

LANDSLIDE WARNING SYSTEM DETECTION USING RASPBERRY PI, ARDUINO AND ZIGBEE

Submitted in partial fulfillment of the requirements
of the degree of

Bachelor of Engineering

By

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Project Report Approval for B.E

This project report entitled *Landslide Warning System detection Using Raspberry pi,Arduino and Zigbee* by *Khan Mohd Haris Masood Ahmed and Kazi Mohammed Saad Siraj* is approved for the degree of *Bachelor of Engineering*.

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Declaration

We declare that this written submission represents our ideas in our own words and where other sides or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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ACKNOWLEDGEMENT

We appreciate the beauty of a rainbow, but never do we think that we need both the sun and the rain to make its colors appear. Similarly, this project work is the fruit of many such unseen hands. It's those small inputs from **Asst. Prof. ZARRAR KHAN** and **Asst. Prof. SHAHEBAZ M. ANSARI** as well as some different people that have lent a helping to our project.

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ABSTRACT

In this project we are going to study about Landslide warning system, as the occurrence of landslides is a big loss for human life and property. We can't stop the natural causes but we can be alert before they occur. So for alerting people from landslides we use this technique. In this design we have used three sensors of Angle sensor which gives the readings of slope angle if there is any movement in landslide and we have Liquid level sensor it collects the depth of water at the mountains. Temperature sensor gives the changes in the temperature. These all nodes of sensors are connected to the Raspberry pi for collection of data. As the data is collected then all the readings are given to Zigbee for transmission. As we obtain the information at the receiver side by LCD display at receiver station or by SMS we can alert the people and save lives and property. Thus this project is very important as we use it in our real time purpose for saving lives and property. This design combines of wireless communication technology and Wireless Sensor Network.

TABLE OF CONTENTS

PROJECT REPORT APPROVAL FOR B.E.

DECLARATION

ACKNOWLEDGEMENT	V
ABSTRACT	VI
TABLE OF CONTENTS	VII
LIST OF FIGURES	IX
LIST OF TABLES	X
1. CHAPTER NO 1	02
1.1 INTRODUCTION	03
2. CHAPTER NO 2	04
2.1 OBJECTIVE OF PROJECT	05
3. CHAPTER NO 3	06
3.1 CASE STUDY	07
4. CHAPTER NO 4	08
4.1 PROBLEM STATEMENT	09
5. CHAPTER NO 5	10
5.1 SCOPE OF THE PROJECT	11
6. CHAPTER NO 6	12
6.1 METHODOLOGY	13
7. CHAPTER NO 7	14
7.1 BLOCK DIAGRAM	15
8. CHAPTER NO 8	16
8.1 HARWARE REQUIREMENTS	17
8.1.1. Accelerometer (MEMS)	18
8.1.1.b) Water level sensor	19
8.1.1.c) Temperature sensor	20
8.2 TYPE OF MODULES USED	21
8.2.1) Raspberry pi	27

8.2.2) Arduino Atmega (2560)	32
8.2.3)Zigbee	38
9. CHAPTER NO 09	41
9.1 RANGES	42
10. CHAPTER NO 10	43
10.1 COST ANALYSIS	44
11.CHAPTER NO 11	45
11.1 ADVANTAGES	46
12.CHAPTER NO 12	
12.1 CONCLUSION	47
12.2 FUTURE SCOPE	47
BIBLIOGRAPHY	

LIST OF FIGURES

Figure 7.1: Block diagram of landslide warning system	15
Figure 8.1.1.a. Accelerometer (MEMS)	18
Figure 8.1.1.b: Water level sensor	19
Figure 8.1.1.a: Temperature sensor (LM35)	20
Figure 8.2.1: Raspberry pi (Model B)	27
Figure 8.2.2 :arduino atmega 2560	32
Figure 8.2.3.a :zigbee s2	38
Figure 8.2.3.3 :Zigbee Usb Explorer	40

LIST OF TABLES

Table 1: 8.2.2.1 Technical specs	33
Table 2: 9.1 RANGE	42
Table 3: 10.1 cost analysis	44

CHAPTER NO. 01
INTRODUCTION

1.1 Introduction

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. 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. 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. This fulfils a very important need for any real time monitoring, especially in hazardous or remote scenarios.

