Project Title: Automatic Storm Shutters

Team Name: Make It Rain

Team Members:
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Project Abstract:

The basic idea for this project is to build automatic storm shutters that will close in the case of strong winds, essentially a large scale storm. This is why we plan on creating our own anemometer, device to read wind speed, and then sending a wireless signal to the storm shutter motor to close and lock in place.

Basically, an anemometer will rotate in a circle and based on how fast the device rotates you can determine the wind speed. Simply buying an anemometer wouldn’t be the best method for our situation. We don’t need to know what the speed of wind is, simply when the speed has reached a certain speed. The below figure will help better understand what an anemometer looks like.
By putting a sensor, some sort that will count the number of times one of the arms spins around, we will be able to determine the wind speed. The only concern is finding a sensor that can read speeds of great magnitude. Another concern is building a device that can withstand such high wind speed. We believe that both of these tasks are easily attainable. Another back-up testing method would be to build a barometer to determine when the pressure has dropped to a certain level, to determine that it is definitely a storm of magnitude and not a rare occurrence.

After the wind has reached a certain speed for a certain amount of time, a signal will be sent to the control circuit inside the home, letting the motor know to shut the shutter. The shutters will then lock in place until the user manually opens them, most likely through a push button for now. There will also be a manual close of the shutter that will override the wind detecting system in case the user would like to shut them on their own. The locking mechanism allows for a security measure, since most homes are subject to theft and destruction of property after storms.

**Introduction:**

The automatic storm shutter system can be used in any home that risks the chance of destruction during a storm. If the resident is out of town or is not at their vacation home, the storm shutter system will close and protect their home without worry. There are similar products on the market; however, none of them apply wind speed detection. Currently automatic storm shutters close under heavy rain, but nothing for the situation we plan on solving. We feel that rain does not necessarily mean storm shutters should close. The true damage occurs under heavy winds. This would be applicable for any hurricane, tornado, tropical depression, tropical storm, etc. The following image shows the type of storm shutters we will use in our design. These are subject to change.
Different developers have run into a variety of problems when creating their automatic storm shutters that close due to heavy rain. We plan to bypass all of the rain problems they encounter by sensing wind speed rather than rain.

**Technical Objectives:**

The automatic storm shutters will use a self-built anemometer detection system using a sensor that is sensitive enough to determine the number of rotations in a certain amount of time. This will determine when wind speeds have reached around 60 to 70 mph, possibly less. Once that has occurred we will use an XBee to transmit a wireless signal to the home control system. This will use an Atmel microcontroller. Once at the home control center another Atmel microcontroller will control the manual pushbutton for close and open. This is where the system will determine whether or not to close the shutters, open the shutters, or do nothing. The shutters will run off of a motor of choice and lock when in the down position. Power consumption should not be too much of an issue. Also we may or may not decide to run the system off of solar power, since the anemometer will already be on the roof of the house. The following block diagram best represents our technical objectives in this project.
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Cost Objectives:
Quantify the expected costs for your prototype and compare it with the cost of similar presently available products, if any.

- Anemometer System w/ sensors: $50-$60
- Atmel: $10
- Programmer: $17
- Xbee: $20
- Motor: $20-$30
- Shutters: $20-$30

Total Cost: $200

No similar product cost.

Automatically operated storm shutters can run for $1000 or more, but we will not be using the equivalent quality shutter as major companies.

References or Bibliography:

First anemometer (Figure 1): http://monterinesf1.blogspot.com/2008/10/first-anemometer.html


Shutter Image (Figure 2): http://www.fema.gov/mitigationbp/fileDetails.do?id=2568
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Materials and Resources:
List any major components and resources required in the development of your project.

- Anemometer System w/ sensors
- Atmel
- Programmer
- Xbee
- Motor
- Shutters
- Resistors, capacitors, etc.

It may be helpful to discuss this idea with individuals knowledgeable about weather and storms.