Locating Flaw in Optical Fiber Cables using GPS, GSM and Fiber Optic Strain Sensor

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***Abstract*-Fiber optic technologies developed in recent days is used in various applications due to its small size and reliable speed. Though Optical Fiber has large advantages but faces threats from various disciplines such as constructional activities like digging, cutting etc..,lighting and wildlife also causes damages to these optical fibers. It was complicated to locate the flaws exactly in fiber optic cables. Hence to overcome this problem we have come forward with our idea to help the communication departments to identify and rectify the flaws efficiently. Our idea is used to obtain damage localization and quantification using fiber optic strain sensor,GPS,GSM.The flaw detected by fiber optic strain sensors is thereby localized using GPS and the appropriate information is given by GSM to the server . As soon as the information reaches the server , required steps of recovery are taken.**

Keywords- Fiber Optic Strain Sensor, GPS, GSM.

I.INTRODUCTION

In the field of fiber optic communication various ideas have been explored and brought to existence. Usually data transmission is faster and more efficient using optical fibers. It has been found that this mode of communication possess very low transmission loses of data. But this condition doesn't last long because optical fibers are so sensitive that its dimensions is similar to that of human hair and get damaged easily.It is surrounded by transparent cladding. Light can be transmitted over the fiber at high data rates providing an ideal medium for the transport of in information. Since light propagates along the fiber by the process of total internal reflection, the loss of data is very low and is not subjected to theelectromagnetic interference. The loss or attenuation of fiber depend on the wavelength of the light propagating within it. Here the data which can be passed through fiber optics is based on the ratio of distance-beam width parameter. [2]

Figure 1.1 Optical Fiber[2]

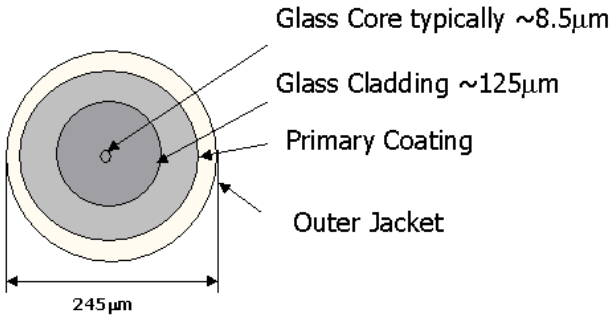


Figure 1.2 Cross sectional view[2]

II.EXISTINGSYSTEM

In previous days abnormality of any kind occurred in an opticalfibercable, its cause was investigated using the transmission alarms received and reports submitted by the customers. An optical-pulse test device called an optical time domain reflect meter(ODTR).It is used to locate false outside NTT buildings as in figure.2.1.The waveforms obtained from OTDR measurements can be used to find out where the flaws has occurred. If the state of damage can be examined visually the repairs can be made quickly. Camera was used to monitor the flaws. Once the man hole nearest to the fault point has been identified from the OTDR,test results and facility data ,a pipe camera can be lowered into the man hole and inserted to the target conduit .[1]

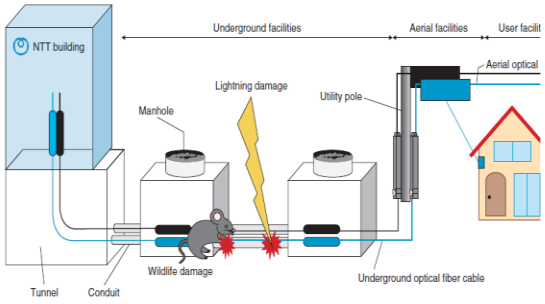


Figure 2.1 Configuration of optical access network.[8]

III.PROPOSED SYSTEM

In the previous decade fiber optic strain sensors which had been evolved significantly and established well in the market because of its advantages are high precision ,long term stability and durability. In addition to that fiber optic techniques is affordable instrumentation of large areas and global monitoring based on the long gate sensors and integrity monitoring based on the distributed sensors. Although the many techniques which has been determined to detect the damage was not effective in real, on site condition. The idea of using cameras to detect the flaws was not suitable for damage detection and characterization i.e., damage localization and curtained extent, quantification. Hence our optical fiber strain sensor localizes the flaws effectively, it is monitored by the GPS and the signals is sent through the GSM which transmits the message to the respective servers.[4]

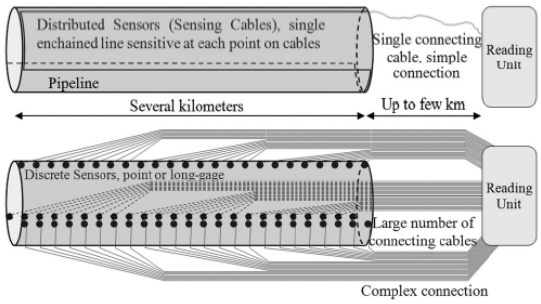


Figure3.1 Distributed Vs discrete monitoring[3]

V.HARDWARE REQUIREMENTS

fiber Optic Strain Sensor:

his sensor is used to detect the flaws, cracks,damages aused by constructional activities, lightning, wildlife tc.This sensor serves to be more effective when compared to ther flaw detecting sensors.

