Bee hive temperature and sound monitoring

Madhuri Kandepi (mk2335)

OBJECTIVE

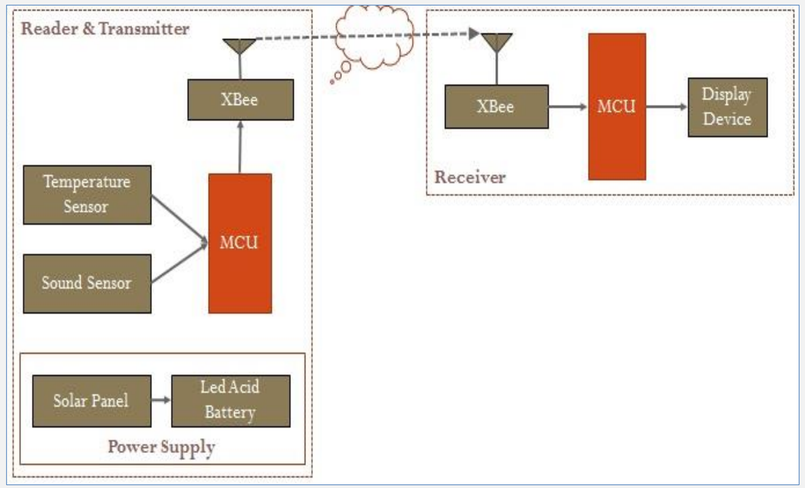
To provide a solution for remote monitoring of a bee hive to check the temperature and acoustics

APPROACH

A telemetry system is designed with temperature and acoustics reading equipment that reads the temperature and audio levels at the bee hive and transmits the data through radios which is analyzed and shown on a display device.

2 Microcontrollers (ATMEGA 1284P) are used to implement the solution.

SYSTEM BLOCK DIAGRAM



TRANSMITTER

A temperature sensor (LM 34 DZ) and a microphone are installed at the Transmitter MCU.

The transmitter is responsible for reading temperature and sound values (amplified sound values using LM 358 op-amp) and transmit the same using an XBEE Pro Radio.

The transmitter runs on solar power which is backed up by battery equipment. Energy efficient features are implemented at the transmitter to increase battery life.

RECEIVER

The receiver is responsible for receiving the data from the transmitter using XBEE Pro Radio, analyze the data and display the graphical analysis of data on a graphic LCD.

Receiver toggles the display between temperature and sound information on a periodic basis.

The receiver also highlights and warns the user when the temperature or sound levels are outside the acceptable limits.

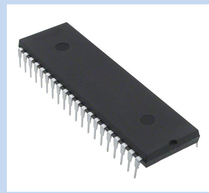
RADIO COMMUNICATION

XBEE Radios, having Outdoor/RF Line-of-Sight Range of 1500 m are used for the communication between two MCUs.

DISPLAY

A monochrome graphic LCD with a resolution of 128X64 pixels is used for displaying the graphical analysis of received data.

MCU



ATMEGA 1284P has 20 MIPS Throughput at 20 MHz 128KB Programmable memory, 6 sleep modes and multiple power options.

ACKNOWLEDGEMENT

Thanks to Bruce R. Land for helping me in completing this project on time. His support has been outstanding throughout the project implementation.