Land Slide Detection and Animal Detection Using WSN

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***Abstract*— This paper is based on wireless sensor network for IOT applications has recently made significant progress and is attracting growing attention in a number of disciplines and application domains. In this paper we describe the method of land slide warning system in order to reduce and prevent the damage of landslides, landslide monitoring is very important to the prediction and estimation of the landslide hazard and prevention. Another method is animal activity detection which is a very important and emerging area due to a large number of real life applications. This project is successfully implemented in embedded tools.**

***Index Terms*— LPC2148 (ARM7), S3C2440(ARM9), GPRS wireless transmission module, ZIGBEE, Sensors, Internet of Things, environmental monitoring applications, WSN optimized design, WSN platform.**

I. INTRODUCTION

Landslide monitoring is an important topic related at the hill slides. Landslides are geological phenomena causing significant loss of life and loss of properties in damages each year in many countries. Therefore technology has to be developed to capture relevant signals with minimum monitoring delay. Wireless sensors are one of the technologies that can quickly respond to rapid changes of data and send the sensed data to the receiver section in areas where cabling is not available. Various animal detection methods and warning systems are used for indicating the presence of animals on the roads or residential area. Applications which are very important in real life are preventing animal vehicle collision on roads, preventing dangerous animal intrusion in residential area, knowing locomotive behavioral of targeted animal etc. All these applications can be narrowed down to three areas namely detection, tracking and identification of animals. The very first area that is detection of animals is applied in various fields of real life applications. The second area that is tracking of animals is important for monitoring or observing the locomotive behavior of animals and its surroundings. The third area that is identification of animals is very important in identifying the targeted animal and its behavior identification of animals helps human being to monitor and manage animals easier.

In this project we designed and developed RFID-based mobile monitoring system for better management of animals in dynamic information retrieving, location tracking, to count the number of animals in forest and to help users over a wireless network. Wireless sensor network (WSN) technology has the capability of quick capturing, processing, and transmission of required data in real-time with high resolution. However, it has its own limitations such as relatively low amounts of battery power and low memory availability compared to many existing technologies. It does, though, have the advantage of deploying sensors in hostile environments with a minimum of maintenance.

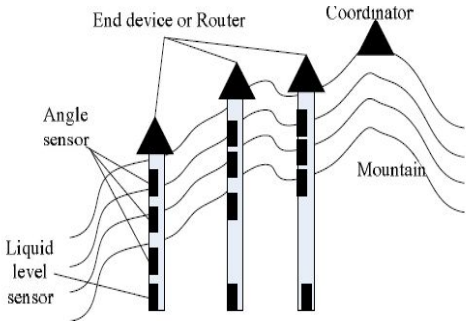

Fig.1. Structure for land slinding

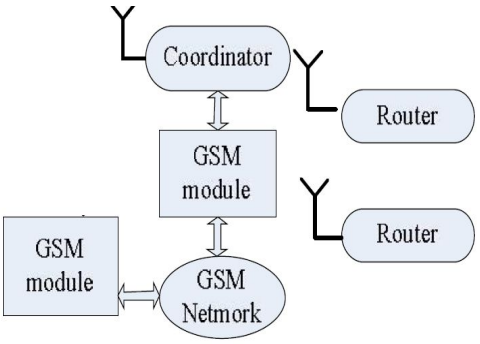

Fig.2. Structure for animal detection

This fulfills a very important need for any real time monitoring, especially in hazardous or remote scenarios. GPS is being increasingly used also for automated continuous monitoring of landslides and avalanches. For such GPS-based deformation monitoring systems, the accuracy, availability, reliability and integrity of the positioning solutions heavily depend on the number and geometric distribution of satellites being tracked. It is composed of a series of sensors, of easy and rapid installation, which can be positioned directly upon the landslide body, or in the immediate surroundings, to provide continuous data on the landslide activity. The SMS technology also enables the user to dialogue with the system, to obtain information on the monitoring operations, either by means of SMS messages. They cause considerable damage to highways, railways, waterways and pipelines. They commonly occur with other major natural disasters

such as earthquakes), volcanic activity, and floods caused by heavy rainfall. In many cases, expanded development and human activities, such as modified slopes and deforestation, can increase the incidence of landslide disasters.

II. OPERATION OF WSN NETWORKS

Following Figure shows the block diagram of node1,2and 3.