CHAPTER NO. 02
OBJECTIVE OF THE PROJECT.

2.1 Objective of The Project

Safe land has the objectives to provide policy makers, public administrators researchers, scientist, educators and other stakeholder with an improved harmonized framework and methodology for the assessment and quantification of landslide risk in world many regions; Evaluate the changes line for choosing the most appropriate risk management ,including risk mitigation and prevention measures. To be able to produce result at the European scale, safe land need to hazards and risk at the local scale i.e. Individual slopes and slides to the hazards and risk at the European scale the smallest Scale of interest in this proposal refers to the local slope scale(less than 3 km²) where most of the research will be done on the triggering factors. The regional studies, including the “hotspot” Evolution from the intermediary scale from 10 to 200 km², depending on the site. The largest Scale will be the “country” and European scale.

CHAPTER NO. 03

CASE STUDY

3.1 Case Study

1) MUMBAI PUNE EXPRESS HIGHWAY-30 july 2014.

On 30 July 2014, a landslide occurred in the village of Malin in the Ambegaon taluka of the Pune district in Maharashtra, India. The landslide, which hit early in the morning while residents were asleep, was believed to have been caused by a burst of heavy rainfall, and killed at least 151 people. The landslide was first noticed by a bus driver who drove by the area and saw that the village had been overrun with mud and earth. In addition to those dead, more than 160 people, and possibly up to 200, were believed to have been buried in the landslide in 44 separate houses. Rains continued after the landslide making rescue efforts difficult.

2) UTTARAKHAND LANDSLIDE –16 June 2013.

According to figures provided by the Uttarakhand government, more than 5,700 people were "presumed dead." This total included 934 local residents.

CHAPTER NO.04
PROBLEM STATEMENT.

4.1 Problem Statement

In June 2013, a multi-day cloudburst cantered on the North Indian state of Uttarakhand caused devastating floods and landslides in the country's worst natural disaster since the 2004 tsunami. Though some parts of Himachal Pradesh, Haryana, Delhi and Uttar Pradesh in India experienced the flood, some regions of Western Nepal, and some parts of Western Tibet also experienced heavy rainfall, over 95% of the casualties occurred in Uttarakhand. According to figures provided by the Uttarakhand government, more than 5,700 people were "presumed dead." This total included 934 local residents. Landslides, due to the floods, damaged several houses and structures, killing those who were trapped. So, **Due to loss of Lives in Landslide their need to develop a system which predicts its occurrence and alert the Authority to take preventive measures.**

CHAPTER NO. 05
SCOPE OF THE PROJECT.

5.1 Scope of the Project

As we know that landslide disaster is a big impact on human being and the resource. The project is implemented on earthquake prone areas. The main aim of implementing this project is to save human life and their property. By using Raspberry pi,Arduino and Zigbee we can alert the human and save the people life.so this system can be easily install on such places where the land slide mostly occur. The implementation of the system is easy and is cost very less.

CHAPTER NO. 06
METHODOLOGY.

6.1 Methodology

DESIGN OF LANDSLIDE WARNING SYSTEM :

In this we have the modules of Raspberry pi, Arduino, Zigbee and Two sensors (as per our requirement). The sensors used are Angle sensor and Water level sensor. Water level sensors and angle sensors will convert water depth and hillsides displacement then electrical signals from the sensors will be voltage converted, and amplified in signal disposal circuit at last signals are sent to processor. This design adopts high precision angle sensor SCA60C produced by VTI to detect the mountain angle. SCA60C is single axis angle sensor, its measuring range is +90 degrees, +5v power supply, the output voltage is proportional to the hill slide displacement, its output range is 0.5-4.5v, the capability of resistant impact is strong and have low power consumption. SCA60C is actually a accelerometer, it consists of a silicon micro sensor and signal processing chip, through measuring the earth's gravity in the direction of measurement, then convert to angle. If the landslides along the direction of arrow on the chips have acceleration, the output value increases. Here Zigbee is connected to processor using serial communication. The message from transmitter is send through transmitter Zigbee device and received by receiver side Zigbee and the information is given through Zigbee at receiver. We have LCD at both transmitter and receiver to observe the readings directly at receiver station without sms.

