Directions For Use:

Turn the TekBot on and ensure that there is a wire connecting PB7 (IR Receive) to PA18 (Serial In). Plug in the Controller logic board and ensure that the pins are hooked up as follows:

Wire Color	Plug	Description
White	VCC	Controller Power
Brown	GND	Controller Ground
Red	PB12	Controller Serial Out
Blue	PB10	Controller Clock
Yellow	PB8	Controller Latch

Once all the connections have been verified, simply point the IR transmitter towards the IR receiver on the TekBot and use the controller direction pad to make the TekBot move.

Logic Device Explanations (T:\students\phillir2\272Demo\)

1. Remote

1. **Five Bit Counter:** Keeps track of when the CPLD should send the latch signal to the SNES controller and to provide the input for the clock decoder to create the clock signal that shifts the serial signal out of the controller.
2. **Clock Decoder:** Generates a clock signal based on what the count is. The output is high when the count from the Five Bit Counter is even and low otherwise.
3. **Latch Decoder:** Generates the signal that tells the SNES controller to latch onto the controller state. This decoder's output is high when the count from the Five Bit Counter is 0 and low otherwise.
4. **Transmitter:** Transmits the inverted SNES controller serial data using IR. When the count from the Five Bit Counter is 26, the transmitter sends the signal 101 to tell the receiver that a transmission is going to be coming when the count resets after 31.

2. Receiver

1. **Input State Machine:** Continually listens for the start signal 101. Once the start signal is received, the state machine activates the rest of the circuit by driving its output pin low until the transmission is received.
2. **Data Buffer:** Sends bits to the shift register when the transfer pin is receiving a 0, which indicates that a transmission is being received.
3. **Clock Divider:** Makes the clock half as fast as the original clock. This is necessary because the clock on the remote that is sent to the SNES controller is half as fast as the original clock on that board.
4. **Five Bit Counter:** As soon as the transmission begins, the counter counts up to 12. When the count has reached 12, the complete pin is driven high to signal that the transmission is complete.
5. **Shift Register:** Shifts the serial data from the buffer into an internal register until the shift_dump pin is driven high. At that time, because the transmission is complete, the register transfers the fully received controller state from the internal register to the output.
6. **Decoder:** Takes the controller state from the Shift Register and translates it to a set of values that determine the direction of the motors and whether or not the motors spin.