

IndeedNET Q3 Technical Review

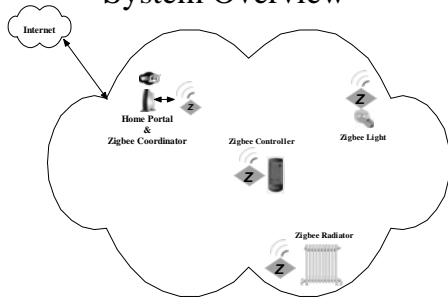
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Zigbee Enabled Home Automation System Overview



WP2: Actuator and communication development

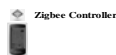
- T2.1: Individual sensor development
- T2.2: Individual actuator development
- T2.4: Routing algorithm development
- T2.5: Energy saving control system development

Zigbee Enabled Light Switch

- Common domestic light switch

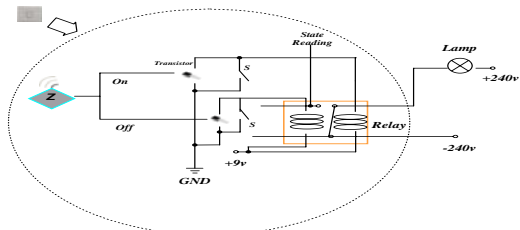


- Target design
Make it wireless



Zigbee Enabled Light Switch Version I

- Use two-coil latching relay



Zigbee Enabled Light Switch Version I

- Zigbee light switch design version I

----Features

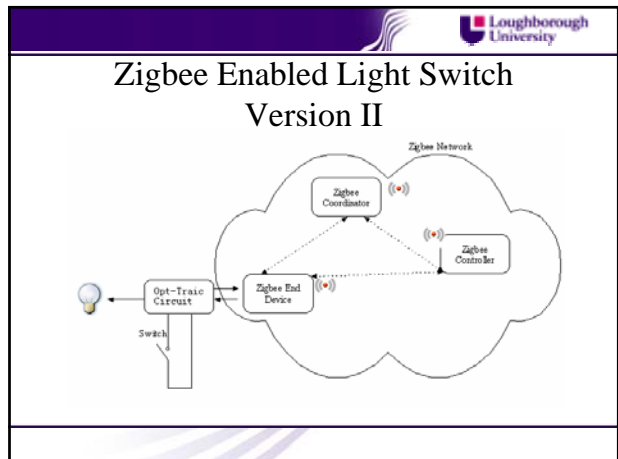
- Use two-phase relay to control the light.
- Separate low current circuit from high current circuit.
- Energy save for Zigbee module.
- Allow manual switch control.

----Shortages

- Additional power needed to drive relay

----Improvement issues

- Use low cost relay which can be driven by on-board battery to replace the current one
- Connect the main power to the relay and Zigbee module in order to remove the battery use.



Zigbee Enabled Light Switch Version II

Three parts included:

- Traic
- Traic Driver
- 'Exclusive-OR' gate

Zigbee Enabled Light Switch Version II

- Zigbee light switch design version II

----Features

- Separate low current circuit from high current circuit.
- Use semiconductor components, which are speed, longevity and lack of contact bounce.
- Low voltage required to drive semiconductor components.

----Shortages

- Energy consumption is serious. All components and Zigbee module must be powered on all the time to keep the state.

----Improvement issues

- Use main power to drive the Zigbee module and semiconductor components
- Improve the circuit to reduce battery use.

Zigbee Enabled Motorized Radiator Valve Control System

- Purpose
 - Enable automatic management on home central heating system.
 - Achieve wireless control on radiation valve.
- Target design
 - Zigbee base unit for daily control schema
 - Zigbee controller for manual control
 - Zigbee receiver & Motorized radiator valve for receiving/sending information and executing valve control



Zigbee Enabled Motorized Radiator Valve Control System

- Development in progress
 - Stepper Motor
 - Control circuit on breadboard

Zigbee Enabled Motorized Radiator Valve Control System

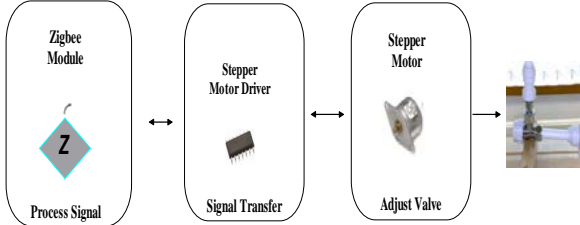
3. Test Device

- Upper layer: Tank for input water
- Middle layer: Valve to be motorized and controlled wirelessly
- Bottom layer: Tank for output water

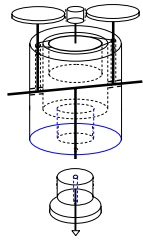



Zigbee Enabled Motorized Radiator Valve Control System

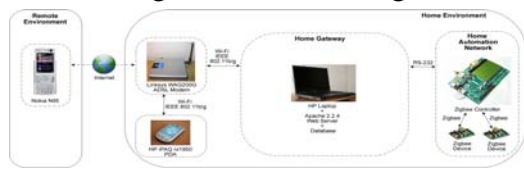
- Intended work flow



Mechanic Part of Radiator Valve





Combination of Home Portal & Zigbee Network Stage 1



The purposed combination work in stage 1 of the project is illustrated above. In this implementation the home gateway entrusted with data translation between the Internet, Wi-Fi and Zigbee networks is based on a laptop.



Combination of Home Portal & Zigbee Network Stage 1

A Zigbee based node with an LED actuator was controlled over the internet using a Nokia N95 mobile.

Combination of Home Portal & Zigbee Network Stage 1

The state of the LED after the user has remotely changed its state is shown below:

Start State End State

Combination of Home Portal & Zigbee Network Stage 2



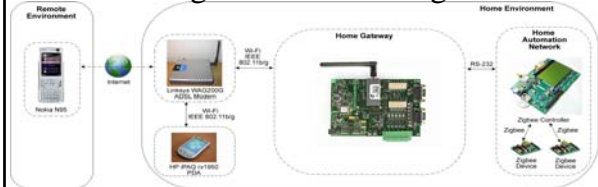
Wi-ME Module



Wi-ME Module & Integration Board

The second stage of the combination work development involves the replacement of the laptop based computer with a Digi Connect Wi-ME module. The Digi Connect Wi-ME module is based on an integration board.

Combination of Home Portal & Zigbee Network Stage 2



The purposed home gateway model developed for Stage 2 of is illustrated above. In this implementation the home gateway entrusted with data translation between the Internet, Wi-Fi and Zigbee networks is based on the Digi Connect Wi-ME module.

Work in Q4

- Continue the Zigbee enabled radiator valve control system development on the mechanical connection part.
- Test the communication of Zigbee network and Wi-Fi network, minimize the combination design.
- Improve the light switch control system to achieve the purpose of efficient energy use and make the design close to the practical use.

Conclusions

- Simple light control system for home use has been achieved.
- Zigbee enabled radiator valve control system has been achieved theoretically.
- Combination of Zigbee network and Wi-Fi network has been proved to be feasible and need further investigation.