Department of Electrical and Computer Engineering
EE302 Special Project Proposal

DATE:
Project Title AIRBORNE WEBCAM II
Project Proposer FASIL MUDDEEN
Project Supervisor FASIL MUDDEEN
Project Category (Type I-IV) IV

Objectives List, in as much detail as possible, what the project must achieve. This should include for example, target specifications for hardware and software designs	To design an instrument pack consisting of a camera, temperature and pressure sensors and digital compass module to be carried aboard a kite to an altitude of several hundred feet. Once there it takes images and uses the sensor information to calculate altitude and camera orientation (NSEW). The data is then relayed to a ground based PC monitoring station for display and analysis using a suitable GUI. The project initially is for still images but is not constrained to this.

Background Provide all pertinent background information and/or motivation for the project.	The ability to send images from an airborne camera has many applications ranging from security to surveying to just having fun. Think of being to send an image of a special occasion such as a wedding taken from 200 feet over the guests' head! Or what about taking a picture of a sporting event for a school similar to what the Goodyear Blimp does for US sporting meets. This project explores these applications. Image transmission will be by a suitable RF transmitter.

Project Implementation Indicate the types of activities required to complete the project	The instrument pack will contain various logic components, the CCD camera a microcontroller, the 16F877 PIC for example, depending on the processing and storage requirements. The ground station, which will be connected to a PC, must display the data and images and be able to send commands to the camera to start and stop its picture taking. **The final product must be assembled on a PCB or wire wrapped cushioned and sealed in a lightweight container.**

Requirements Indicate the resources required for the successful completion of the project. Pay special attention to cost and the procurement of items not usually in the Dept stores	**(VERY CHALLENGING)** Will require analog and digital design skills, especially in video interfacing and RF communications. Will require familiarity with the PIC family of microcontroller or other single chip microcontroller for system control and data storage, comfortable familiarity with a high level language for the design of the GUI interface for the ground station. Will require the design of a suitable kite (box kite most likely)

Department of Electrical and Computer Engineering
EE302 Special Project Proposal

DATE:
Project Title TINTOMETER
Project Proposer FASIL MUDDEEN
Project Supervisor FASIL MUDDEEN
Project Category (Type I-IV) IV

Objectives List, in as much detail as possible, what the project must achieve. This should include for example, target specifications for hardware and software designs	To design and fabricate the Tintometer - a device to measure the transmissivity of auto window tint to assess compliance with police specifications. Based on using three primary coloured LEDs and a appropriate photo detectors to evaluate the light transmittance of the film at selected wavelengths. **A commercial version of this project is being entertained**

Background Provide all pertinent background information and/or motivation for the project.	Most of us have some level of tint on our car windows. Properly used and installed tint serves an important function in that it reduces the occupants' exposure to harmful UVB radiation. Police regulations stipulate that the degree of tinting must not be so high as to prevent identification of the driver and occupants of the vehicle. Therein lays the problem, in that most times the assessment of what is 'legal' rests with the *subjective* opinion of the police or licensing officer. This project will eliminate this subjectivity by providing an appropriate measuring tool.

Project Implementation Indicate the types of activities required to complete the project	Activities include but are not limited to: 1. Research into auto tint and its specifications; 2. Determining the legal requirements in the region 3. Research into LED sources and their spectral response 4. Design of a light transmission measurement system 5. Calibration and validation of the operation of the system

Requirements Indicate the resources required for the successful completion of the project. Pay special attention to cost and the procurement of items not usually in the Dept stores	**(VERY CHALLENGING)** The final project MUST be packaged so that it can be demonstrated to the appropriate authorities. Requires good electrical engineering and mechanical skill, familiarity with PIC (or other appropriate microcontroller) programming or C programming. **Any specialized components not available in stores must be identified by the student for ordering by October 31 2006**

Department of Electrical and Computer Engineering
EE302 Special Project Proposal

DATE: _____
Project Title INTELLIGENT WATER MONITORING SYSTEM
Project Proposer FASIL MUDDEEN
Project Supervisor FASIL MUDDEEN
Project Category (Type I-IV) IV

Objectives List, in as much detail as possible, what the project must achieve. This should include for example, target specifications for hardware and software designs	To design, fabricate and test a **low cost, automated** water monitoring system for home use. Must sense water flow into and out of the water tank using appropriate flow sensors, calculate tank capacity based on the liquid level, provide automatic pump shut off for low level and provide notification of mains supply failure. Water system status is to be displayed on a remote panel inside house linked to the sensors via a suitable wireless link. The remote panel will also provide manual override on water supply. The system must have data logging capability to provide daily and weekly water usage statistics and to provide estimated capacity based on current usage and current billing information. **MUST BE ABLE TO EASIY RETROFIT EXISTING HOME TANK FOR USE WITH THIS SYSTEM**

Background Provide all pertinent background information and/or motivation for the project.	Apparent weather changes globally have resulted in dramatic changes in fresh water supplies for a number of countries. As the past severe dry season showed even small island states like ours are not immune. One universal mitigation strategy is water conservation at all levels – industrial, domestic country-wide and so-on. This project is designed to address the domestic conservation area through a usage monitoring and control system.

Project Implementation Indicate the types of activities required to complete the project	**Design and fabrication** of appropriate flow and level sensors. Fabrication (or sourcing) of appropriate weather resistant housings for all electronic and electrical components. Implementation of an appropriate inexpensive data communication system to facilitate the remote display and control of the water supply status. Power supply design for local and remote devices. Design of a user friendly, attractive remote display unit.

