HACETTEPE UNIVERSITY
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
ELE 401-402 GRADUATION PROJECT

The Eye

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Introduction

Humanity is now living in Communication Age. Internet and GSM operators stand out and meet communication needs of people. But these are not available everywhere because of their high price.

Sometimes providing communication in vital situations can be very important for people's safety. In such cases, a different communication method that what we already use can save lives. This project aims to transmit message , picture and desired sensor data with LoRa when internet and GSM operators are not available. Therefore, it can be used as an alternative communication method that people can use with smartphone, it can also be used in IoT applications.

Specifications and Design Requirements

- Long Range
- Low Power
- Long Battery Life
- Low cost communication device which can send any type of message such as text,image,etc..

Solution Methodology
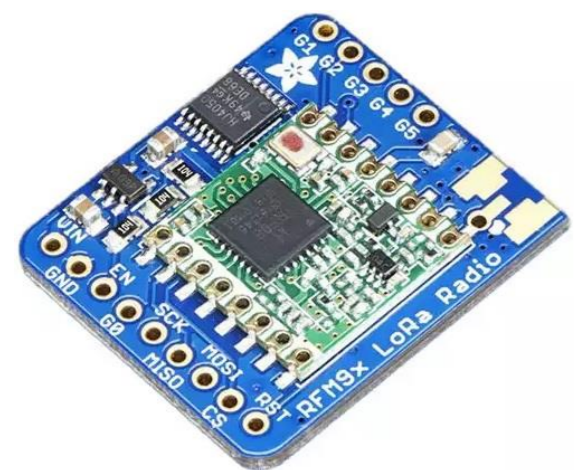
LoRa is a wireless technology that offers long range low power and secure data transmission for IoT and M2M applications.

In this project, two separate LoRa modules were used to transmit and receive the data.

In order to provice communication between the Eye and a smartphone, HC05 bluetooth module was chosen because of its high speed.


The increasing bandwidth, lowers the range. Since Lora has long range connection, the data size it can send in one packet is small. The main problem was sending large-sized data such as image. So we need the sd card to send these data.
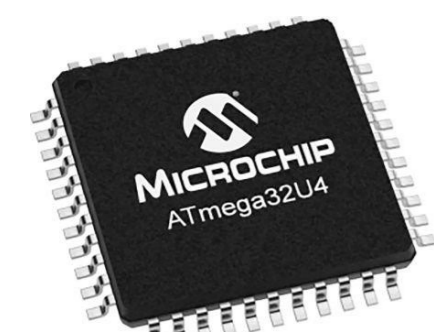
After the data is stored on the sd card, the microcontroller must split the data into 200-byte packets so that the LoRa can send the data one by one.


Also, user can add sensors according to field, The Eye will be used. Then microcontroller can manage data coming from sensors and data coming from smartphone and can send them to receiver.

Working Principle
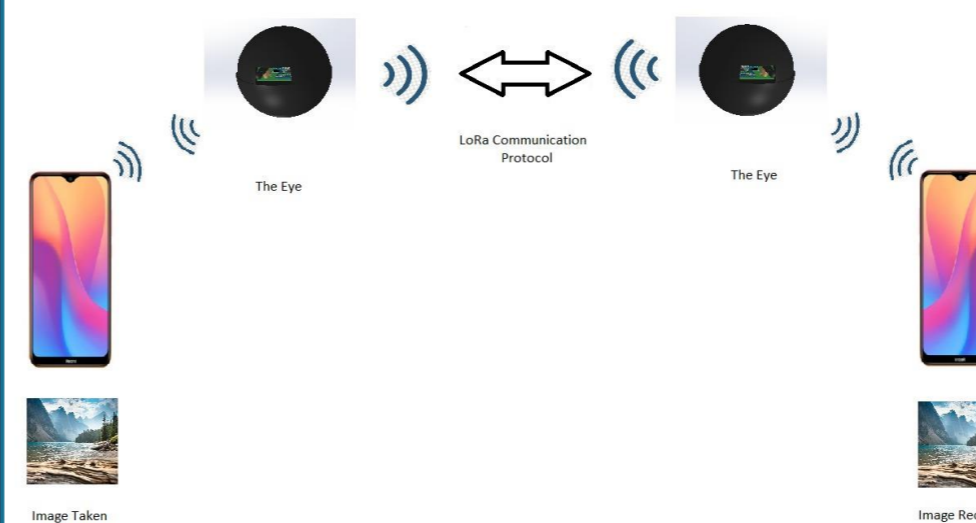
User can send an image, GPS location or text message with using The Eye. If the message is an image, our app The Eye changed the jpeg format into Base64. Then sends it to microcontroller at the transmitter part via Bluetooth. After microcontroller writes image data to an SD card, it transmits this data 200-byte packets. The Eye receives the image data and writes to SD card in receiver side. Then it this sends data via Bluetooth. App at receiver side, converts this image into jpeg format and shows it. Then, if there is an Internet connection, it uploads this picture to firebase cloud.

