Progress Presentation-I
e-Yantra Summer Internship-2018
Low Cost Sensor Node

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Overview of Project

- Project Name: Low Cost Sensor Node
- Objectives:
  1. A custom built power supply for optimized for low power sensor node applications
  2. Ability to program via Arduino IDE/ Atmel Studio
  3. Use nRF2401 for RF communication
  4. Completely open source design and sample codes to make it useful for WSNs
  5. Can be used as general purpose microcontroller board for learning interfacing and C programming
- Deliverables:
  1. A sensor node platform along with sample codes for rapid prototyping
  2. A firmware for low power modes and nRF24L01 networking
  3. Documenation on Hardware and Software

Overview of Task

Task No.	Tasks	Completion
1	Study about different sensor nodes platform available and their USP. Take desirable aspects of each	Completed
2	Review low power modes in ATmega328p, nRF2401 literature review	Completed
3	Build prototype using Arduino Pro Mini and nRF2401, test range theoretically and experimentally in outdoor environment	Completed
4	Research components available and select to fit price v/s performance metric	Completed
5	Build PCB design, source components, evaluation in Proteus (if necessary)	Completed
6	Prototype soldering and testing	Pending
7	Building a network of 3 nodes, relaying info, power consumption analysis	Working on
8	Making reusable firmware for nRF2401, interfacing soil moisture, temperature/humidity sensors	Working on
9	Gateway implementation using ESP32	Completed
10	Firmware documentation, hardware manual and reporting result	3

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Task Accomplished

- Change fuse bit in Atmega328p as per our application
- Complete circuit designing and send to printing
- Writing SPI library for Atmega328p in Atmel Studio
- Replacing Arduino core functions with our own GPIO functions for Atmega328p
- Testing of nRF24L01 transceiver on new firmware for our WSN
- Implement mesh and star network using 3 nodes
- Complete Duty cycling of Atmega328p

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Task
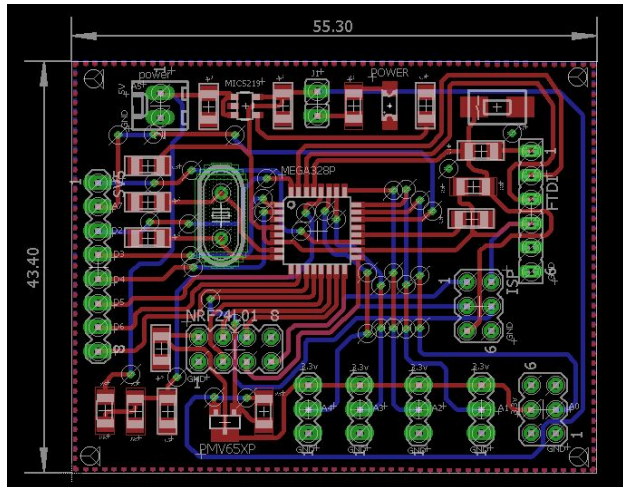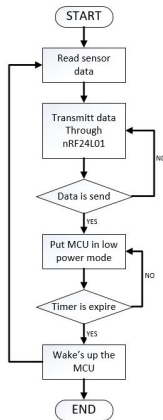Accomplished

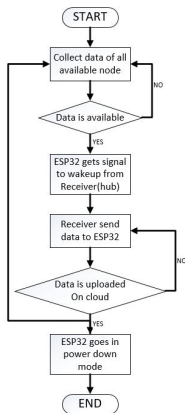Challenges Faced

Future Plans

Thank You

Task Accomplished

Figure 1: Schematic Design

Figure 2: Board Design

Task Accomplished

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Figure 3: Transmitter flow

Figure 4: Receiver flow

Task Accomplished

Figure 5: Graph of uploaded data

Challenges Faced

- Importing C file in C++ ATMEL project.
- Understanding new concept in embedded C++
- Timing issue with SPI library
- Transmit and Receive flot value in string
- Synchronization in Star network with duty cycling on both sides

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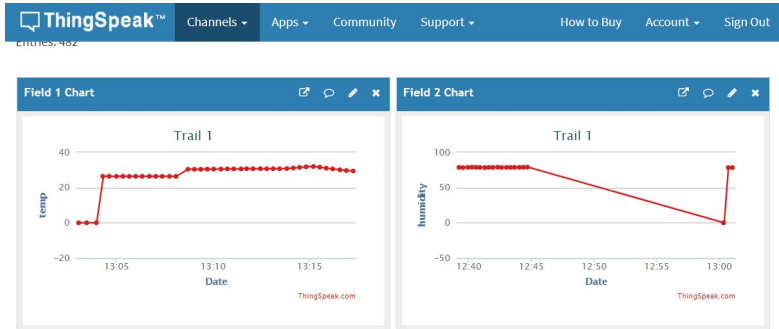Task
Accomplished

Challenges Faced

Future Plans

Thank You

- PCB soldering and testing
- Setup of 5 nodes WSN star network
- Operating life prediction of WSN
- Add soil moisture, light intensity sensor, humidity sensor on board and make provision to connect other sensors if needed
- Improvement in receiver for gateway implementation

THANK YOU !!!