Requirements Indicate the resources required for the successful completion of the project. Pay special attention to cost and the procurement of items not usually in the Dept stores	**(CHALLENGING)** Good electrical engineering and mechanical skill, familiarity with PIC (or other appropriate microcontroller) programming or C programming. **Any specialized components not available in stores must be identified by the student for ordering by October 31 2006**. . The final design MUST include an error budget describing the overall performance of the system.

Department of Electrical and Computer Engineering
EE302 Special Project Proposal

DATE:
Project Title 3 WAY WIRELESS LOUDSPEAKER SYSTEM
Project Proposer FASIL MUDDEEN
Project Supervisor FASIL MUDDEEN
Project Category (Type I-IV) IV

Objectives List, in as much detail as possible, what the project must achieve. This should include for example, target specifications for hardware and software designs	To design and fabricate a 3-way loudspeaker system which is connected via a wireless signal to the music source. The system will comprise a subwoofer using an 8" speaker and two 2-way satellite speakers. Each speaker will have its own amplifier to drive the units. The crossover will be an active one using digital filters. The wireless communication will be facilitated by using Zigbee transceiver modules

Background Provide all pertinent background information and/or motivation for the project.	Home entertainment systems are popular especially because of their ability to provide a high quality listening and viewing experience. Many commercial home systems however neglect the principles of good design for the loudspeaker components, which degrades the overall quality of the sound produced. This project will address this by producing a set of self powered and amplified speakers. Additionally, to eliminate the need for long runs of speaker wire, the audio information will be sent via an RF communications channel.

Project Implementation Indicate the types of activities required to complete the project	Activities include but are not limited to: 1. Specification of suitable Low, Mid and High frequency drivers; 2. Measurement of Thiele Small parameters for drivers; 3. Design of appropriate enclosures according to latest theory; 4. Sourcing of power amplifier driver ICs and design of individual power amps; 5. implementation of digital filter crossovers; 6. implementation of RF channel addressing the delays and other factors encountered; 7. Testing and evaluation of the system

Requirements Indicate the resources required for the successful completion of the project. Pay special attention to cost and the procurement of items not usually in the Dept stores	**(CHALLENGING)** Suitable analog and digital electronic components, microprocessor/DSP, loudspeaker units. Good electrical engineering and mechanical skill, familiarity with PIC (or other appropriate microcontroller) programming or C programming. **Any specialized components not available in stores must be identified by the student for ordering by October 31 2006**. .

Department of Electrical and Computer Engineering
EE302 Special Project Proposal

DATE:
Project Title ACTIVE NOISE CANCELLATION HEADPHONES
Project Proposer FASIL MUDDEEN
Project Supervisor FASIL MUDDEEN
Project Category (Type I-IV) IV

Objectives List, in as much detail as possible, what the project must achieve. This should include for example, target specifications for hardware and software designs	To design and fabricate a noise reduction headphone which uses signal processing techniques to reduce ambient noise levels but leave voice data unaffected.

Background Provide all pertinent background information and/or motivation for the project.	Control of occupational noise exposure is critical to satisfying OSH requirements in the workplace. In situations where the noise level cannot be reduced, the exposure is lowered by using appropriate hearing protection. Typical hearing protection for example, earplugs or ear-muffs, reduce all audible frequencies including voice. The disadvantage here is of course that verbal communication becomes more difficult and there is now the possibility that aural warning signals will not be heard.

Project Implementation Indicate the types of activities required to complete the project	Commercial versions of this device exists, for instance from Bose ®. 1. Research into noise cancellation techniques 2. Research into digital filtering and signal processing 3. Research into human voice components 4. DSP or uP implementation of noise cancellation

Requirements Indicate the resources required for the successful completion of the project. Pay special attention to cost and the procurement of items not usually in the Dept stores	**(VERY CHALLENGING)** Miscellaneous electrical and electronic components. The initial concept for this project used a dsPIC but other signal processors maybe used subject to availability of necessary programming tools. Because of the nature of the project small components will be needed. The student will have to work with SMT devices.

Department of Electrical and Computer Engineering
EE302 Special Project Proposal

DATE:
Project Title POWER LINE COMMUNICATION SYSTEM
Project Proposer FASIL MUDDEEN
Project Supervisor FASIL MUDDEEN
Project Category (Type I-IV) IV

Objectives List, in as much detail as possible, what the project must achieve. This should include for example, target specifications for hardware and software designs	To design and fabricate a system which transmits a hi-fi quality audio signal to a set of loudspeakers via the domestic house wiring system. The system must be able to accept a standard audio signal for example from the output of a CD player.

Background Provide all pertinent background information and/or motivation for the project.	Power line communications are becoming increasingly common especially in domestic situations. Typical application examples include appliance control and security. The rational is simple – houses contain a whole lot of pre-installed wiring connecting all of the rooms to each other via some central power panel, so why not use this infrastructure for some additional applications beside power transfer. To this end standards have been developed for example X10 and those of the Home Plug Alliance to facilitate transmission of data over live power lines.

Project Implementation Indicate the types of activities required to complete the project	Activities include but are not limited to: 1. Identify appropriate safety standards for this type of system; 2. Identify appropriate communication system for use; 3. Design of suitable interface circuitry; 4. Design of satellite speaker systems ; 5. Design of appropriate safety systems to protect users.

Requirements Indicate the resources required for the successful completion of the project. Pay special attention to cost and the procurement of items not usually in the Dept stores	**(VERY CHALLENGING)** Miscellaneous electrical and electronic components. Specialized devices to be specified by the project student. **NOTE: THIS IS A HAZARDOUS PROJECT WHICH REQUIRES VERY CAREFUL ENGINEERING**