CHAPTER NO. 07
Block Diagram

7.1 Block Diagram

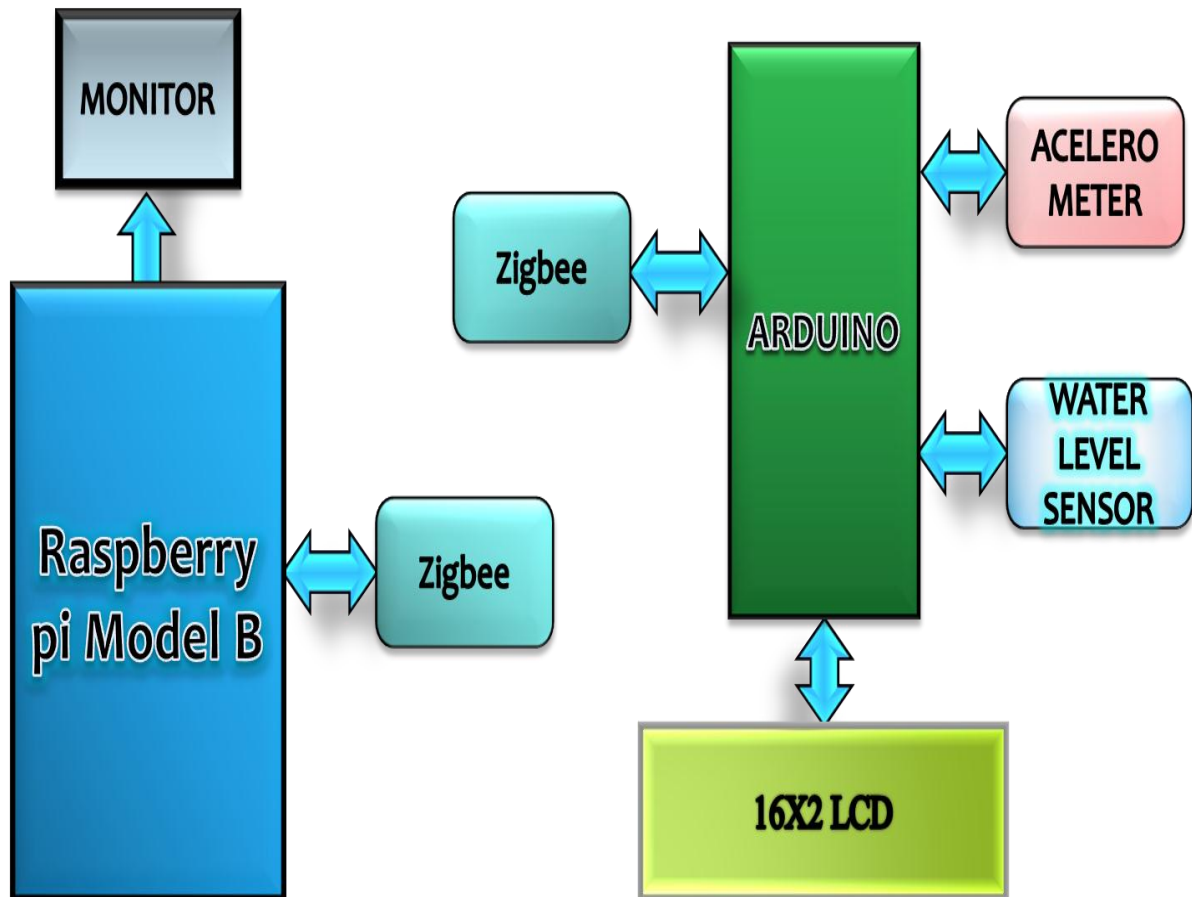


Figure7.1: Block diagram of landslide warning system

CHAPTER NO. 08
HARDWARE REQUIREMENTS.

8.1 Hardware Requirements

8.1.1 TYPE OF SENSORS USED:

For efficient and effective monitoring activities of landslides we used three types of sensor which are given as follow:

8.1.1.a) Accelerometer (MEMS).

8.1.1.b) Water level sensor.

8.1.1.c) Temperature sensor.