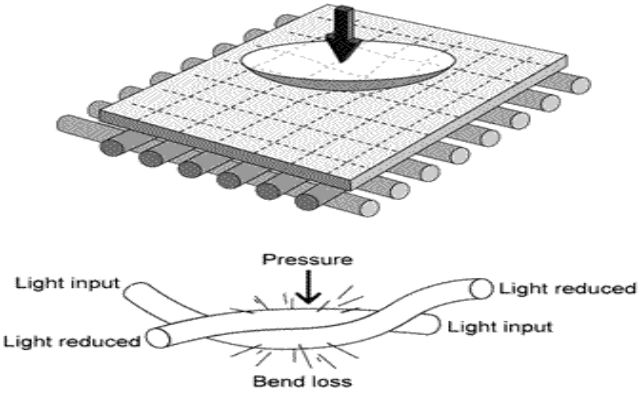


Figure 4.1 Fiber optic strain sensors[2]

GPS(Global Positioning System):

GPS is a space based navigation system that provides location and time information in all weather conditions anywhere on earth.This system has come in small integrated form as GPS modules.

Figure 4.2 GPS[4]

Figure 4.3 GPS module[4]

GSM(Global System For Mobile Communications)

GSM is a default globalstandard for mobile communications. GSM is basically used for automatic intimation of information to respected people in case of threat and other purposes, Serves as a best means of automatic mobile communication[3]

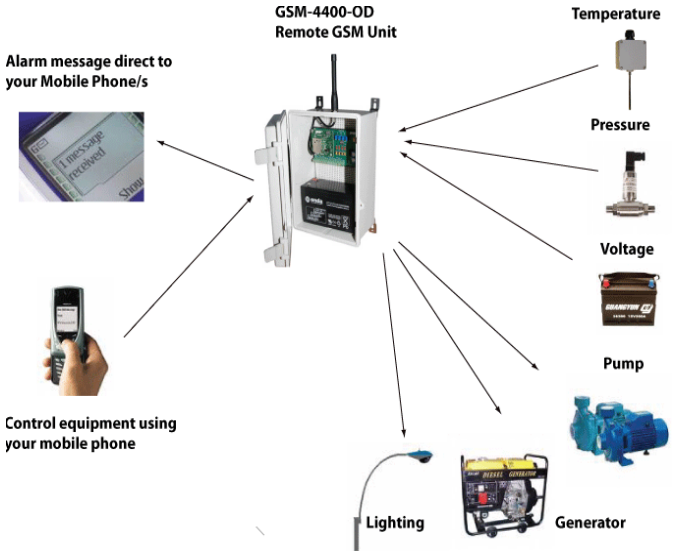
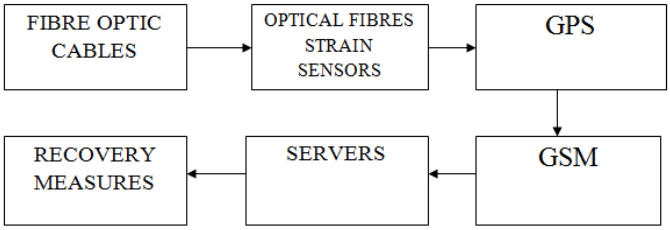


Figure 4.4 GSM monitoring[3]

V.BLOCK DIAGRAM



VI.IMPLEMENTATION

Optical fiber cables are laid purposefully that they efficiently transmit dataup to long distances without much losses. They transmit data at faster rates also. But it experiences large amount of threats like constructional threats,threats from wildlife,human threats etc. In order to locate the particular flaws optical fiber strain sensor is used which effectively detects the damage in the optical fiber. Once the damage is detected it is monitored carefully by the GPS and hence the data are given to the GSM which efficiently transmit the required data to the appropriate servers. The required recovery measures will be taken as soon as the information are received.[5]

ADVANTAGES

- Low cost.
- Non-flammable
- Less Power consumption
- Efficient detection of damages.
- Small in size. DISADVANTAGES
- Need expensive optical Transmitters and receivers
- At higher optical powers, chances of optical fuse to occur.
- Cannot carry electrical power to operate terminal devices.

CONCLUSION

Hence the implementation of this idea provides efficient damage detection of data loses and provides more accuracy . At the same time non-destructive tests under long term service load with ability to warn against impedance failures. Compared to the other application of sensors this implementation is hoped to serve better.

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