



IMPLEMENTATION OF NATURAL DISASTER ALERT SYSTEM BY USING MEMS

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ABSTRACT

The purpose of this project is develop associate degree intelligent sensing and alerting system which will be accustomed alert the individuals once moving ridge comes. we have a tendency to square measure getting to place a sensing element in numerous elements of the ocean. If the planet got disturbed during a larger magnitude suggests that it sense the extent and therefore the signal square measure born-again into electrical signal by a electrical device. The management unit grabs the signal and conveys the message to the closest management station. however we have a tendency to square measure implementing the moving ridge Alert System is simply activity magnitude of the planet Quake that rocks beneath the ocean. furthermore not all the planet Quake brings moving ridge, solely A level higher than an explicit limit can cause this. thus in our example we have a tendency to live} getting to measure the planet Quake magnitude by a vibratory (MEMS Accelerometer) sensing element. If this parameter exceeds an explicit level it alerts the management station and therefore the warning message is enlightened to the mobile, that is delineated already.

KEYWORDS: Cross Compiler, Embedded System, Microcontroller, Sensors, Transmitter.

1. INTRODUCTION:

A wave could be a terribly long-wavelength wave of water that's generated by earthquakes that causes displacement of the seafloor, however wave may also be generated by volcanic eruptions, landslides and underwater explosions [1]. Earthquakes of $M > 6.5$ area unit essential for wave generation. On the

typical, there area unit 2 tsunamis p.a. somewhere within the world. or so each fifteen years a harmful, Pacific wide wave happens. wave speed depends on the depth of water through that it travels Tsunamis travel or so 700 kmph in 4000 m depth of ocean water. the speed drops to regarding thirty six kmph at ten m of water depth that cause injury close to the

shore. wave typically happens suddenly suddenly and d that they area unit very dangerous to the coastal communities. to guard ourselves from such disaster some automatic warning systems ought to be created. The planned wave warning system is largely associate degree Embedded Systems. associate degree embedded System could be a microcontroller based mostly system that's incorporated into a tool to watch and management the functions of the elements of the device. Embedded systems area unit designed to perform specific tasks. associate degree Embedded system is meant to perform a particular perform, during which the software system rules the whole hardware. the tip user cannot alter the software system. responsibility, responsiveness, specialised hardware, low cost, strength area unit a number of the vital options of associate degree embedded system. to form such embedded applications, microcontrollers area unit required [2]. during this work microcontroller is programmed to send and receive the signals.

1.1. Physical Characteristics of

Tsunami : All types of waves, as well as tidal wave, have a wavelength, a wave height, amplitude, a frequency or amount, and aspeed. The physical characteristic of tidal wave is shown in figure one.

• Wavelength: the space between 2 identical points on a wave (i.e. between wave crests or wave troughs) is named as wavelength. traditional ocean waves have wavelengths of concerning a hundred meters. tidal wave is sometimeshaving the longer wavelengths and up to five

hundred kilometers.

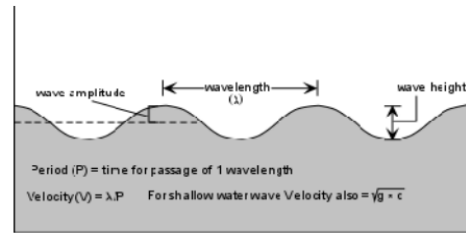


Figure 1: Physical Characteristics of Tsunami

- Wave height: the gap between the trough of the wave and also the crest or peak of the wave is typically referred as wave height.
 - Wave amplitude: the peak of the wave higher than the still water line, typically this can be equals to 1/2 the wave height. wave will have variable wave height and amplitude that depends on water depth as we have a tendency to shall see in an exceedingly moment
 - Wave frequency: the number of your time it takes for one full wavelength to pass a stationary purpose is named as wave frequency or wave amount.
2. • Wave velocity: is that the speed of the wave. Velocities of traditional ocean waves square measure regarding 90km/hr whereas wave have velocities up to 950 km/hr (about as quick as jet airplanes), and so move far more quickly across ocean basins. the speed of any wave is adequate to the wavelength divided by the wave amount. $V = \lambda/P$