Results and Discussion
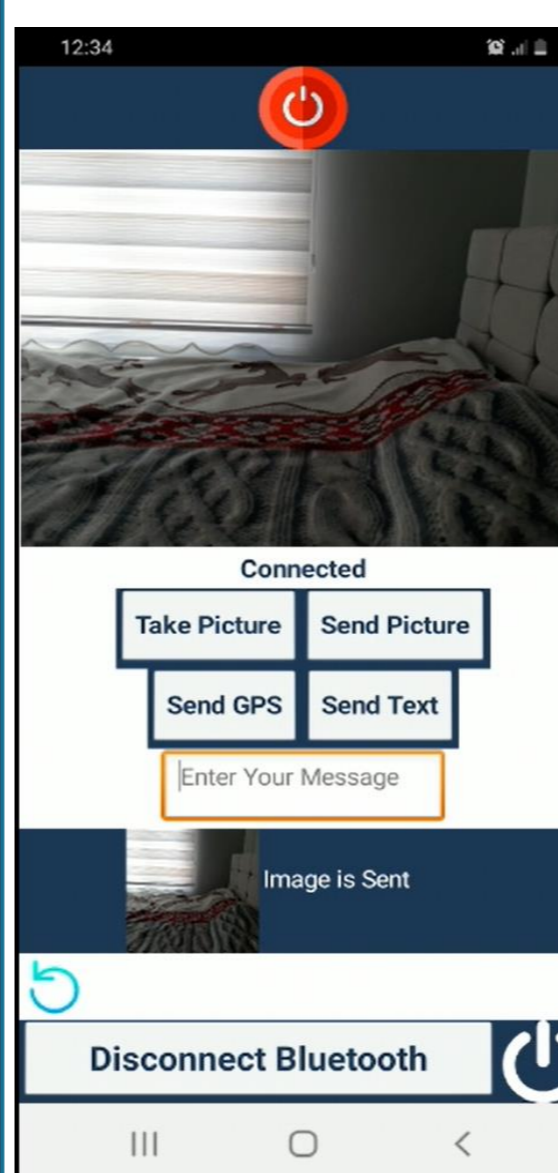
While the picture on the left is taken from the transmitter application on the smartphone, on the right is a sample picture taken from the receiver application. hello message written in the transmitting application, the picture taken and the GPS coordinate data were transmitted and displayed in the receiving application.

There are two parameters of LoRa which are affect the both baudrate and the transmission range. Spreading Factor and Bandwidth. Decreasing SF and increasing Bandwidth, increase the bit rate. RFM96 LoRa module's maximum packet size is obeserved as 255 byte. The size of the packet lies still same but, the time is decreasing. So bit rate is increased.

Final Design

The outer shell of the device is designed to be like a tennis ball. When necessary equipment was found in this sphere, the diameter of the device was calculated as 10.5 cm. The designed device can send files such as messages, gps and even images over long distances. The small size of the device allows people to carry it comfortably. Also it can be used in mountains and deep in forest for supplying communication. It not only provides communication to the region, but also collects the necessary information, because of its compact structure, the desired sensors can be easily integrated into the hardware part according to the requirement of the area to be used, and thus can be used in IoT applications. In addition, the cost of the device is up to 15 dollars, making it one step ahead as it is cheaper than its competitors.