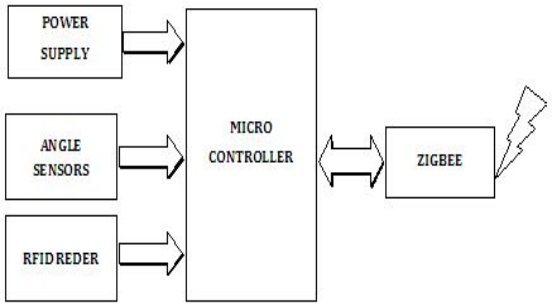

Fig.3. Node Section 1

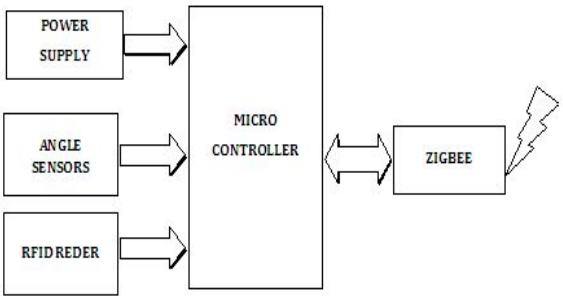

Fig.4. Node Section 2

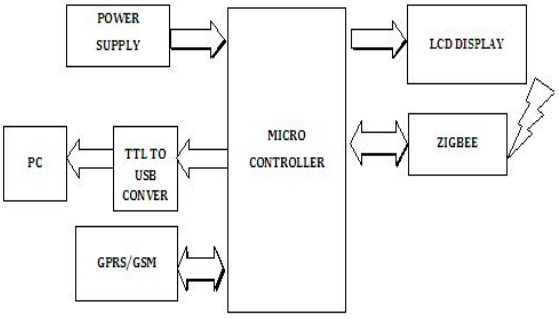

Fig.5. Node Section 3

III. CIRCUIT DIAGRAM SYSTEM

Below fig show circuit diagram of transmitter. The ARM7 LPc2148 is the main processing microcontroller having the 12 MHz crystal connected to pin pin no 61 and pin no.62

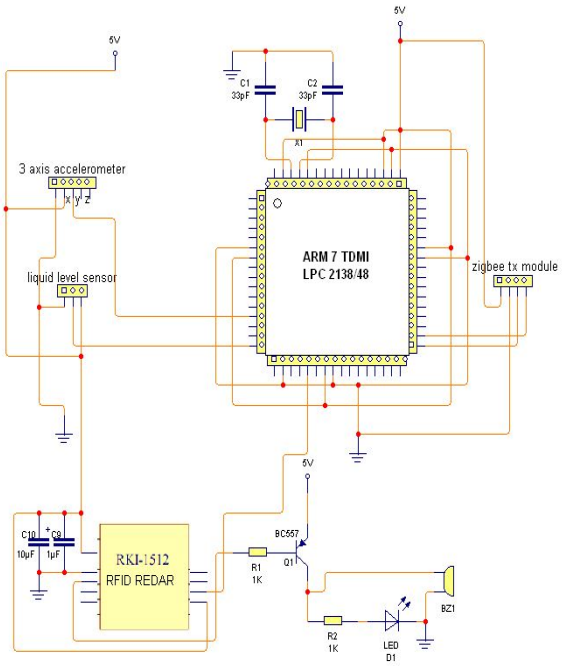

Fig.6. Transmiter section

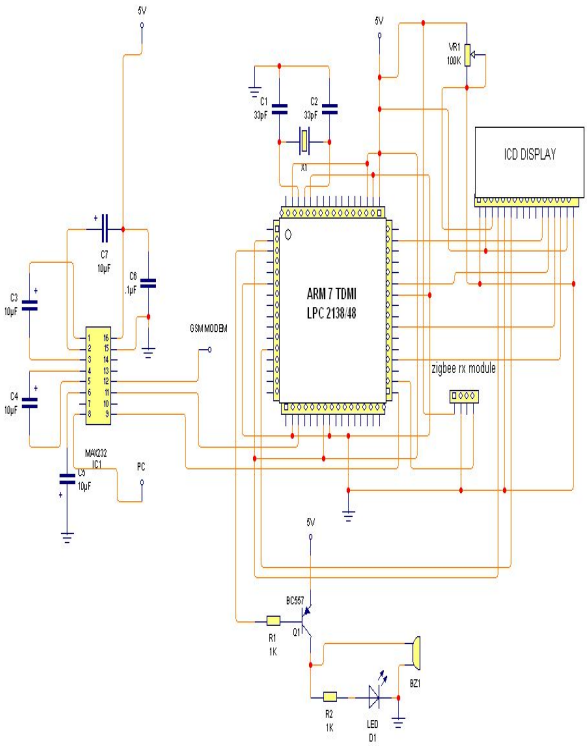

Fig.7. Receiver section

Above fig show circuit diagram of Receiver

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IV. ALGORITHM AND FLOW CHART