8.1.1.a) Accelerometer(MEMS):

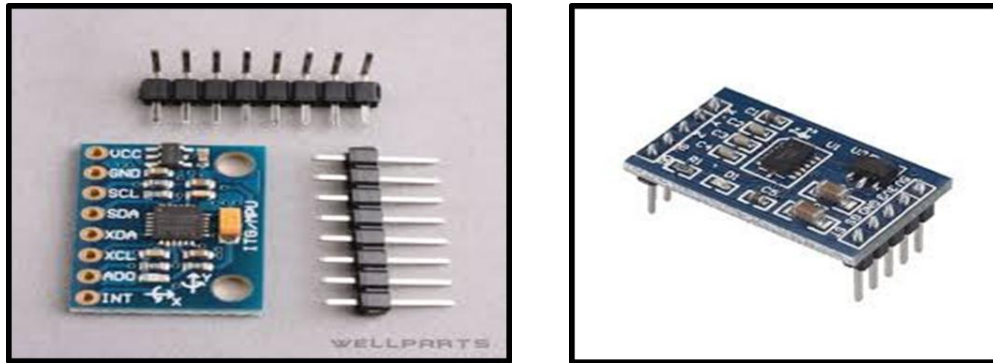


Figure: 8.1.1.a. Accelerometer (MEMS)

MEMS (Accelerometer) is Micro Electro Mechanical Systems, this sensor senses if there is any movement in the angle of sensor it sends the data of movement of angle to receiver side. MEMS is the integration of mechanical elements, sensors, actuators, and electronics on a common silicon substrate through micro fabrication technology. It is placed on the land if any movement occurs then sensor senses it and sends information so that we can be alert at that area.

8.1.1.b) Water level sensor:

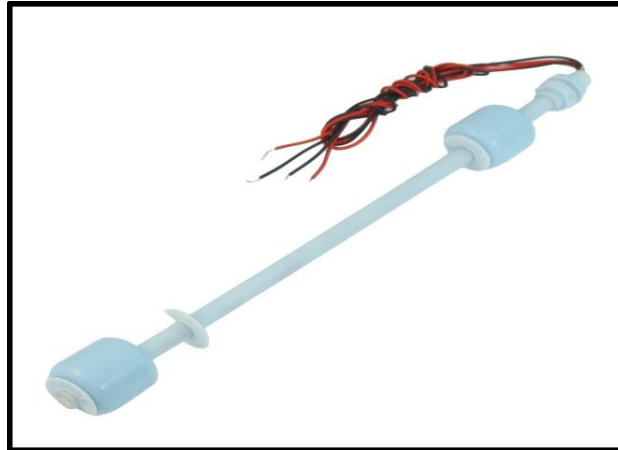


Figure 8.1.1.b: Water level sensor:

Water level sensor is used to measure the water level in hill stations under water level increases if any disturbance in hills. So we use water level sensor to measure water level it is connected using transistor, a wire of 5v power supply is immersed in water then a scale with levels 1,2,3 are immersed in water as water level increases it shows at which level water is, so that we can be alert.

8.1.1.c) Temperature sensor(LM35):

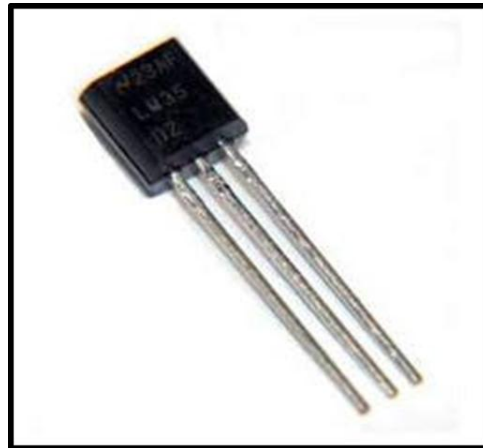


Figure 8.1.1.c: Temperature sensor (LM35)

Temperature sensor is used to measure temperature level at the hill stations as hill slides may occur due to volcanic eruptions also so as temperature increases the sensor senses and gives information to processor. We used IC called LM35 as a temperature sensor. LM35 senses temperature and converted to digital form using ADC and given to processor.

