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Department of Electrical and Computer Engineering

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Friend Finder Armband

Project Proposal

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Team #30

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1. Introduction

1.1 Motivation: Many times GPS devices can not be used to locate a person in a big crowd. They are not accurate enough to tell you exactly where a person is within close distances, and sometimes the signal is unreliable. The friend finder armband aims to fill this void in the market by creating an intuitive tool to easily find others which works where GPS does not. Our product would be useful in a myriad of situations including concerts, malls, and any other events where large gatherings of people make getting separated easy.

1.2 Objectives: Our goal is to develop a compact armband that will allow the users to easily locate each other in any situation. The armbands will use a system of antennas to locate each other. There will be increasing vibration with increasing proximity. Moreover, the armbands will have LED's to point the user in the right direction.

Features:

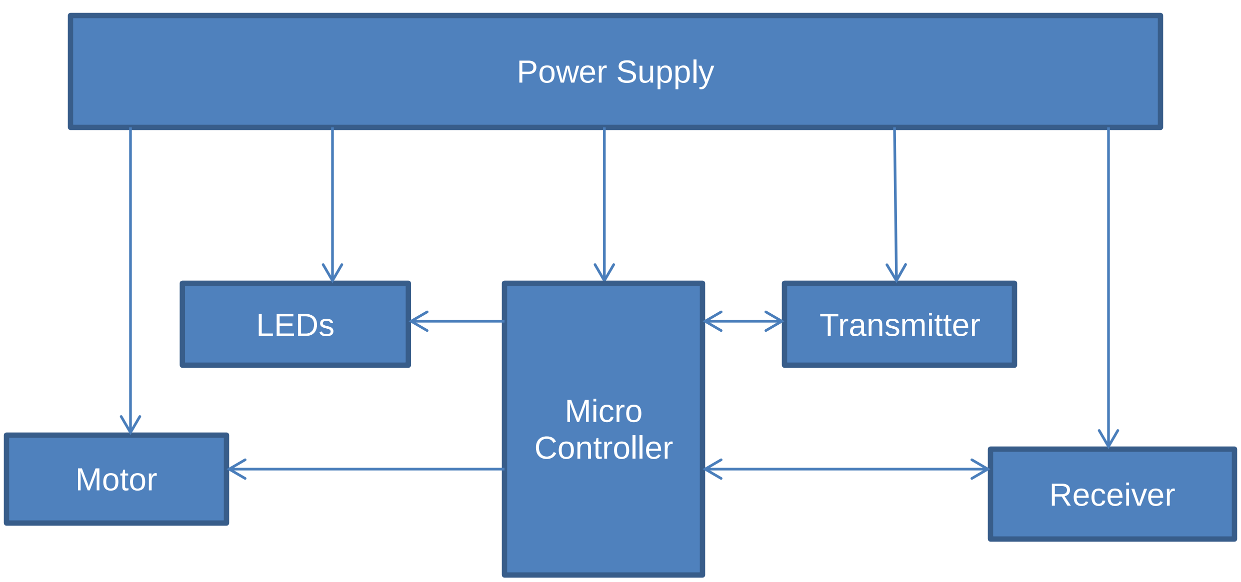
- Sends and receives position wirelessly.
- LED display to indicate direction of other armband.
- Vibrates more intensely with increasing proximity.

Benefits:

- Easily locate friends in a large crowd
- Works when GPS does not
- User friendly interface
- Robust design to be used in almost any situation

2. Design

2.1 Block Diagram:



2.2 Block Descriptions:

Power Supply: The main power will be from a low voltage DC battery. This module also contains any necessary power regulations for each component.

LEDs: This module contains three LEDs that indicate the direction of the paired armband.

Motor: The motor receives commands from the microcontroller indicating how hard it should vibrate.

Micro Controller: This is the main brains of our design. It will send out position data via the transmitter. By comparing the strength of the received signals (from different antennas) it will control the LEDs to indicate position. It will use the magnitude of those signals to control the motor making it vibrate more intensely with stronger reception. We plan on using an Arduino LilyPad.

Transmitter: This module will transmit a signal indicating the presence of the friend finder armband.

Receiver: This module will use several antennas to receive the signal transmitted from the other armband.

2.3 Performance Requirements

- Indicate location via LEDs from 3ft to 200ft
- Indicate close proximity via vibration from 3ft to 50ft
- Be able to turn on when separated and within a second find the other armband

3. Verification

3.1 Testing Procedures:

Our first test will be to ensure the transmission is working well. We will test how strong our signal is up to 200ft. This way we can know what strength corresponds to what distance so we can activate the LEDs and motor accordingly.

The next test will be to make sure we can receive signals at a variety of angles. We will also compare the strengths of the signals on each antenna to ensure a measurable difference; this will be important information so we can program the microcontroller to control the LEDs and motor.

We will also test the motor to make sure the vibrations have noticeable differences based on proximity.

Finally, we will test to ensure that the LEDs indicate the direction of the strongest signal.

3.2 Tolerance Analysis

The most important part of our design will be in locating the position of the other armband. Without this aspect of our product functioning it is virtually useless. Over the entire range of our requirements (from 3ft to 200ft) we need to be able to tell which antenna is receiving the strongest signal so we indicate the direction of the paired armband. Thus we will test to measure the maximum and minimum strength of transmitting signal that we can have to get good contrast between antennas. We will use this information to ensure our distance requirements are met, and that we have accurate locating of the other armband.

4. Cost and Schedule

4.1 Cost Analysis

Parts

Part	**Quantity**	**Price**	**Total Cost**
Arduino LilyPad	2	$25	$50
Transmitter	2	$40	$80
Receiver	6	$40	$240
Motor	2	$6	$12
LED	6	$.15	$.90
Battery	2	$3	$6

Total Parts Cost: $388.90

Labor

Name	**Rate**	**Hours**	**Total**	**Total * 2.5**
Tim Capota	$40/hr	240	$9,600	$24,000
Dave Drake	$40/hr	240	$9,600	$24,000

Total Labor Cost: $48,000

Total Cost: $48,388.90

4.2 Schedule

Date	Task	Group Member(s)
6-Feb	Finish Proposal Research Microcontroller/Motor Research Transmitter/Receiver	All Dave Tim
13-Feb	Sign Up for Design Review Design RF Design Microcontroller Design PSU	All Tim Dave Tim
20-Feb	Design Review Order RF/Microcontroller Order PSU/Misc. parts Order LEDs/Motor	All Dave Tim Dave
27-Feb	Start building PSU Start building RF system	Tim Dave
5-Mar	Start Programming Microcontroller Finish building PSU	Dave Tim
12-Mar	Build LED/Motor Continue building RF system Continue Programming Microcontroller	Tim Dave Tim
19-Mar	Spring Break	
26-Mar	Prepare for Mock-up Presentation Finish Building RF system Finish Microcontroller Programming	All Dave Tim
2-Apr	Mock-up Presentation Test RF system Test LED/Motor	All Tim Dave
9-Apr	Tolerance Analysis Debugging	Dave Tim
16-Apr	Preparation for Demo/Presentation	All
23-Apr	Demo/Presentation	All
30-Apr	Demo/Presentation/Checkout	All