

# Good Morning Blinds

**Prepared for:**

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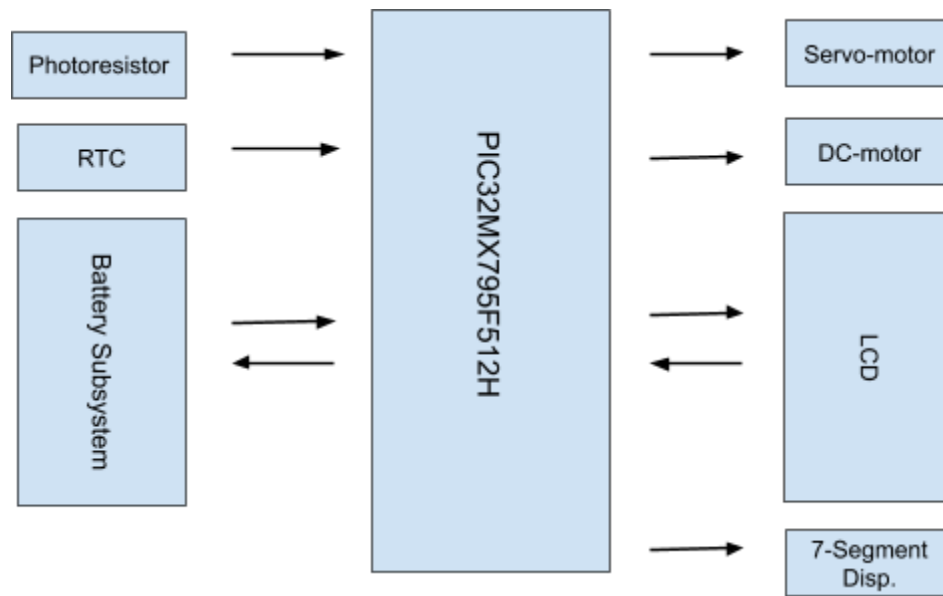
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## Introduction:

The Good Morning Blinds will be an automated system that is designed to control the amount of light within a home or office environment. The system will be designed to consider user preference, the time of day, and the amount of light being detected. In response to these inputs, the Good Morning Blinds system can adjust the angle of the blinds or if the blinds are raised or lowered. The overall system will include a microcontroller, three or four inputs, roughly three outputs, and a power supply. The inputs to the microcontroller will consist of a photoresistor, data for sunrise and sunset, a timer, and an interface consisting of buttons or phone application for user input. With these variables in consideration, the Good Morning Blinds microcontroller shall adjust the blinds via motor(s) and provide feedback to the user via LCD or seven segment display. In addition, the microcontroller will also monitor the battery level and only operate if there is enough power to run the motors. If there is not enough power, the battery level also will be displayed by a LCD or seven segment display to indicate to the user that the system needs to charge or be provided a back-up power source. With all these factors in consideration, it is hoped that the Good Morning Blinds system will be a beneficial addition to one's home or place of business.

## System Block Diagram:



## Subsystem and Component Functionality:

PIC32: Monitors and controls the system based on inputs from both external sensors and human interaction. Using an LCD and a 7-segment display, the PIC will be able to communicate the system status with the users. The microcontroller can also use the buttons on the LCD for input from the user, which will then be placed in a stateflow along with additional inputs from the photoresistor, RTC timer, and battery level indicator to determine the output. The stateflow will likely use interrupts to determine the hierarchy of the inputs.

Photoresistor: Detects the current brightness level in the room. The value measured from the photoresistor is used as input to determine if and how much the motor opens/closes the blinds.

LCD/Keypad: Used to interface with the user. Will allow a manual override of the Good Morning Blinds as well as additional input. The LCD that will be utilized comes standard with buttons for user input. The LCD will display messages to the user with regards to system state and settings.

7-Segment Display: Used to display the current battery level of the system.

Servo: Servo motor may be implemented to adjust the angle of the blinds.

Stepper Motor: A stepper motor would be implemented to raise or lower the blinds.

Solar Cells: Charges the onboard battery.

Battery Charger: The battery charger is the interface between the solar cells and the battery. The battery chargers presented in this project prevent the overcharging of the battery.

Voltage Divider: Used to monitor battery level and provide information to the microcontroller so that it may use this data to determine if the motor or servo should operate. The voltage divider presented in this project can also be used to step up or down the power supply.

RTC Module: A on board timer used to keep track of the time of day. This RTC module can also be found in laptops and other electronic devices.

## Bill of Materials:

Item	Supplier	Price Per Unit	Quantity	Total Per Item
PIC32	Microchip	\$49.00	1	\$49.00
<a href="#">Photoresistor</a>	Micro Center	\$0.99	2	\$1.98
<a href="#">LCD Display and Keypad</a>	Micro Center	\$14.99	1	\$14.99
<a href="#">7-Segment-Display</a>	Amazon	\$12.67	1	\$12.67
<a href="#">Servo - 3 Pack</a>	Micro Center	\$9.99	1	\$9.99
<a href="#">Stepper Motor</a>	Amazon	\$13.99	1	\$13.99
<a href="#">Solar Cells</a>	Amazon	\$21.75	1	\$21.75
<a href="#">Lipo - USB Lilon/LiPoly Charger</a>	Amazon	\$8.19	1	\$8.19
<a href="#">Battery</a>	Amazon	\$21.49	1	\$21.49
<a href="#">Charging Module</a>	Amazon	\$8.99	1	\$8.99
<a href="#">DC-DC Power Regulator</a>	Amazon	\$8.99	1	\$8.99
<a href="#">RTC Module Clock Timer</a>	Amazon	\$6.79	1	\$6.79
<a href="#">2 Pack RTC Battery</a>	Amazon	\$7.99	1	\$7.99
<a href="#">Duracell 9V Battery</a>	Meijer	\$7.99	1	\$7.99
<a href="#">Window/Floor Blinds</a>	Amazon	\$40.47	1	\$40.47
			Tax	\$14.12
			Total	\$249.39

## PIC32 I/O:

	Port Number or Name	Input/Output	Analog/Digital
Photoresistor	RD8	Input	Analog
RTC	RD9	Input	Digital
7-Segment Display	RE0	Output	Digital
Motor	RD1	Output	Digital
Servo	RD2	Output	Digital
LCD	RD3/RE1	Input/Output	Digital
USB Power Supply Converter Module DC w/ Display*	RD4/RE2	Input/Output	Digital

\*This particular power supply comes with a seven-segment display and is the voltage divider.  
If necessary, an additional seven segment display can be implemented.