A. Algorithm of Transmitter section:

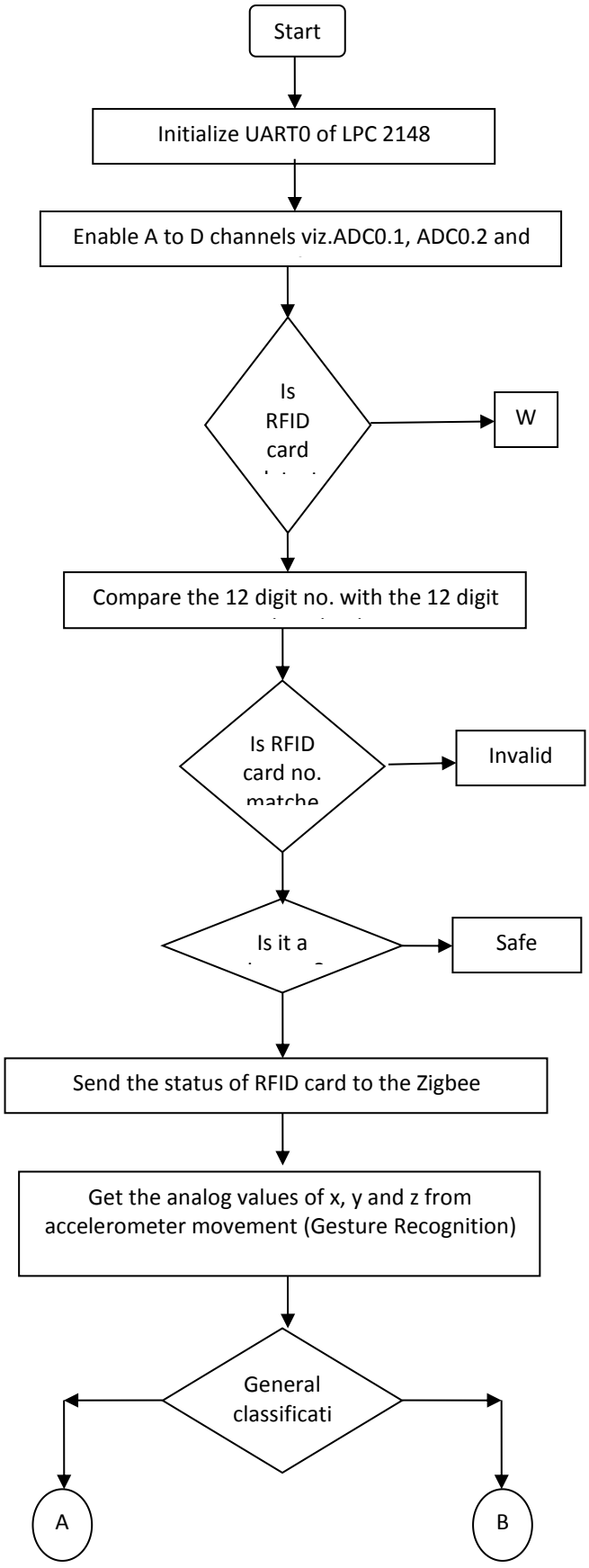
1 Switch on the system
2 Initialize UART0
3 Enable ADC channels
4 Wait for the RFID card to be detected
5 RFID card is detected
6 Compare the 12 digit number given by RFID card with the 12 digit number stored in the device
7 If matched, send the status to the Zigbee transmitter having the frequency 2.4 GHz using UART0 LPC 2148
8 Take the analog input from accelerometer movement (gesture) connected to the AD0.1 channel of LPC 2148.Convert the analog signal to the digital signal. Record the x, y, z values
9 Send the values of x, y, z given by the accelerometer to the Zigbee transmitter using UART0 of LPC 2148
10 Get the analog signal from liquid level sensor connected to the pin
11 Send the value of temperature to the Zigbee transmitter using UART0 LPC 2148