1.2. Increase and decrease in the wavelength of shallow waters :

Tsunami is characterised as shallow-water waves. These square measure totally different from the waves most folkshave determined on a beach, that square measure caused by the wind processing across the ocean's surface. Atidal

wave will have a amount within the vary of 10 minutes to 2 hours and wavelengths larger than five hundred metric linear unit. once the quantitative relation of the water depth and wavelength is incredibly little then the wave is characterised as a shallow-water wave. the speed of a shallow-water wave is additionally capable the root of the merchandise of the acceleration of gravity, g , (10m/sec^2) and also the depth of the water. the speed at that a wave loses its energy is reciprocally associated with its wavelength [3]. Since the tidal wave loses very little energy because it propagates and it's terribly massive wavelength. Thus, in terribly trouble, a tidal wave can travel at high speeds with very little loss of energy. As a tidal wave leaves the trouble of the open ocean and arrives at the shallow waters close to the coast, it undergoes a metamorphosis. because the depth of the water decreases, the speed of the tidal wave decreases and also the amendment of total energy of the tidal wave stay constant.

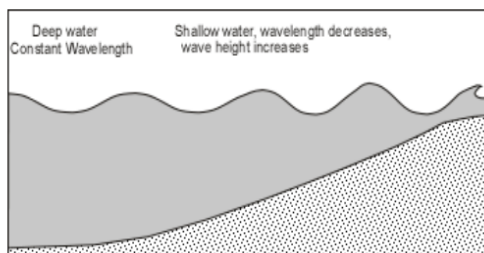


Figure 2: Increase and decrease in the wavelength of shallow waters

The wave size ranges from few centimeters to over thirty m height and most of the tsunamis are but three m tall.

Tsunamis are seldom over 1m high in trouble and can not be detected by ships as a result of their long amount (time between crests). The wave height of the wave will increase by over ten times because it propagates into shallow water. A wave wave

is totally different from a wind-generated wave that's the amount of the wind-generated wave sometimes five to twenty seconds, whereas wave periods are sometimes between five minutes and an hour.

1.3. Impact of tsunami on salinity levels of drinking water :

The fresh and H₂O equilibrium were disturbed by the underground wave pressure caused by wave wave. The pressure of the wave could cause combination of the recent groundwater with saline water and this might lead to a discount of the quantity of the fresh lens. The salinity within the flooded wells abated considerably from AN calculable average salinity at the time of the flooding. The initial well salinity simply when the wave was necessary to understand because it would provide a live of the most level which might be expected to occur in real time when the wave

1.4. Generation of tsunami

In the Pacific basin, a median of 2 damaging tsunamis happens in once a year. Pacific wide tsunamis area unit a rare development, occurring each ten - twelve years on the common. The tsunamis area unit generated by earthquakes, volcanic eruptions, landslides, underwater explosions, and meteoroid impacts [4]. The tsunamis generated by landslides tend to be comparatively localized and do less harm than the wave generated by earthquakes.

1.4.1. Earthquakes

A fast unleash of energy within the crust is understood as Earthquake. A rupture of geologic faults, volcanic activity, landslides, Earthquake, mine blasts, and nuclear tests area unit the foremost causes for tidal wave. Associate in Nursing earthquake with the Richter magnitude level seven and on top of is incredibly unfortunate, whereas the Richter magnitude level three and below is incredibly meager. Earthquakes occur within the crust or layer, that ranges from the surface to concerning 800 kilometers deep. Earthquake is classed in to 2 types; one is Inter-plate earthquake, within which earthquakes occur on the boundaries of tectonic plates. The second is Intra-plate Earthquakes that's earthquakes occur at intervals the plate itself however faraway from the plate boundaries. Earthquakes area unit recorded with the assistance of seismogram. owing to earthquakes or landslides a series of ocean waves referred to as tidal wave is caused at below the ocean floor. owing to giant submarine earthquakes and landslides the displacement of the ocean floor happens and intern causes displacement {of giant|of huge|of enormous} volumes of the ocean water on top of it manufacturing large, fast-paced waves.

