WPRC Speaker Timing System

Initial Project Summary (Phase Zero)

Team *Time’s Up!*

Frank Gonzales
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I. Project Overview

1. Stake Holders:

Customers: Western Protective Relay Conference

Sponsors: WSU Conferences and Institutes

Client: Dave Angell

Advisor: Brian Johnson

Capstone Instructor: Brian Johnson

Consultant/Staff: N/A

Other: Moderator, Speaker, Audience, Design Team

2. Project Background

The Western Protective Relay Conference in Spokane Washington is in need of a conference speaker timing system. At the conference, multiple speakers are presenting simultaneously and a wireless monitoring system is needed to keep these multiple presentations synchronized. The system will consist of two remote speaker stations and two monitoring stations that will control the remote units. The moderator station should be programmable in terms of the presentation parameters of length, intermediate time signaling, indicator warnings, etc.

3. Deliverables

- Two sets of portable speaker timing systems.
- Each set contains a programmable master and slave unit as described in the “initial ideas” section.
- The reports delivered will include an instruction manual, design documentation and schematics.
II. Justify the Project

1. Needs
   This project will help the WPRC run smoothly. The system will enable the conference to stay on schedule and decrease the likelihood of a speaker overrunning their allotted time.

2. Benefits
   - This project will reduce the moderator’s workload and could potentially decrease the number of moderators.
   - Adhering to the speaker schedule will allow the conference to run more efficiently and on time.
   - A conference that stays on schedule and is run efficiently will create a positive experience for attendees and encourage them to return for future conferences.
   - As University of Idaho professors are often involved in the WPRC, producing this timing system will be good representation of the electrical engineering education provided to students.
   - This project will allow the design team to further their knowledge of the engineering project design process as well as enhance their understanding of the technical aspects involved in this project.

3. Investments
   - Projected financial contribution from the client of $600.
   - Additional funding from the University of Idaho senior design fund.

4. Initial Estimated Costs

   **Equipment Costs**
   - RCM2000 TCP/IP Development kit (includes Rabbit 2000 microprocessor, flash, SRAM, Ethernet hardware, serial ports, digital I/O, and Dynamic C development software), Price - $199.00
   - 6 x Jumbo 6-digit LED clock display Price – 6 x $69
   - Housing Unit, Price – 4 x $50
   - Wireless transmitter/receiver for each terminal, Price - 4 x $75
   - Power Converter, Price - 4 x $20
   - Total estimated equipment cost: $1331

   **Engineering Costs**
   - Student Time @ $50 per hour (10 hours/week per student: $36000)
   - Faculty Time @ $150 per hour (1 hour/week: $2700)
   - Facilities Lab Time @ $25 per hour (2 hours/week: $900)
   - Miscellaneous Expenses (Travel time, photocopies, poster, etc.) $250
   - Total estimated engineering cost: $39,850
5. **Return on Investment**
This project is justified because adhering to the time schedule will improve the efficiency of the conference and not waste the valuable time of the engineers and consultants that attend the conference.

**III. Team Formation**

- **Goal:** Complete the project by the October deadline and satisfy all of the customer’s requirements. Everyone on the team is committed to this goal.

- **Expectations:** The main expectation that is shared by all of the team members is accountability and responsibility. Each team member will be expected to complete their work by specified deadlines and be accountable for all of their actions. What the team members want out of this project is design experience.

- **Accountability:** The members of the team will be assigned specific tasks during team meetings and will also be given a deadline. If the work is not complete by the deadline then the team will meet together to discuss why this did not happen and how the situation will be resolved.

- **Roles:** The roles that will be needed in the team will be a record keeper, procurement specialist, client liaison, web master, team coordinator, and team accountant.
  - Montoya - client liaison and team coordinator
  - Gonzales – web master
  - Rebeck - procurement specialist and team accountant
  - Roberts – record keeper and assistant web master

- **Assessment:** During team meetings, the other team members will evaluate the work completed by each team member. Team members will give constructive criticism and suggestions.

- **Criteria:** Criteria for evaluating work performance will include the following:
  - Meeting deadlines
  - Successful completion
  - Successful functionality
  - Quality of solution
  - Cost
  - Amount of time spent on task

**IV. Exploring The Project: Questions and Answers**

1. **People**

   - Who will be financing this project?
WSU Conferences

- Who would like to receive updates on the project?
  - Dave Angell

- Who will be our contact at the hotel?
  - The hotel can be contacted by reaching Kelly Newell at 509-335-4247 or Tamara Kerk at 509-335-4248.

- Who will be our contact for the conference?
  - Dave Angell

2. Needs

- What kind of system are we replacing?
  - The previous system consisted of a remote station connected to a master by a wire. The remote displayed three lights. A green light indicated that the speaker could start, a yellow light indicated a 5-minute warning, and a red light indicated that the speaker had to stop.

- What were the problems with the old system?
  - The old system failed due to old age.