8.2 Type of Module Used

In this project we are using three types of Module which are given as follows:

8.2.1) Raspberry pi

8.2.2) Arduino Atmega (2560)

8.2.3) Zigbee

8.2.1) Raspberry pi

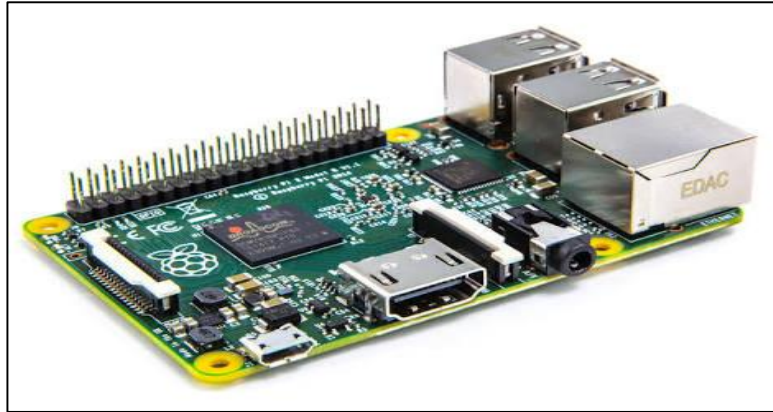


Figure 8.2.1: Raspberry pi (Model B)

Raspberry Pi board is a miniature marvel, packing considerable computing power into a footprint no larger than a credit card. It's capable of some amazing things, but there are a few things you're going to need to know before you plunge head-first into the bramble patch.

8.2.1.1 ARM vs. x86:

The processor of the Raspberry Pi system is a Broadcom BCM2835 system-on-chip (SoC) multimedia processor. This means that the vast majority of the system's components, including its central and graphics processing units along with the audio and communications hardware, are built onto that single component hidden beneath the 256 MB memory chip at the center of the board. It's not just this SoC design that makes the BCM2835 different to the processor found in your desktop or laptop, however. It also uses a different instruction set architecture (ISA), known as ARM. The BCM2835 uses a generation of ARM's processor design known as ARM11, which in turn is designed around a version of the instruction set architecture known as ARMv6. This is worth remembering: ARMv6 is a lightweight and powerful architecture, but has a rival in the more advanced ARMv7 architecture used by the ARM Cortex family of processors. Software developed for ARMv7, like software developed for x86, is sadly not compatible with the Raspberry Pi's BCM2835—although developers can usually convert the software to make it suitable. That's not to say you're going to be restricted in your choices. As you'll discover later in the book, there is plenty of software available for the ARMv6 instruction set, and as the Raspberry Pi's popularity continues to grow, that will only increase. In this book, you'll also learn how to create your own software for the Pi even if you have no experience with programming.

8.2.1.2 Getting Started with the Raspberry Pi:

Now that you have a basic understanding of how the Pi differs from other computing devices, it's time to get started. If you've just received your Pi, take it out of its protective anti-static bag and place it on a flat, non-conductive surface before continuing with this chapter.

8.2.1.3 Connecting a Display:

Before you can start using your Raspberry Pi, you're going to need to connect a display. The Pi supports three different video outputs: composite video, HDMI video and DSI video. Composite video and HDMI video are readily accessible to the end user, as described in this section, while DSI video requires some specialized hardware.

8.2.1.4 Composite Video:

Composite video, available via the yellow-and-silver port at the top of the Pi known as an RCA phono connector is designed for connecting the Raspberry Pi to older display devices.

8.2.1.5 HDMI Video:

A better-quality picture can be obtained using the HDMI (High Definition Multimedia Interface) connector, the only port found on the bottom of the Pi. Unlike the analogue composite connection, the HDMI port provides a high-speed digital connection for pixel-perfect pictures on both computer monitors and high-definition TV sets. Using the HDMI port, a Pi can display images at the Full HD 1920x1080 resolution of most modern HDTV sets.

