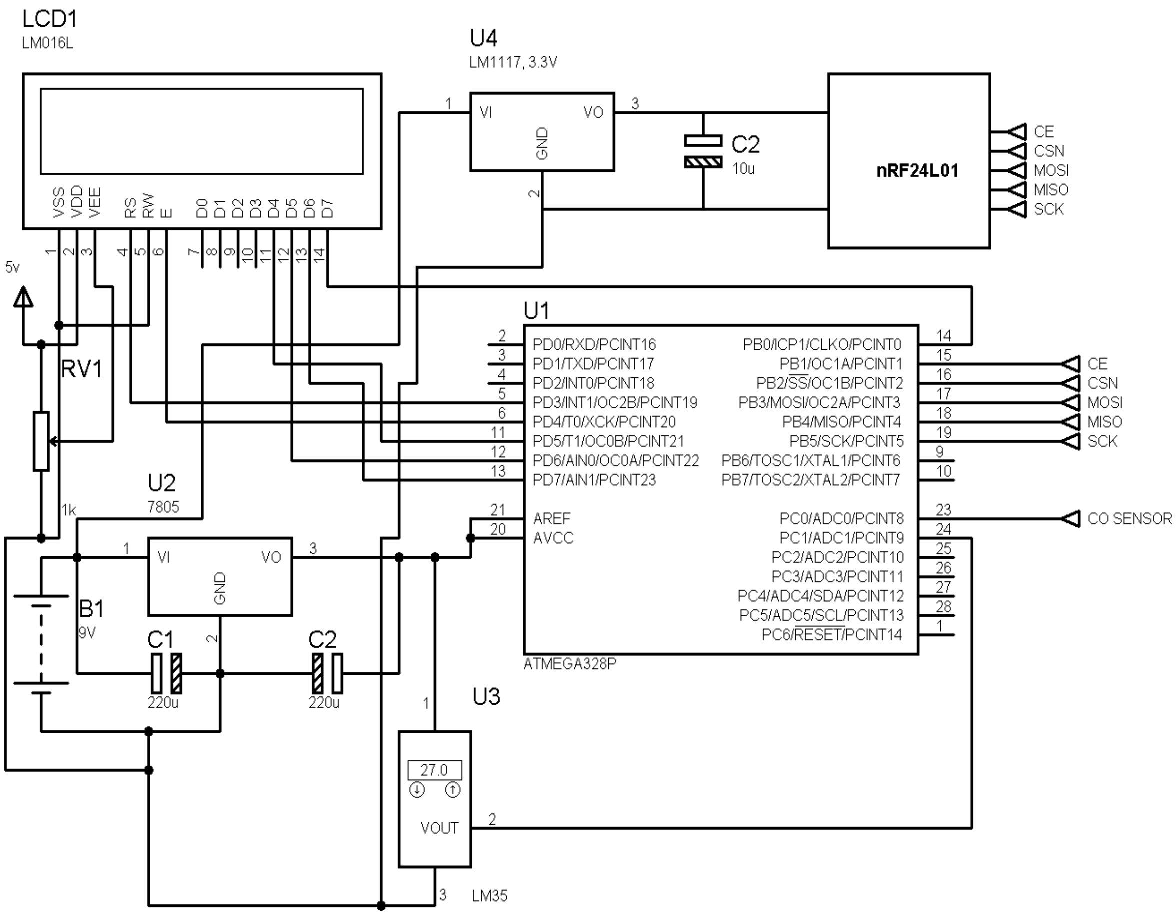

Fig:4 Circuit diagram of Node 2

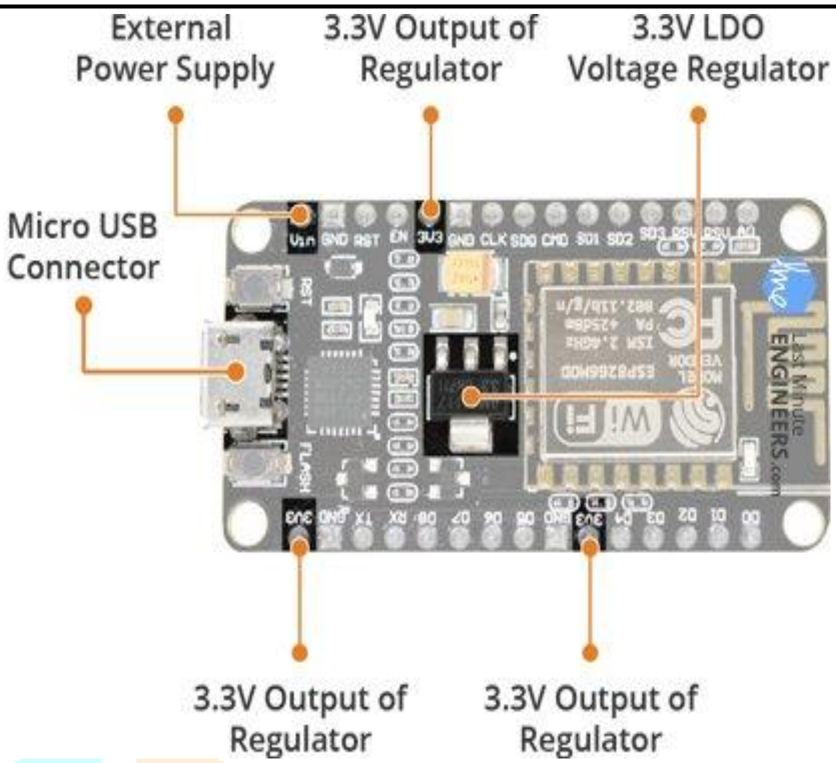

Fig:5 NodeMCU

NodeMCU

NodeMCU is an development package used for modeling or making IoT products.Opable source firmware. Uses Lua script language. The firmware depends on the Luka business and is based on the Espress if Non-OS SDK for ESP8266. The firmware works on ESP8266 Wi-Fi SoC from Espress if Systems, with equipment based on the ESP-12 module.The E SP8266 is actually a small controller and not a Wifi module. It is a creation by Espress if Systems, an organization based out of shanghai.It is wide used as the Wi-Fi module because of its capacity to perform Wi-Fi exercises. Here, we use ESP8266-12. All ESP modules have the same type of mode but not the same as the rest board. In ESP8266-01 there are 2 GPIO pins. This chip enables assets to be integrated with the web and to become IoT gadgets. It is a Wi-Fi module used for sending and receiving cloud.

Sensors

Wireless sensor network utilizes sensors to assemble information from the climate. These are the equipment gadgets which produce a major reaction to an adjustment in a very completeness like temperature or weight. Actual information of the boundary is checked by the sensor and have explicit attributes like exactness, affectability and so on In our venture, we have utilized the accompanying sensors :

CO Sensor

A carbon monoxide locator or CO identifier is a gadget that identifies the presence of the carbon monoxide (CO) gas to forestall carbon monoxide harming. In the last part of the 1990s Underwriters Laboratories changed the meaning of a solitary station CO finder with a sound gadget to carbon monoxide (CO) alert. This applies to all CO security alerts that satisfy UL 2034 guideline; anyway for inactive markers and framework gadgets that meet UL 2075, UL alludes to these as carbon monoxide locators.

- **Software Implementation**

Node 1 is equipped with a 2.4GHz wireless communication module and a WiFi module to upload environmental information to the server. The server used in this project is the Thing speak server provided by Maths work. Hub 2 is equipped with a 2.4GHz communication modem used to transmit data in hub 1.