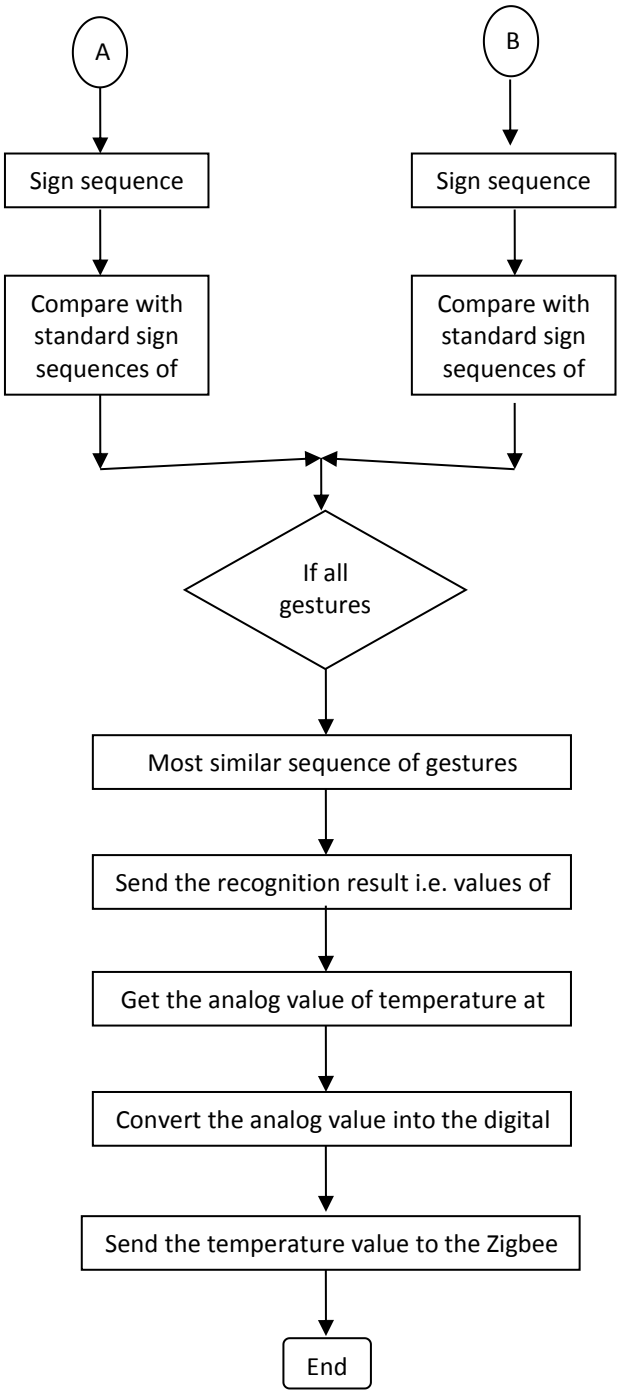
B. Algorithm of receiver:

1 Reception of status of RFID card being detected, values of x, y, z of accelerometer and value of temperature by the Zigbee receiver
2 Display states of RFID system on LCD
3 Display accelerometer states on LCD
4 Display liquid level sensor on LCD
5 Send the alert message using GSM modem connected to the UART1 to the owner regarding animal detection and land slide detection movement
6 Send all parameter to the PC using UART0