8.2.1.6 Connecting Audio:

If you're using the Raspberry Pi's HDMI port, audio is simple: when properly configured, the HDMI port carries both the video signal and a digital audio signal. This means that you can connect a single cable to your display device to enjoy both sound and pictures. Assuming you're connecting the Pi to a standard HDMI display, there's very little to do at this point. For now, it's enough to simply connect the cable. If you're using the Pi with a DVI-D monitor via an adapter or cable, audio will not be included. This highlights the main difference between HDMI and DVI: while HDMI can carry audio signals, DVI cannot. For those with DVI-D monitors, or those using the composite video output, a black 3.5 mm audio jack located on the top edge of the Pi next to the yellow phone connector provides analogue audio. This is the same connector used for headphones and microphones on consumer audio equipment, and it's wired in exactly the same way. If you want, you can simply connect a pair of headphones to this port for quick access to audio.

8.2.1.7 Connecting a Keyboard and Mouse:

Now that you've got your Raspberry Pi's output devices sorted, it's time to think about input. As a bare minimum, you're going to need a keyboard, and for the majority of users, a mouse or trackball is a necessity too. The old PS/2 connection has been superseded, and the Pi expects your peripherals to be connected over the Universal Serial Bus (USB) port. Depending on whether you purchased the Model A or Model B, you'll have either one or two USB ports available on the right side of the Pi. If you're using Model B, you can connect the keyboard and mouse directly to these ports. If you're using Model A, you'll need to purchase a USB hub in order to connect two USB devices simultaneously.

8.2.1.8 Flashing the SD Card:

To prepare a blank SD card for use with the Raspberry Pi, you'll need to flash an operating system onto the card. While this is slightly more complicated than simply dragging and dropping files onto the card. Firstly, you'll need to decide which Linux distribution you would like to use with your Raspberry Pi <http://www.raspberrypi.org/downloads>. After downloading the raspberry pi operating system i.e. "NOOBS".We have to connect all the connection as per requirement After connection we have to install the os on it.

8.2.2 ARDUINO 2560:

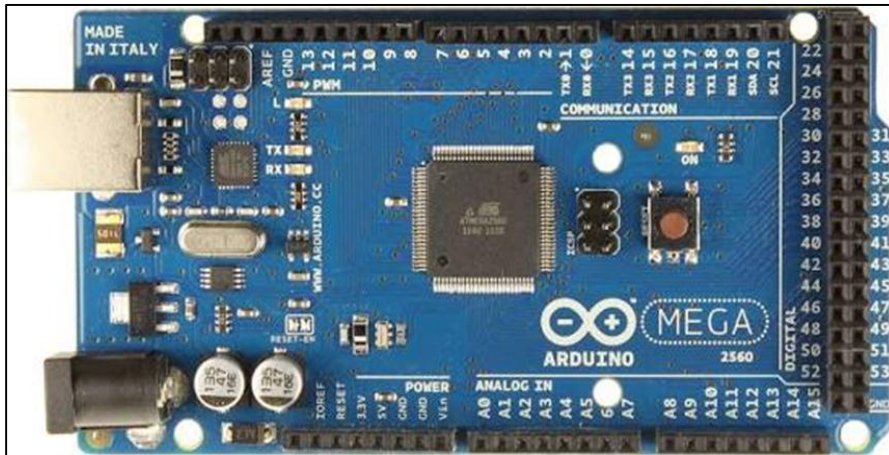


Figure 8.2.2 : arduino atmega 2560.

The Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega 2560 board is compatible with most shields designed for the Uno and the former boards Duemilanove or Diecimila.

8.2.2.1 Technical specs:

Microcontroller	Atmega 2560
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	54 (of which 15 provide PWM output)
Analog Input Pins	16
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	256 KB of which 8 KB used by bootloader
SRAM	8 KB
EEPROM	4 KB
Clock Speed	16 MHz
Length	101.52 mm
Width	53.3 mm
Weight	37 g

8.2.2.2 Programming:

The Mega 2560 board can be programmed with the Arduino Software (IDE). The ATmega2560 on the Mega 2560 comes preprogrammed with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files). You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP or similar. The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available in the Arduino repository. The ATmega16U2/8U2 is loaded with a DFU bootloader. On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2. On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode. You can then use Atmel's FLIP software (Windows) or the DFU programmer (Mac OS X and Linux) to load a new firmware. Or you can use the ISP header with an external programmer (overwriting the DFU bootloader).

8.2.2.3 Power:

The input voltage to the board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin. 5V. This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it. 3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA. GND. Ground pins.

