Divide & Conquer Assignment Spring 2016

Senior Design Project Group #6 Spring/Summer

Name: Knight Nite (K&N)

1. Members:

Marcus Hobbs - CPE

Mark Hughes Atkins- EE

Ahkeim Pierre - EE

Hieu Pham - EE

2. Narrative

Over the years, we have seen people close to us battling sleep disorders caused from stress, studying for finals, and financial responsibility. There are several devices such as *Knight Time* as well as some of these devices that will monitor a person's sleep pattern and recommend solutions to treat the disorder in the future:

- Withings Aura
- Beddit Smart
- Sense
- Jawbone
- SleepRate

However, there are very few devices that actually help with sleep aid features for people with sleep problems such as insomnia. We would like to use this opportunity to design and build a device that can provide a real-time solution for sleep disorders that plague those closest to us.

Insomnia, sleep apnea, and sleep restless legs syndrome are the few disorders we plan to treat with our project called Knight Nite.

Therefore, the objective of Knight Nite is to provide a solution to an user's sleep disorder based on information from the user and their environment. Knight Kite will ask the user several questions in order to get a baseline of their symptoms, and by monitoring the user's vitals, temperature, and measuring the lighting and noise in the environment to determine treatment. A microcontroller will use all the data gathered from the survey and sensors to provide the most viable treatment to help the user sleep. The treatments we plan to implement are introduce white noise, stable temperature of the frontal lobe, and light therapy to help the user wake up.
One of our main goals is to have this project as THE designated go-to sleep project for the senior design ideas.

3. Requirements

A. Light System

- Monitor Ambient Light
    - Shall be powered by 100-120 Volts.
    - Shall use LED lamps
    - LEDs shall be controlled by microprocessor
    - Shall monitor the light spectrum in surrounding environment.
    - Shall provide various brightness to wake up the user

B. Auditory System

- Shall measure Ambient Noise in surrounding area

- White noise application
    - Shall generate sounds varying in frequency
    - Shall generate sounds varying in intensity
    - Feedback based on the user's motions and vital signs will be cycled back through the controller in order for the controller to determine if white noise is a viable solution

C. Mechanical System (Cooling System)

- Have a fluid system (liquid) for cooling
    - Reservoir and pump with liquid to cool the forehead
    - The fluids system will consist of a separate reservoir away from the user and utilize a pump which will cycle through liquid to cool the forehead based on the data processed through the controller.

D. Controller (Processor)

- Process data from survey from user
- Process data from sensors
- Control the mechanical system
- Corded Power
- Find a processor that meets the support of all sensors and control algorithms