1. 4.2. Volcanic Eruptions : A rupture or a gap on the crust of a planet like earth is termed as volcano. the foremost common and high volcanic hazards square measure particularly, Lava, ash, and rubbish flow[5]. Severe eruptions may cause tsunamis, volcanic earthquakes that produce serious threats to each life and property. it's terribly troublesome to predict the incidence of volcano eruption, since a number of the volcanoes square measure sleeping volcanoes.

2. style ideas Of planned System the target of this work is to cut back the warning that threatens the general public and therefore the government. example of moving ridge warning system is developed here. this is often divided into 2 modules: Module 1: moving ridge detection Module two: moving ridge warning 2.1 . moving ridge Detection To sight the moving ridge incidence, electrical phenomenon device is employed. On variable the capacitance price, the electrical phenomenon device sends the signal to the transmitter aspect microcontroller. The receiver aspect receives the transmitted signal.

2. TSUNAMI WARNING:

The receiver aspect microcontroller is interfaced with buzzer and laptop. The microcontroller invokes the laptop, that successively invokes the mobile interfaced with it. At this stage, laptop sends message to mobile numbers per the shape. at the same time the laptop raises alarm to alert the individuals within the coastal space. The diagram of tidal wave Warning System is shown in figure three

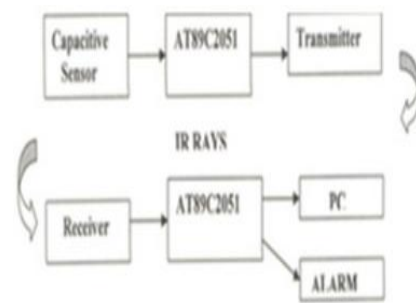


Figure 3: Block Diagram of Tsunami Warning system

In this tidal wave warning system, by variable the capacitance price of proximity electrical phenomenon sensing element, signals square

measure sent to the microcontroller within the transmitter facet. Microcontroller passes infrared signals from AN IR transmitter. These IR rays square measure received by the receiver. The signal is passed to the laptop through the interface. Forth with, when the signal is received by the laptop, it sends alert message to the mobile connected and at the same time it raises an alarm.

3. HARDWARE DESCRIPTION

3.1. Microcontroller

In this work, the pressure is induced victimization piston pump. The pressure is perceived victimization electrical phenomenon proximity sensing element and therefore the raise within the pressure that is on top of the edgeprice is send as signal to the transmitter facet microcontroller.

Microcontroller utilized in this work is AT89C2051. it'sa twenty pin DIP. The AT89C2051 may be a low voltage, high performance CMOS 8-bit PC with 2K bytes flash programmable and eradicable scan solely memory (PEROM). By combining a flexible 8-bit central processor with flash on a monolithic chip, the Atmel AT89C2051 may be a powerful PC that provides a extremely versatile andcost-efficient resolution to several embedded management applications. The AT89C2051 provides the subsequent customary features: 2K bytes of flash, eighteen bytes of RAM, fifteen I/O lines, 2 sixteen bit timer/counters, and 5 vector low levels interrupt design, a full duplex interface, a exactitude analog comparator, on-chip generator and clock electronic

equipment. additionally, the AT89C2051 is intended with static logic for operation right down to zero frequency and supports 2 code selectable power saving modes. The idle mode stops the central processor whereas permitting the RAM, timer/counters, interface and interrupt system to continue functioning. the facility down mode saves the RAM content however disables all alternative chip functions till following hardware reset.

3.2. Transmitter

The light supply diode produces a light-weight beam across the lowest of the coil. IR (infrared) rays ar chosen as a result of there's less noise and close light-weight than at traditional optical wavelengths. diode is employed as transmitter and it uses Infrared rays to transmit the signals. The transmitter module diagram is shown in figure four.

