# Automated Window Shades: Design Decisions

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**Main Device Feature Implementation:**

| **Function** | **Device Selected** | **Reasons** | **Alternative** | **Reasons for not implementing** |
|---|---|---|---|---|
| Daylight Reading Sensor | LDR | Simple straight forward, inspired by street light concept. | Tracking time instead of light | Seemed unnecessarily complex |
| Wireless Control | IR receiver | More understanding of concept. Seemed more approachable | Bluetooth | Very little previous experience. Not sure how SW would work. |
| Window Shades Actuator | Continuous Servo Motor | Simple hookup to IC. Simple controlling with PWM. | Stepper Motor | Requires external circuitry. Little experience |
| Manual Control | Push Buttons | Simple for user | Did not consider | --- |

**Basic Circuit Functions:**

| Function | Method / Device Selected | Reasons | Alternative | Reasons for not implementing |
|---|---|---|---|---|
| IC Programing | ISP | Programmers at school used this protocol. Wanted to gain good experience programing device without Arduino. | Rx Tx, Arduino Bootloader | No experience. ISP seemed more straightforward |
| Power Source | 9V DC wall adapter, regulated to 5V DC | 9V adapters very common. Simple approach. Can use 9V battery. | Many other alternatives | Not worth spending too much time on. |
| Clock frequency | 16Mhz | Arduino Uno uses 16Mhz | 8Mhz, 12Mz, etc | Did not play around with effect of lower/higher frequencies |

**Part Selection:**

| Part Designator | Part Number Selected | Specific; Values/Parameters/Package Chosen | Reasons |
|---|---|---|---|
| U1 | ATMEGA88-20AURCT-ND | TQFP-32 | Some versions of Arduino use this device, great for ref. design. Chose a middle amount of memory (not too much, not too little). Had AVR Programer. Cheaper. DIP package too large, waste of space. |
| U2 | LM317AEMP/NOPB | 1 A, SDM | Have experience with device. Servo needs plenty of current. |

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| | | | cheap, good datasheet/ reference circuit. |
| U3 | TSOP38238 | Generic | Generic IR Sensor, demodulated signal, cheap, good datasheet/ reference circuit. |
| J1 | RAPC722X | | Common barrel jack connector. Through hole, for more support. |
| J2 | 901210126 | 1X6 Servo/LDR | Versatile connector. Through hole, for more support. |
| J3 | 67997-106HLF | 2X3 ISP | Matched programer connector. Through hole, for more support. |
| B1-B4 | 3-1437565-0 | SMD | Could be SDM, not too much stress. |
| S1 | 1825255-1 | SPDT | Through hole, for more support. |
| TP1-TP6 | 5004 | | Can hook to scope probe |
| X1 | FOXSLF/160-20 | | Based on Arduino Uno |
| D1 | Generic | Green | Already owned |
| D2 | Generic | RGB | Already owned, RGB for multi-purpose |
| C1, C2 | EEE-1CA100SR | 10uF, 16V | 0805, Easier to solder, not too large. |
| C3-C5,C9-C11 | 885012207045 | 100nF, 16V | 0805, Easier to solder, not too large. |
| C6,C7 | 885012007012 | 22pF, 16V | 0805, Easier to solder, not too large. |
| C8 | 885012207051 | 1uF, 16V | 0805, Easier to solder, not too large. |
| R1 | ERJ-P06J241V | 240, 1%, Large Power | 0805, Easier to solder, not too |

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|---|---|---|---|
| | | | large. |
| R2 | ERJ-6ENF7320V | 715 1%, Large Power | 0805, Easier to solder, not too large. |
| R2 | ERJ-6ENF7150V | Second Value Just in Case | 0805, Easier to solder, not too large. |
| R3,R7,R17,R18 | ERJ-P06J103V | 10K, 5%, 0.5W | 0805, Easier to solder, not too large. |
| R8 | ERJ-6GEY0R00V | Jumper | 0805, Easier to solder, not too large. |
| R10 | ERJ-6GEYJ102V | 1k | 0805, Easier to solder, not too large. |
| R12 | ERJ-P06J220V | 22, 5%, 0.5W | 0805, Easier to solder, not too large. |
| R13-R16 | ERJ-P06J221V | 220, 5%, .25W | 0805, Easier to solder, not too large. |