e-Yantra Ideas Competition 2019-20

Landslide Detection With Optical Fibres

Team ID: 676
College of Science and Technology

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Outline

Motivation

- Landslides has been a major issue faced by drivers during monsoon season
- Number of lives claimed by landslide has been increasing annually
- Our goal is to develop a sensor that can sense motion of the soil
- It can be used to generate a warning signal
- The data can be used to predict stability of soil

Market Research

- Existing methods of landslide detection includes the following techniques:
  - Remote Sensing
  - Photogrammetric techniques
  - Geodetic techniques
  - Terrestrial laser scanning
  - Fibre-optic sensing

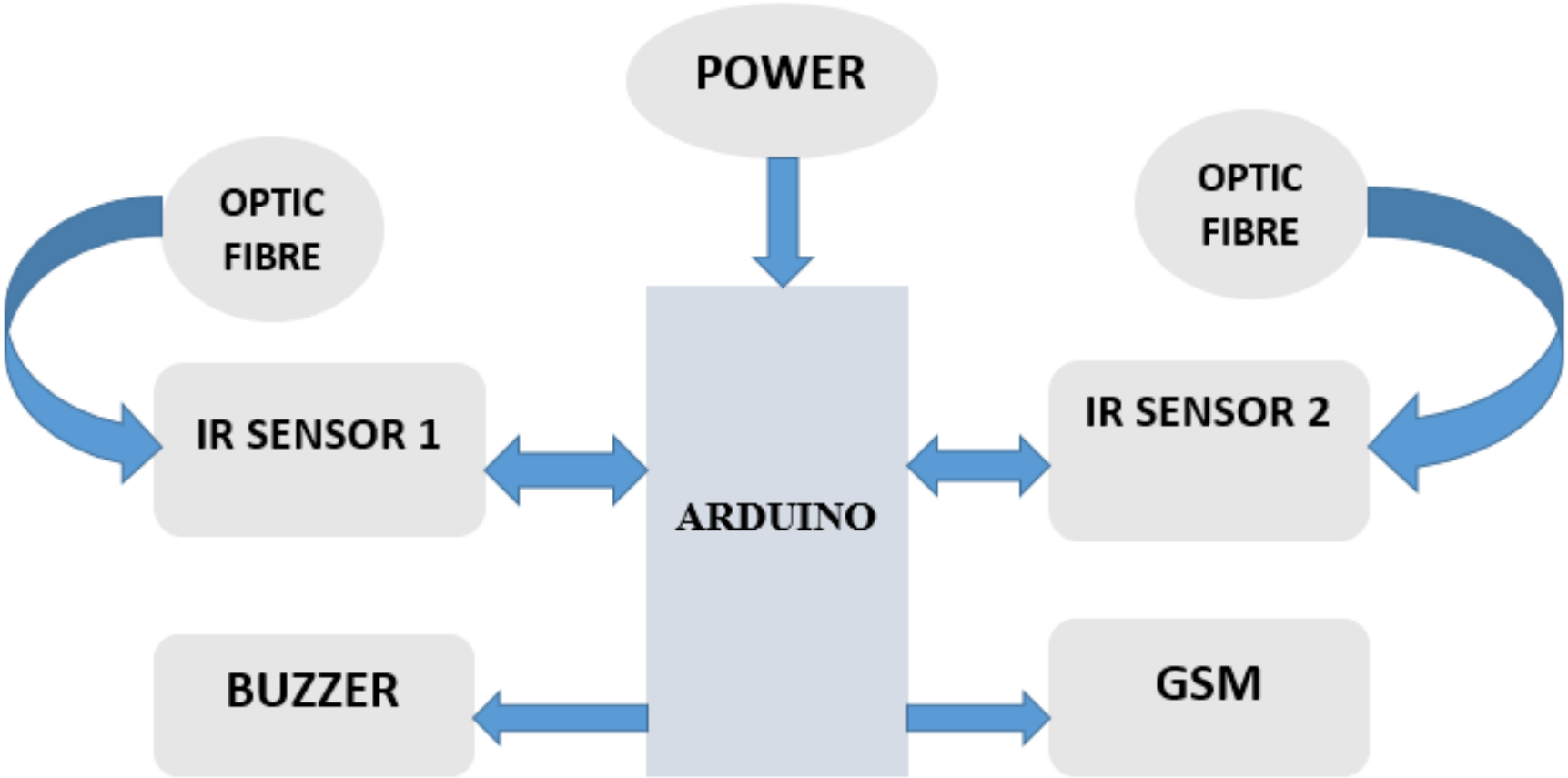
Hardware requirements and specification

Sl.no.	Item	Specification
1	IR sensors	Operating Voltage:3.0V-5.0V Detection range: 2cm -30cm Current consumption:at 3.3V-23mA
2	Optical fibres	Min bending radius: 15 * O.D Transport and storage: -25C to +70C
3	Buzzer	Rated voltage: 6V DC Operating Voltage: 4-8V DC Resonant frequency: 2300Hz Sound type: Continous beep
4	GSM module	Dual-Band 900/1800 MHz Dimensions: 24x24x3mm Weight: 3.4g
5	Arduino	Microcontroller: ATmega328 Operating Voltage:5V Clock speed: 16 MHz
6	Power Source	230V AC

Software requirements

Sl.no.	Software
1	MATLAB V
2	Java or Python

Implementations



- The system consists of the following materials:
  - Optical Fiber: are flexible and small in size and can exhibit total internal reflection.
  - IR sensors: transmits infrared light that is received by a receiver which generates electrical signal
  - Microcontroller:Arduino UNO R3 would be used for processing the electrical signal generated by the IR sensor
  - Buzzer: Used to generate a sound when the processed electrical signal is received
  - GSM: Microcontroller would send a text message to the registered sim by using a GSM module

Feasibility

- Bhutan is a landslide prone area
- Similar ideas have been implemented in other countries but not in Bhutan
- Landslide prone area are small and easy to identify

Estimated cost

Sl.No.	Components	Quantity	Cost
1	Arduino Uno	1	Nu.480
2	GSM/GPRS	1	Nu.1180
3	Rechargeable Battery	1	Nu. 780
4	9V Battery Charger	1	Nu. 499
5	Battery Snap connector to DC Male Adapter	1	Nu. 98
6	Buzzer	1	Nu. 120
7	Jumper Wire	1	Nu. 192
8	Fiber Optic cable	1	Nu. 450
9	IR sensors	2	Nu.600
Total			Nu. 4399

Work distribution

- CEO /HR manager - Tashi Phunthso
- Operations manager - Kinga Lhaden Dakpa
- Marketing manger - Kinley Gyem
- Accounting manager - Thubten Jamthso

- THANK YOU