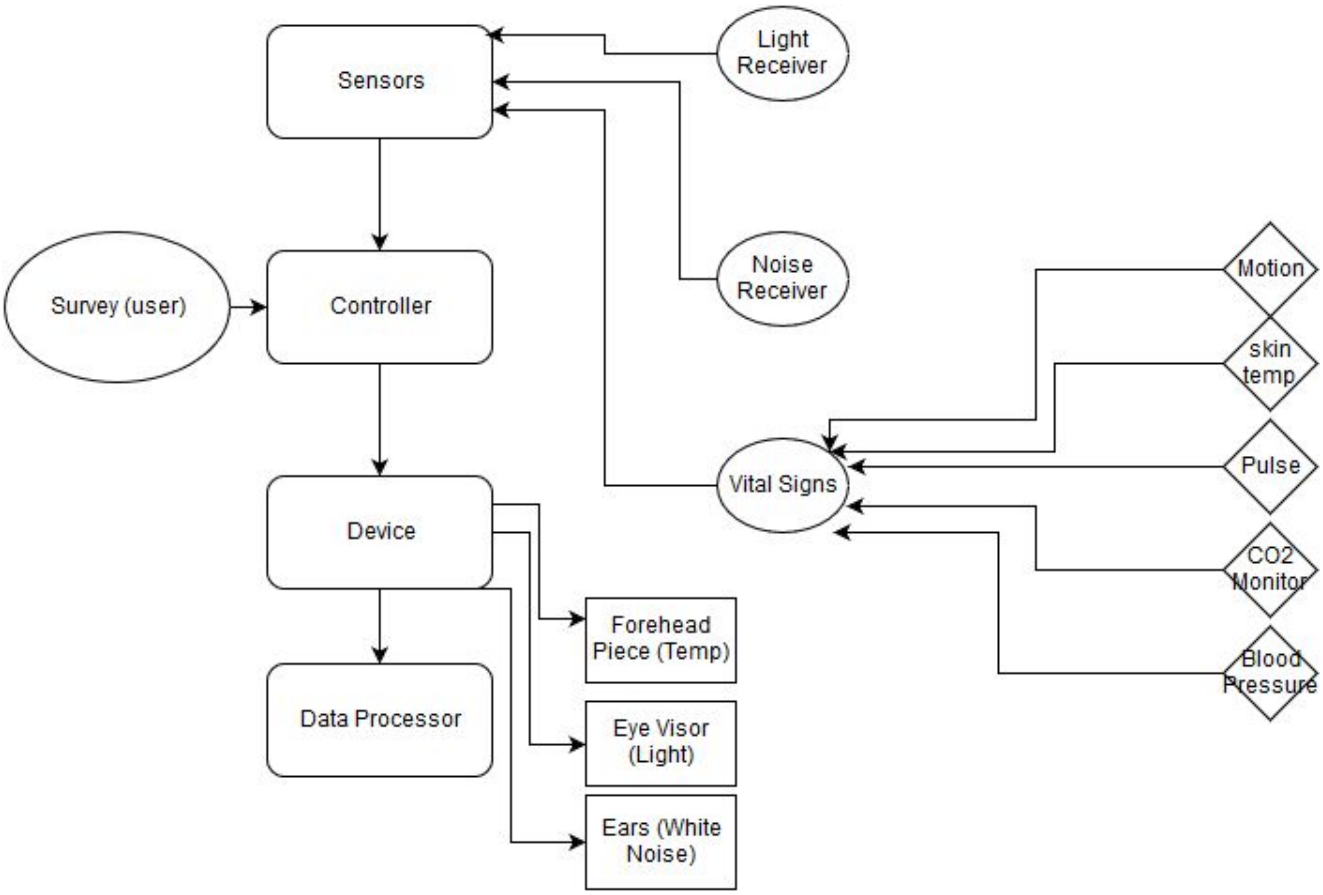
E. Data Processing

- Display Information
    - show graphs/charts/percentages
    - future suggestions for user

- user interface
- survey and control of device

4. Block Diagram

Knight Time Low Level Block Diagram



5. Possible Sponsors:

- Northrop Grumman

- PEO STRI
- Lockheed Martin
- Command and Control Technologies
- Harris Corporation
- Mattress 1
- Sleep Number Sleep System

Estimated Project Budget - $1,000

6. Milestones

General Milestones:

Initial - Identify project and requirements

End of Spring Semester - Complete Design Layout, Funding Completed

Beginning Summer Semester - Completed Design Plan/Layout and Materials

By End of Month:

Jan - Form Group and Complete 5-10 page divide and conquer

- Agree on a project idea

Feb - Majority of requirements identified, each group member knows their role

- Each member has in depth research of similar products for their part
- Each member will provide a list of components we plan to use for each device.

March - At least 2 propositions for funding,

- Major and Sub design components (high level)

April - Build of Materials (parts list) after having a complete design

- Design a prototype

- All documentation/schematics complete
- Have parts ordered in order to have them ready by the beginning of the summer semester

May - start building and implementing test plans for sub components

June - completed project ready for testing

- Analyze performance of each test
- Fix any bugs or issues with the design

July - completed project with presentation and results