ECE 411 Project Proposal

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### Plant Monitor (Not this one)

Rotating plate for plant to sit on to give even sunlight, with sensors for temperature and moisture. Temperature and moisture can be reflected with simple displays, or LEDs. Purpose is to let plant owners know if their plant is in ideal conditions.

Components include:

Waterproof moisture sensor probe

Waterproof temperature sensor probe

Low power DC motor

Power source, either via battery or from wall plug

Variable LEDs, or simple LCD monitor

Must:

* Rotate base for plant
* Have sensors for temperature and moisture
* Have some sort of display for temperature and moisture

Should:

* Display temperature and moisture via color coded LEDs

May:

* Display temperature and moisture via simple LCD monitor
* Clock and colored LEDs to simulate daytime for inside plants

### Light-Seeking Solar Panel (Not this one, either)

A solar panel can sit on a motorized system that uses the output of a sensor(s) and/ or camera(s) to find the position of the sun and face the solar panel towards it to achieve maximum efficiency. A camera or sensor(s) can be used to provide inputs to the motors moving the solar panel. We can add a small screen that displays the energy harvested from the sun and a battery to store the energy.

Components will include:

Solar panel (probably small ~ 10"x10". 10 watts)

8-bit microcontroller (maybe ATMega8, ATMega32U4, or TMS370)

Light Dependent Resistor

Motor driver IC Stepper Motor (might need more than one depending on solar panel weight)

Must:

* Rotate solar panel
* Have a sensor to determine light

Should:

* Store retrieved power in battery

May:

* Have an interface such as USB for charging of devices, eg phones

### Chosen Project: Pan and Tilt Camera Mount (This one!)

The basic function of this design would be to rotate and tilt a camera screw-mounted on top. Likely, the device would also screw-mount onto a tripod. Component-wise, the device would be built using two servo motors (one for rotation and one for tilt) and would also use rotary encoders to provide positional feedback. A four-button arrow key (left, right, up, down) would provide directional inputs to the device which would tell it which way to rotate. Possible additional features would include speed (slow, moderate, fast?) settings for rotation.

*Features*

Must:

* Be capable of rotating the camera
* Be sturdy enough to operate with the weight of the camera
* Be capable of attaching the camera
* Have an arrow key for controlling rotation

Should:

* Be capable of screwing camera on top
* Be capable of screwing onto a tripod

May:

* Be capable of tilting the camera
* Be capable of adjusting rotation speed setting
* If more buttons were added:
  + Be capable of storing saved positions to automatically rotate into desired positions.
  + Be capable of panning from one position to another at a slow, steady velocity

Specific Project Requirements:

* Actuator(s): DC servo motor(s)
* Sensors: Rotary encoder and arrow key buttons
* Processor: likely the ATMega32U4 Microcontroller
* PCB Circuitry: Amplifier to provide actuator drive capability, positional feedback circuitry, processor, input circuitry

Comparison between projects:

The plant monitor is not ideal in too simple of scope; most plants have varying degrees of ideal temperature and moisture, so it would need profiles programmed and an interface to choose between them. It would also be limited to small plants, as the rotating base likely would not have the needed support for a large plant.

The solar panel itself is a complex tool, and would require a bit of research to figure out if making it face the sun is a worthwhile gain in power in the first place, and if it gains enough power to even be a self sufficient machine. If it does give a gain in power, is it then substantial enough to compensate for the motor and computer. Wouldn’t really have time to solve the research aspect of it in time for actually building it.

The camera mount seems the most achievable and useful. It’s usefulness increases further with additional degrees of freedom (allowing movement in the Y-axis to tilt), but that then poses problems with stability and durability