ECE 421: Fall 2009 Project Ideas,

September 25, 2009

ABSTRACT

Initial project ideas from students

1. **Cell-Phone Home Controller :** Be able to access a home control system remotely via a wireless device. Like you said, access to a browser would probably be the best route of doing this. However, I began thinking that the system could also accept text messages that instruct the system. Thus, this could be useful for those without web capabilities on their phone or when the web is unavailable. I began to look into this, and services that use text like this are already available. (however, Starbucks wasn't the first to make coffee and look at them now!)

2. **Roadside Kiosk-Assisted Traffic Data:** Roadside wireless servers that communicate with passing traffic and give them information about their route. For example, a car programmed with GPS would ask for information regarding its future path, as well as give information about where it had just been. Thus, the cars can learn of traffic, accidents, and other situations which may prompt action.

3. **Sonar Marauder's Map:** Batman cell phone sonar (assuming you've seen The Dark Knight.) I can't imagine how cool it would be if something like that came to fruition, though from what I've read, it is not possible.

4. **Camera LED Projector Combo:** Camera with LED Projector: A digital camera with an in built projector. Once the image is captured it should be able to project the taken photo on any flat surface. Another cool feature would be if the user could stand upto a distance from the camera and say a simple command like Click or Picture and the camera clicks the photo automatically.

5. **WYSIWYG Environment Controller:** Universal Remote Control-Literally: A video camera that captures and displays the image of a certain room and the image acts as an interface between devices in that room and the user. So the displayed image is the remote control to the entire room. The user then touches the image of the device he wants to operate. For example if the user touches the image of the lamp, TV, radio etc. it turns on. I know this idea is a little too ambitious!

6. **Wireless In-Home Entertainment Data Distribution:** Wireless Entertainment Interface - An interface which can connect elements of an entertainment system wirelessly, including the TV, sound system, DVRs, Bluray players, gaming systems, etc. Would use a central unit and individual adapters for each device.

7. **Cellular Phones as Traffic Pattern Sensors:** Using cellphones to track traffic patterns along major highways. Can in theory provide real time information about traffic flow.

8. **Cellular Phone Heads Up Display:** One idea is to create a Heads-Up Display for use with cellular phones and other handheld devices. When a call comes in the display can show the caller's name, and at other times information such as the time and weather conditions can be shown. MP3 players can also interface with the portable display to show the currently-played song. Devices in cars can interface with the display which could minimize driver inattentiveness by maximizing the time drivers spend looking at the road rather than the displays in their cars.

9. **Bluetooth Distance Approximations:** Another idea is to perform Bluetooth distance approximations. These can be rough, as one example application can be to adjust a phone's ringtone depending on the proximity to the user. When the user is close to the phone the ringtone volume is reduced, and when the user is far away the ringtone volume is increased. Another example application is automatically pairing the phone to a pair of Bluetooth headphones or a hands-free device when the device is within a set distance of the phone.

10. **Wireless Temperature Monitoring:** Monitoring temperatures would require censors on the object that you wish to know the temperature of.. This would come in handy in computers since they can rise to high temperatures which can be harmful to speed and performance and can even damage the CPU. This would be very useful for company who sell electronics that can rise to high temperature. Companies and warn consumers of these electronics if they rise to a harmful temperature if they are constantly monitoring it.

11. **Positioning System using Bluetooth Technology:** Locating users using bluetooth would be possible in a small radius but would eliminate the use of satellites. This has many useful applications especially in a disastrous emergency where satellites are not available. Using bluetooth technology can even be used to transmit voice when the user is located with same bluetooth signal. Again this is useful in real life emergencies, for example if people are trapped underground or in a subway system, they can be located and can be heard using bluetooth.

12. **House Sensor System:** Essentially I'd want to monitor power being used by different appliances and also water usage. All live information sent to either a in home computer or wall mounted controller, maybe even a cell phone. I also want to be able to set alerts as to when you reach a predetermined limit set by the user, perhaps even have the option to shut off the power or water if the head of the house wants their kids or tenants to not waste anymore power or water after the limit is reached.

13. **Highway WiFi Network:** Mainly intended for families traveling long distance for vacations. I was thinking of even having a video download service through this system to allow traveler's to watch a bigger variety of movies on their rides. If I added that service I'd also want to be able to transfer over the movies to home tv's, basically the way onDemand works for tv, but in cars.