- Was the old system unsatisfactory?
  - No, but improvements should be made. The project description includes a list of the advanced features desired.

3. Constraints

- Will batteries or a 120VAC supply power the remote units?
  - The remote units will be powered by a 120VAC supply.

- How close will the units be to a 120VAC supply?
  - A power outlet will be on the speaker’s podium.

- What are the size limitations? Are there any physical constraints?
  - The base of the unit should be smaller than a standard notebook.

- Where will the remote speaker units be placed?
  - The units will be placed on the speaker’s podium.

- Do they need to be wall mountable?
  - The units do not need to be wall mountable.

- Do you have a preference in terms of wireless communication?
The client has no preferences in terms of wireless communication.

- How far away from each other will the units be placed? In other words, what kind of range will be required?
  - The moderator will be seated in the first row of the audience approximately 15-20ft away from the speaker.

- Are there any security concerns associated with the data transmission?
  - There are no security concerns.

4. Functions

- Would you like the option to have one moderator unit to be able to control two remote units so that the system will work when only one moderator is available?
  - The design team is allowed to use their best judgement.

- Would you like the moderator station to also display the time of day?
  - Yes, the moderator station should display the time of day. The time of day should also be synchronized between the two moderator units.

- Would you like the moderators to be able to signal each other and inform the other when their speaker has finished?
  - This feature would be desirable but it is not necessary.

5. Scope

- How large is our budget? What are the limitations on cost?
  - The client would ideally like to pay less than $300 per unit. One unit consists of a master and a slave.

- What is the estimated design life?
  - The desired design life is 20 years.

- Will this system be used only for one conference and one building or does it need to be portable and universal?
  - This is up to WSU conferences.

- Do you want the units to be designed for future expansion and addition of remote units?
  - This is a possibility but it is not necessary.

6. Existing Knowledge

- How can we get information on the wireless network in the building?
  - Contact the hotel.
• Can you give us more details on the conference rooms and building?
  ♦ Contact a hotel representative or visit the site.

• Will a computer be available to the moderator?
  ♦ The moderator will most likely have a laptop computer but the design should not rely on it.

• Would it be possible for us to travel to the hotel for data collection and testing?
  ♦ Yes it is possible for the design team to visit the hotel.

• Could you please elaborate on what you mean by synchronized and how would you like the separate moderators to be able to decide on a starting time.
  ♦ The only feature that needs to be synchronized is the time-of-day clocks on the moderator stations. The start time of the individual speakers will be up to the moderator in the room.

7. **Expectations** – see deliverables section above.

8. **Research and Learning Needs**

  • Technical Knowledge
    • Familiarity with micro-controllers and the ability to program them in a master-slave scheme
    • Interfacing timers, clocks, and indicator lights
    • Understanding of wireless data communication
    • Implementation of a power converter
    • Ability to develop an adequate housing design

  • Codes and Standards
    • Conference etiquette
    • Electrical and Power Safety Standards
    • Wireless Standards and Licensing

  • Product Knowledge
    • Research on Existing and Similar Products

9. **Capstone Instructor Signoff**
   The meeting and signoff with Brian Johnson was completed Tuesday 2/28/06.

10. **Client Interview**

    We had our client interview with Dave Angell on March 7, 2006. Due to timing conflicts, Tim Montoya was the only team member able to attend the interview. Mr. Angell’s answers to the design team’s questions are included in section IV.
11. Assessment of Phase Zero

- **Strengths**: After meeting as a team on several occasions, we were able to successfully develop expectations for the project as well as the roles each member will fill in order to complete the project on time and under budget. Each member played an important role in the development process and we have united as a team under one common goal. We feel this project is feasible and our individual skills and knowledge make the team capable of completing this project.

- **Improvements**: Since each member has a unique daily schedule, it would be beneficial for the team to develop an agenda for team meetings and events. Due to scheduling conflicts, only one member of our team was present at the client meeting. In the future, a team member should be designated as the schedule coordinator who is responsible for creating an agenda that works for each member. This person will also email reminders to the team and any other parties involved in meetings.

- **Insights**: Our budget is smaller than initially anticipated. Revisions to our investments and costs will be needed so that our budget is not exceeded. A meeting with the sponsor is necessary as early in the project as possible to discover these details so that time is not wasted in research. The client often has limited availability due to a busy work schedule. It is necessary for the design team to base their agenda on the availability of the client, sponsor, faculty advisor, and mentor. More coordination between team members and outside parties will improve performance and effectiveness because time is a large factor in the success of a project. It is important that deadlines are met and time limits not exceeded.
12. Phase Zero Signoff

Capstone Instructor:
Brian Johnson ______________________  date_________

Faculty Advisor:
Brian Johnson ______________________  date_________

Design Team:
Frank Gonzales _____________________  date_________
Tim Montoya ________________________  date_________
Jesse Rebeck _______________________  date_________
Hugh Roberts _______________________  date_________