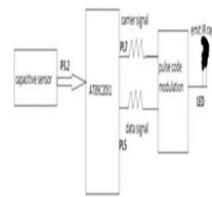


Figure 4: Transmitter Module Diagram

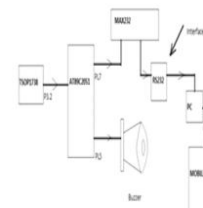


Figure 5: Receiver Module Diagram

In the transmitter module, the electrical phenomenon detector senses the amendment in capacitance. If the particular price exceeds the target price then it considers that there's some condition. the worth is given as interrupt signal on the port P3.2 of AT89C2051 microcontroller. As a result, the information signal and carrier signalarea unit generated by the microcontroller. knowledge signal is pulse code modulated with the radio wave. Negative pulse code

modulation is performed. The signal is passed to receiver within the variety of IR rays with the assistance of diode.

3.3. Receiver: TSOP 1738 is that the receiver employed in this study that has the potential to receive frequency with the vary of thirty eight kc. TSOP 1738 is that the normal IR device receiver series, supporting all major transmission codes. The receiver module diagram is shown in figure five. within the receiver module, TSOP1738 receives the signal within the input pin. this is often given as input to a different AT89C2051 microcontroller on the interrupt pin P3.2. The computer is interfaced with the microcontroller through MAX-232 level device, so as to convert TTL logic to RS logic. In MAX-232 eleventh pin takes the microcontroller TTL logic and method it so offersthe RS logic output on the ordinal pin. The buzzer is interfaced with the microcontroller on the port P1.5.

3.4. electrical

phenomenon detector :Proximity electrical phenomenon detector is employed during this study. This detector contains a nonconductor material separated by an electrical plate and comparator. once there's any variation in capacitance price, International Journal of Embedded Systems and Applications (IJESA) Vol.1, No.2, Dec2011 seventy one the comparator compares the particular price with the target price. supported this principle,electrical phenomenon detector gets operated.

3.5. MAX-232 Level device : The MAX-232 level device may be a sixteen pin DIP. It contains twin charge pump DC-DC voltage converters, RS 232 drivers, RS 232 receivers and

receiver and transmitter change management inputs. 3.6. RS232 RS232 devices may be obstructed straight into the computers port. this is often remarked as COM port. the information acquisition device used here is electrical phenomenon sensors. Its output is fed through microcontroller. In warning section mobile is connected to computer through the RS232 port.

4.SOFTWARE DESCRIPTION

4.1. KEIL μ VISION2

This is used to compile the code written for the microcontroller. The microcontroller code is written using embedded C. It encapsulates the following components:

2. • A project manager
- A make facility.
- Tool configuration.
- Editor.

4.1.1. Project Manager: A project consists of all supply files, development, tool choices and directions necessary to make a program. one μ VISION2 project will generate one or a lot of target programs [6]. The supply files wont to produce a target square measure organized into teams. the event tools may be set at target, group, or file level.

4.1. 2. Integrated Utilities :The tools menu is employed to begin the user utilities among the μ VISION2 IDE. A configurable interface provides access to version management systems.

4.1.3. Editor: The μ VISION2 editor includes all the redaction options, color syntax, light and text indentation for the CASCII text file. The editor is

offered whereas debugging the program and this provides a natural debugging atmosphere that lets to quickly check the applying.

4.1. 4. Debugger: The debugging is performed through breakpoints. Its sets program breakpoints whereas redaction. Breakpoints square measure activated whereas beginning the computer programme.

5. CONCLUSION

The microcontroller is programmed with embedded C language, compiled mistreatment keil compiler and therefore the verified program was amalgamated into microcontroller mistreatment the microcontroller burner. Then the pressure variations area unit perceived mistreatment electrical phenomenon proximity detector and so providing warnings mistreatment mobile by means that of gas Mobile SMS management. supported the pressure changes underneath the ocean, moving ridge might be detected ahead, that's before 5 hours.

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