8.2.2.4 PIN MAPPING:

Each of the 54 digital pins on the Mega can be used as an input or output, using `pinMode()`, `digitalWrite()`, and `digitalRead()` functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50 k ohm. A maximum of 40mA is the value that must not be exceeded to avoid permanent damage to the microcontroller. In addition, some pins have specialized functions: Serial: 0 (RX) and 1 (TX); Serial 1: 19 (RX) and 18 (TX); Serial 2: 17 (RX) and 16 (TX); Serial 3: 15 (RX) and 14 (TX). Used to receive (RX) and transmit (TX) TTL serial data. Pins 0 and 1 are also connected to the corresponding pins of the ATmega16U2 USB-to-TTL Serial chip. External Interrupts: 2 (interrupt 0), 3 (interrupt 1), 18 (interrupt 5), 19 (interrupt 4), 20 (interrupt 3), and 21 (interrupt 2). These pins can be configured to trigger an interrupt on a low level, a rising or falling edge, or a change in level. See the `attachInterrupt()` function for details. PWM: 2 to 13 and 44 to 46. Provide 8-bit PWM output with the `analogWrite()` function. SPI: 50 (MISO), 51 (MOSI), 52 (SCK), 53 (SS). These pins support SPI communication using the SPI library. The SPI pins are also broken out on the ICSP header, which is physically compatible with the Arduino /Genuino Uno and the old Duemilanove and Diecimila Arduino boards. LED: 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off. TWI: 20 (SDA) and 21 (SCL). Support TWI communication using the Wire library. Note that these pins are not in the same location as the TWI pins on the old Duemilanove or Diecimila Arduino boards. See also the mapping Arduino Mega 2560 PIN diagram. The Mega 2560 has 16 analog inputs, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and `analogReference()` function. There are a couple of other pins on the board: AREF. Reference voltage for the analog inputs. Used with `analog Reference()`. Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

8.2.2.5 Communication:

The Mega 2560 board has a number of facilities for communicating with a computer, another board, or other microcontrollers. The ATmega2560 provides four hardware UARTs for TTL (5V) serial communication. An ATmega16U2 (ATmega 8U2 on the revision 1 and revision 2 boards) on the board channels one of these over USB and provides a virtual com port to software on the computer (Windows machines will need a .inf file, but OSX and Linux machines will recognize the board as a COM port automatically. The Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the ATmega8U2/ATmega16U2 chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Mega 2560's digital pins. The Mega 2560 also supports TWI and SPI communication. The Arduino Software (IDE) includes a Wire library to simplify use of the TWI bus; see the documentation for details. For SPI communication, use the SPI library.

8.2.2.6 Physical Characteristics and Shield Compatibility:

The maximum length and width of the Mega 2560 PCB are 4 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Three screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins. The Mega 2560 is designed to be compatible with most shields designed for the Uno and the older Diecimila or Duemilanove Arduino boards. Digital pins 0 to 13 (and the adjacent AREF and GND pins), analog inputs 0 to 5, the power header, and ICSP header are all in equivalent locations. Furthermore, the main UART (serial port) is located on the same pins (0 and 1), as are external interrupts 0 and 1 (pins 2 and 3 respectively). SPI is available through the ICSP header on both the Mega 2560 and Duemilanove / Diecimila boards. Please note that I2C is not located on the same pins on the Mega 2560 board (20 and 21) as the Duemilanove / Diecimila boards (analog inputs 4 and 5).

8.2.2.7 Automatic (Software) Reset:

Rather than requiring a physical press of the reset button before an upload, the Mega 2560 is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2 is connected to the reset line of the ATmega2560 via a 100 Nano farad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip. The Arduino Software (IDE) uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload. This setup has other implications. When the Mega 2560 board is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the boot loader is running on the ATmega 2560. While it is programmed to ignore malformed data it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data. The Mega 2560 board contains a trace that can be cut to disable the auto-reset. The pads on either side of the trace can be soldered together to re-enable it. It's labeled "RESET-EN". You may also be able to disable the auto-reset by connecting a 110 ohm resistor from 5V to the reset line; see this forum thread for details.