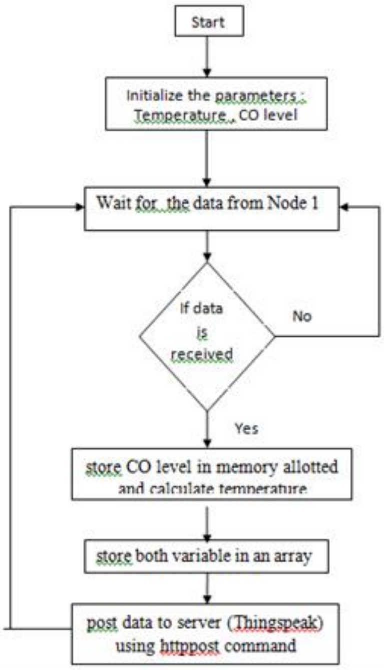

Fig6: Node1 flowchart

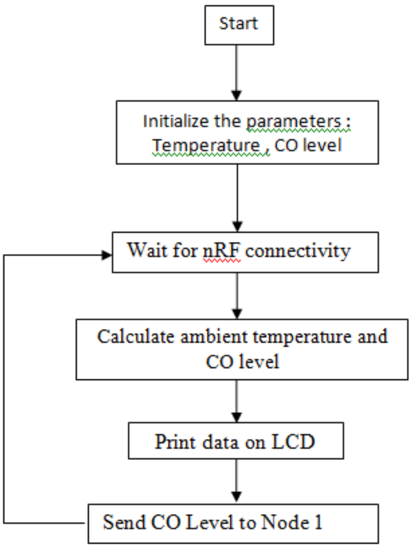

Fig7. Node2 flowchart

6 Conclusions

Research into continuous testing of Carbon mono-oxide and different parameters such as temperatures present in climate has examined the use of wireless sensor network based on RF transcription and Internet of Things (IoT). The framework of regular inspections is designed to give a clearer and clearer view of the weather. This framework shows the limitations on the LCD in the underground part where the sensor unit is introduced as in the PC unit test unit on the go to work; it will be beneficial for all present within the space to save their lives before any recurrence occurs. This framework further stores all information on the PC for future reference. From experiments and speculations, the corresponding end can be drawn:

7 Results

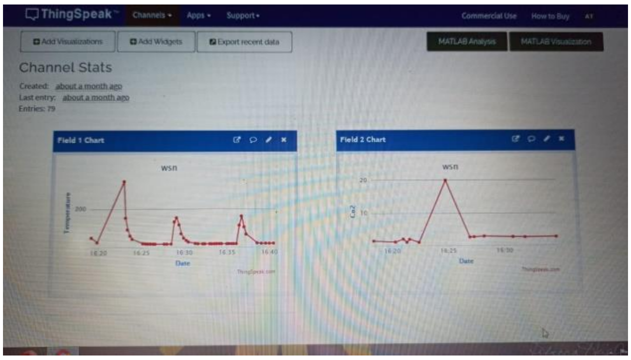

Fig 8: The figure shows the prototype of the wearable device along with all the sensors mounted onto a general-purpose board.

In this work, we develop a cyber-physical-social design approach for temperature monitoring with wireless sensor networks. The source nodes adopt sleep/wake scheduling, that is, wake up and sense the temperature with duty cycles, and forward the data to the destination through multi-hop relaying nodes with any cast protocol. We first show an optimal delay algorithm, which is proven analytically and via simulations. We further implement this any cast scheme on a sensor platform. We dynamically adjust the period of sleep/wake duty-cycle based on the measured temperature. Particularly, when the measured temperature is in the normal range, the sensor nodes wake up infrequently in order to achieve high energy efficiency. On the other hand, if the sensed temperature increases closer to a threshold, the sensors wake up more frequently so that the an alarm can triggered in time. We implement our design using sensors with TinyOS, and we show that experimental delay matches our mathematical analysis.

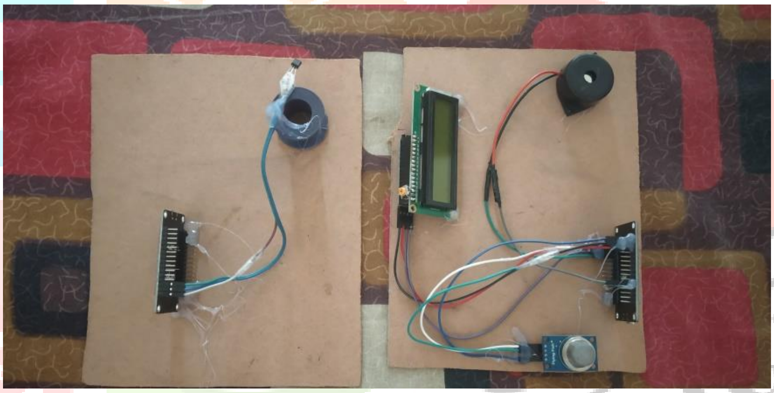

Fig 9: The figure shows the autonomous robot with all the sensors mounted on to it and the medicine box mounted at the end.

8 Future Potential

There are several more technologies relevant to the construction of wireless sensor networks that we did not have the means to pursue. These technologies could be useful to sensor networks, and should be considered in any future implementation. Our experiences with the Tmote Sky platform lent themselves to supporting two technologies in particular: alternative energy sources and node localization. As discussed in sensor localization is of prime importance to ad-hoc wireless sensor networks.

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