14. **Voice-Controlled Remotes:** Not really sure about this one yet but was thinking about a voice activated tv since remotes are always getting lost, however its already bad enough people fight over the remote I don't know what kind of fights would break out if anyone could change the channel with their voice. There would also have to be some kind of feedback from the speakers so that if a voice on the tv says something like "channel 11" the tv won't automatically change to channel 11.

15. **Wireless Video Transmission on Multiple Screens:** Being able to transmit video (dvd/blu ray) on multiple screens wirelessly.

16. **Wireless Hard Drive:** Have a hard drive with huge amounts of memory with the ability to be accessed wirelessly with a huge range. Multiple computers should be able to access hard drive simultaneously.

17. **Ambient Power Harvesting:** Ubiquitous radio signals mean there is energy in the air being used to transmit information. By analyzing the spectrum and finding the channels on which there is the most power and which are most available in many areas we could determine whether it is feasible to power a small device using signals already in the air. We could also research applications which would best be able to take advantage of such a system.

18. **Television Whitespace Messaging:** The frequencies used in television whitespace are now available use and have very large ranges compared to the frequencies found in wifi. This may open up the opportunity for cooperative phone to phone messaging at relatively low power. Messages are short and can take advantage of even the smallest whitespace timeslot to be sent out. The large range means that it may be possible for you to message a recipient in 1 or 2 hops which removes your message from the backbone taking load off of the network. This could also be used for messaging between multiple devices under a single users control to transmit data or instructions.

19. **Bluetooth Club-Chat Messaging** This is the interface where people will interact with other through a wireless device using Bluetooth or any other signal. This will create a virtual world, will allow people to socialize differently. In todays world, as there is more technology we are getting away from normal way of socialization. This will give that new way of socializing without the person knowing who is talking to him or not. This will be a virtual chatroom with avatars which will allow a person to talk to other one.

20. **Automatic car stopper**

    This is an idea where the car is stopped by signal. The process will include sending a signal to the chip which will be embedded in the car and when it needs to be stopped the computer will send a signal commanding it to stop. The main purpose of this will be to eliminate high speed car chase.

21. **Voice to Text**

    This is an idea where a widget will be created, which will help the person SMS while driving.

22. **Wireless [Lost] Item Finder:** This would feature a set of extremely small, low-powered wireless devices that would be manually attached to commonly lost household objects (i.e. remote control, cell phones, keys, small pets). This would also feature a control center, with the range between small (1 story apartment) to big (3 story house), that is able to turn "on" the mini-radios from the power-saver mode and able to contact and locate the lost devices. Perhaps it should be a game of hot/cold (strength of signal)?

23. **In-Home Coordinate System:** Currently, many household, self-automated robots (lawn mowers or vacuum cleaners) covers area with a random algorithm, often using 5 hours to do something it should be done in 2 since it goes over the same spot may times. Usually, it uses an infrared or other sensor system to detect obstacles and boundaries. However, the path of the robot could be more controlled if there was a way to set up a "coordinate system" for the robot to follow. This would allow the user to only clean/mow specific areas, or in a specific way. So, basically setting up mini-towers that are constantly communicating [wirelessly] with a robot about its location would save lots of time / energy (maybe? will need to do a wireless communication vs. running time energy comparison)

24. **RF to Fiber Optics** We turn the RF into Optics. Then using an AWGN signal to create noise we can insert 2 signals (1 small and 1 large). We can then subtract the large signal with the noise going on to see how much cancellation we can get using an oscilloscope and Spectrum Analyzer.

25. **Wireless Home Monitoring:** Monitoring homes is going to require sensors around the house and certain freq/internet connection on your cell phone. This would come in handy in case parents want to monitor they're kids or belongings while they're away from home. Since you can never be 100% sure things are as perfect as they can be. This would be very useful for company who sell electronics.

26. **Wireless Car Security System:** Sensors are placed into a car like on the windows or car locks and are connected to a device in the car. Whenever a window is broken or the car locks are opened while the owner is away from the car, the device in the car notifies the owner instantly via cell phone and tells what has been done to the car. The device could also notify police and show the exact location of the car through GPS. The device can also be used to tell the owner if the headlights have been left on and if the car doors are unlocked. The owner could turn off the headlights via cell phone. (this idea could be used more as an indicator of car issues than a security system.)

27. **Voice controlled room** Using bluetooth-like technology, you can control things in your room by using voice commands. You can have commands like closing or opening the windows, lock the door, turn the lights on or off, and turn the A/C on or off. You could also have a device that can say the time and date when commanded.