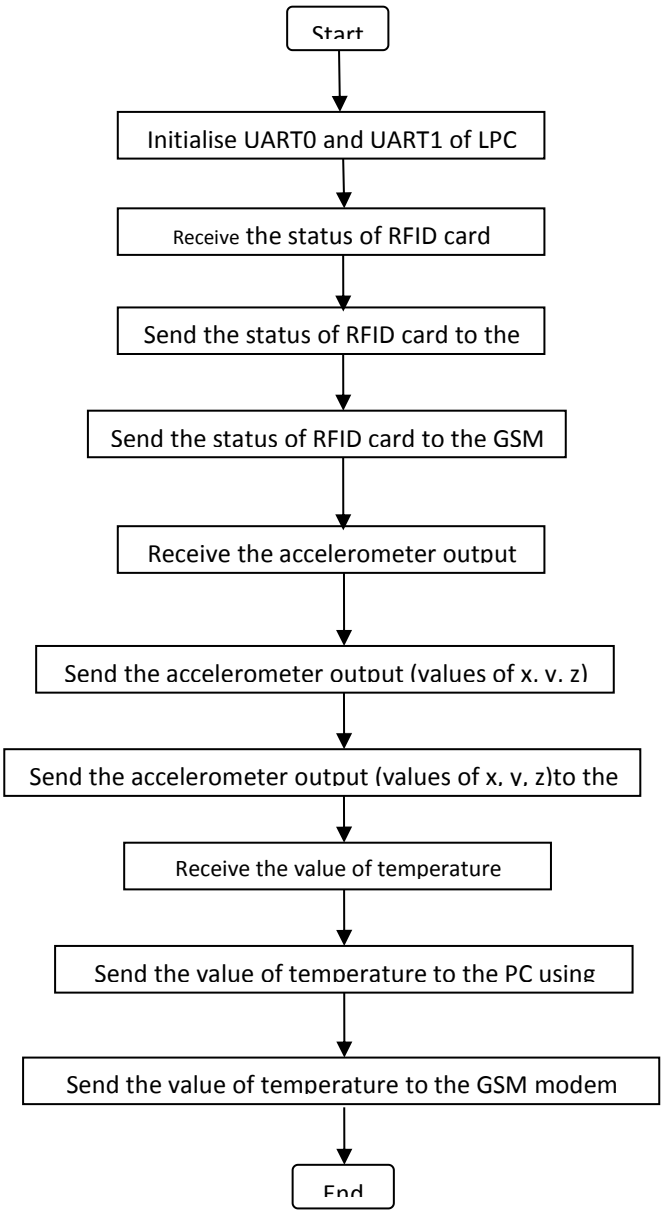
C. Flowchart for Transmitter section:

Following shows the flowchart of transmitter 1 and 2:





Following shows the flowchart of receiver:



V. SIMULATION RESULTS

Simulation of this project is done using Proteus software. For simulation we used UART terminals. Following fig. shows the simulation result of animal detection in which lion is detected using RFID and this information is sent to the receiver where GSM and pc is connected for processing the information.

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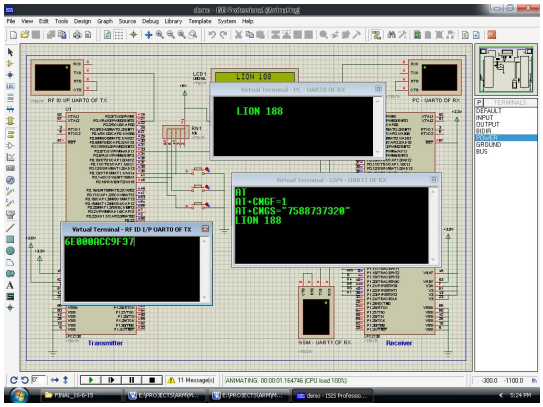

Fig.8 Animal detection

Following fig.9 shows the simulation result of land slide detection in which landslide is detected using sensors and signal is sent to the receiver.

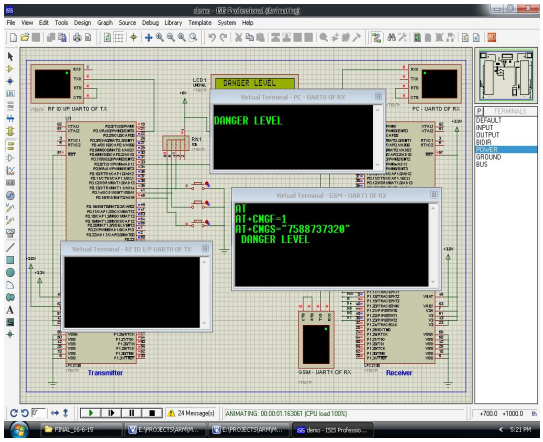

Fig.9 Landslide detection

VI. CONCLUSIONS

It is proved that the potential of the wireless sensor networks concepts will be fully unleashed once it is connected to the Internet, becoming part of the Internet of Things. However, it is necessary to discuss whether a full integration at the network level (i.e. using direct TCP/IP connections) should be advisable for every application. It has also some disadvantages like overall cost. It has high complexity level. In future we can use different techniques by which cost is reduced.

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