Justification For Component Selection

STM32F103C8T6 Microcontroller
A microcontroller with UART and CAN interfaces to convert communications between the two types was needed. Its operating voltage is 3.3V. It also has plenty of GPIO pins, which will be helpful when connecting the three RGB LEDs. Many models were looked at and it was found that $3.09 was the most cost effective price for a microcontroller that has the functionality needed for this project.

TJA1042 CAN Transceiver
A CAN transceiver was needed to translate the digital signals from the CAN network to the microcontroller and vice versa. This transceiver had its supply voltage on pin VIO to be between 2.8V and 5.5V, meaning it is compatible with a 3.3V MCU. $1.77 was found to be the most cost effective price for a CAN transceiver with its desired functionality.

ADM3222ARWZ RS 232 Transceiver:
An RS 232 transceiver was needed to translate the digital signals from the MCU to the Roboclaw and vice versa. Its compatibility with the Roboclaw and MCU was ensured by selecting a transceiver with a 3.3V operating voltage. The Roboclaw has an output voltage of 3.3V, meaning it will be compatible with this transceiver. This device was $2.65, the cheapest kind for its desired functionality.

UHD1110-FKA-CL1A13r3q1BBQFMF3 RGB LEDs
- Forward Current 10mA per color
- R: 1.9V
- G: 2.9V
- B: 2.9V
- $0.15

Resistor Calculations:

Using $\frac{V}{I} = R$

Price: $0.15 per LED, $0.45 for three LEDs

	Red	Green	Blue
Voltage Drop (V)	3.3 - 1.9 = 1.4	3.3 - 2.9 = 0.4	3.3 - 2.9 = 0.4
Resistor Value (Ω)	$\frac{1.4}{0.01} = 140$	$\frac{0.4}{0.01} = 40$	$\frac{0.4}{0.01} = 40$

The nearest standard resistor values that also account for miscellaneous discrepancies, would be 150Ω and 47Ω.

Did you meet the requirement for data transfer rate?
The requirement for data transfer rate is to ensure all connections have matching bit rates. The lowest bit rate between all devices is 460 kbps. We can configure all bit rates for the other devices to match, as long as they're higher than 460 kbps. A matching bit rate will ensure effective data transmission.

Total Costs w/ links

STM32F103C8T6: $ 3.09
TJA1042BT: $ 1.77
ADM3222ARWZ: $ 2.65
UHD1110-FKA-CL1A13R3Q1BBQFMF3: $0.15, $0.45 for three LEDs

Sum = $ 7.96