8.2.3 Zigbee

8.2.3.1 ZIGBEE S2:



Figure 8.2.3.a: zigbee s2

ZigBee is a kind of low speed short distance transmission wireless network protocol, the bottom is to use IEEE802.15.4 standard media access layer and physical layer. Main features low speed, low power, low cost, support a large number of network nodes, and support a variety of network topology, low complexity, fast, reliable, safe. Zigbee Series 2 modules allow you to create complex mesh networks based on the XBee ZB ZigBee mesh firmware. These modules allow a very reliable and simple communication between microcontrollers, computers, systems, really anything with a serial port! Point to point and multi-point networks are supported.

8.2.3.2 Features:

- 3.3V @ 40mA
- 250kbps Max data rate
- 2mW output (+3dBm)
- 400ft (120m) range
- Built-in antenna
- Fully FCC certified
- 6 10-bit ADC input pins
- 8 digital IO pins
- 128-bit encryption

8.2.3.3 Zigbee Usb Explorer:

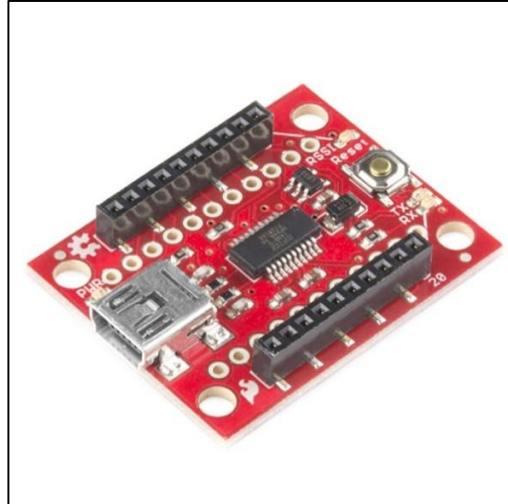


Figure 8.2.3.3: Zigbee Usb Explorer.

This is a simple to use, USB to serial base unit for the DigiXBee line. This unit works with all XBee modules including the Series 1 and Series 2.5, standard and Pro version. Plug the unit into the XBee Explorer, attach a mini USB cable, and you will have direct access to the serial and programming pins on the XBee unit. The highlight of this board is an FT231X USB-to-Serial converter. That's what translates data between your computer and the XBee. There's also a reset button, and a voltage regulator to supply the XBee with plenty of power. In addition, there are four LEDs that'll help if you ever need to debug your XBee: RX, TX, RSSI (signal-strength indicator), and power indicator. This board also breaks out each of the XBee's I/O pins to a pair of breadboard-compatible headers.

CHAPTER NO. 09
RANGES

9.1 RANGES

PARAMETERS	RANGE
ACCELEROMETER LEVEL	X=6,Y=4,Z=2
TEMPERATURE	ABOVE 56 ⁰ C
WATER LEVEL	ABOVE LEVEL 3

CHAPTER NO. 10
COST ANALYSIS

10.1 COST ANALYSIS

Sr. No.	Particulars	Cost(Rs.)
1	RASPBERRY PI MODEL B	2,750
2	Arduino atmega 2560	1,500
3	Zigbee S2 modules (x2)	2,400
4	Xbee USB Explorer	850
5	ACCELEROMETER	300
6	Water level Sensor	150
7	Temperature Sensor	95
8	LCD	150
TOTAL		8,145

CHAPTER NO. 11
ADVANTAGES

11.1 ADVANTAGES

This SYSTEM can be used in following area:

- a) **HILLY AREA**
- b) **VOLCANIC ERUPTION**
- c) **WATER LOGGED**

CHAPTER NO. 12
CONCLUSION AND FUTURE SCOPE

12.1 CONCLUSION:

This system is developed using Raspberry pi, Arduino and Zigbee processor. In the transmitter section we have sensors connected to Arduino which is further connected to Zigbee. If any sensor detected any disturbance, Zigbee transmits signal to receiver Zigbee and it displays in LCD at receiver. By using the detection system we can take prevention and save the life and properties of humans.

12.2 FUTURE SCOPE:

This system can be connected to internet for real time application and the information related to land slide is available on the internet. After the use of this system, it can be connected to a barrier. If there is a land slide occur, the alarm will on and the barrier get down and due to this we can save many life of human.

CHAPTER NO. 13
REFERENCES

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