28. **Cellphone Door Bell Notification**

    Wouldn't it be great to see who is knocking on your door without leaving your easy chair? There are so many times I would like to be able to see who is at my door if I am hanging around the house or even out on the town. The days of wondering if the DHL guy/gal dropped off your new electronics in the rain on your stoop are over! With the press of your door bell, you get a picture text message so you can see whose there. Most likely you will always have your cellphone around so using this technology makes a lot of sense. If this is too easy we could take it to the next step and implement a door intercom to cellphone call when the door bell is pressed.

29. **Smart Fridge Tablet PC**

   Ever forget what is in your fridge? I do it all the time. The current trend at least at the Somerset Stop&Shop where I go once a week they have these personal scanners you can take around the store and make checkout even easier by not having to empty your cart at checkout, just pay and go. My idea would be to take these scanners home and upload the receipt list from the store into a tablet PC w/ touchscreen. The beauty of it is that you could keep a running tally of everything in your fridge easily. As you finish things you scan the Universal Product Code (UPC) off of the list or manually check them off via touchscreen for items without UPCs. Once you have your initial shopping list, you could get the list of stuff you need to refill on demand. I could see it being a big item for FoodNetwork or other cooking programs. It would also appeal to people because they could use the PC to find YouTube video recipes, keep their own recipes, program them so that when you select a recipe it automatically deducts the ingredients from the fridge/cupboard making keeping inventory even easier. I still haven't figured out the exact Wireless comm sys aspect of this but it would fit somewhere.

30. **Home Power Controller:** Improving energy efficiency in homes will save consumer's money and contribute to the reduction of greenhouse gas emissions. A wireless network can be created to monitor the power usage of individual appliances and link each one to a controller. The controller can be programmed or remotely controlled to reduce electricity usage in appliances.

31. **ComPass(Commuter Pass)** Create a billing system using RFID tags that can be attached to a keychain to pay for public transportation(bus, ferry, subway). Frequent commuters will save time while not having to buy tokens or MetroCards. It could even be an extension of the EZ-pass program which would make paying for public transportation more convenient.

32. **Network Police:** System admin who monitors all the wireless protocols in a given network and have full control over them.

33. **Wireless Heart/Blood Pressure Monitors:** Monitor cardiovascular health in newly released patients or patients suffering from blood pressure. The monitors would take the readings and queue them up and send them wireless-ly to the doctors' office. Currently, WiFi and Bluetooth are the only way I can see this working.

34. **Wireless Car Starter:** A cellphone that functions as a car remote. This cellphone would be synced with the car remote system and when at a reasonable distance from the car, the user is prompted for a pin/pass code which starts the car. This way, one has one less gadget to carry around.

35. **Wireless Camera:** A digital camera synced with a computer. This camera is synced with a computer such that once a picture is taken it is automatically transferred to the computer. Hereby making the use of memory card unnecessary.

36. **Photo Sharing:** When one person takes a picture at an event they can share the picture with other cameras in the area. Similarly if a person at an event misses an

oppurtunity to take a photo, they can check if any cameras in the area have made good photos of that event available.

37. **Paperless News:** Each subscriber to the newspaper just has a single device that displays the current issue on a monitor of some type. When the next issue is due to be delivered, the device updates automatically, but the previous issue will be lost. The monitor should be small so it can be carried around like a newspaper. Maybe with the OLEDs it can be rolled up like a newspaper too.

38. **Remote Controlled Car:** Just like a little kids toy car, except life size. You sit in the car, and use the remote as a key to get in, but then you also drive with the remote control. Everything else in the car is also controlled by the remote, so heat, A/C, radio, etc. all controlled by the wireless remote control.

39. **Wireless Power Delivery:** I was thinking either a device that could charge small appliances wirelessly, like cell phones, ipods, cameras. I went to look for information on this idea and to my surprise it's kinda of already in the market.

    http://www.youtube.com/watch?v=_iFqAYvJI2g
    http://www.youtube.com/watch?v=IstnSZhtkq4

    It all seems to relate to magnetic induction, wireless induction, white power, e-coupling technology. Since we are all invisible to magnetic fields, that's why this is possible.

40. **Electical Storage Trough:**

    http://www.youtube.com/watch?v=QU05d43dw6g

41. **Wireless Identity Widget:** To bring back the idea of storing basic info about your identity and medical record (such allergies) into a small device (micro) that you will carry in your wrist. So in case of a accident, no tests will have to be performed in order to know what allergies the person has and faster to save that person's life. The device will wireless be read from another the device that will be at the hospital. (I think this is out the subject as well) Religious and privacy issues raised about this, so the project was aborted.