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1. How many signals does I2C protocol use to send and receive data between devices? What are these signals and describe their functionality? (5 pts)

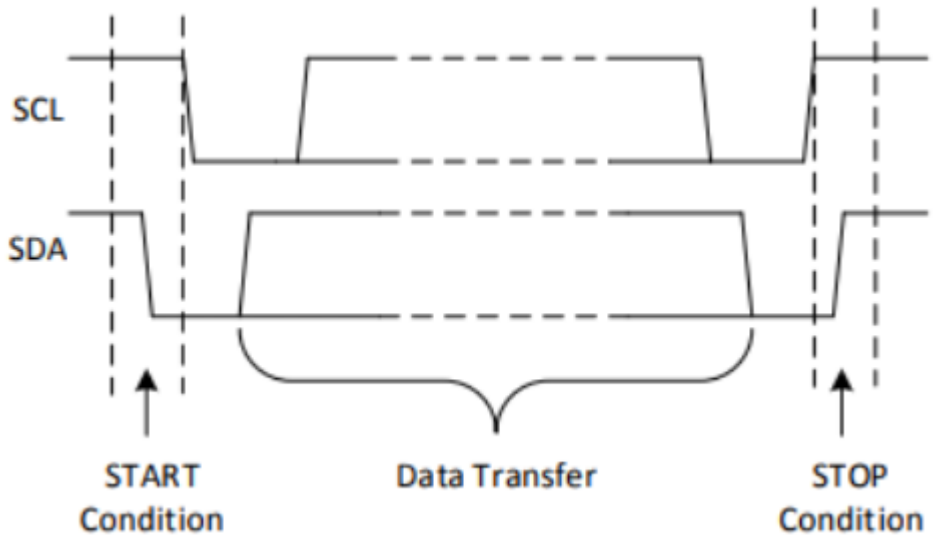
   2

   SCL: carrying the clock signal which synchronize the data transfer between the devices on the I2C bus

   SDA: sending and receiving data

2. How do you start and end serial communication with I2C protocol? Be specific about the timing relationship between Serial Data Line (SDA) and Serial Clock Line (SCLK) signal. Draw the necessary timing diagrams to clarify your point. (5 pts)

   A high-to-low transition on the SDA line while the SCL is high defines a START condition. A low-to-high transition on the SDA line while the SCL is high defines a STOP condition.



3. What is the maximum frequency for the SCL signal? You should check for this information in the temperature sensor data sheet as it is device specific. (5 pts)

   400kHz

4. After how many transfer bits from the master to the slave device, does the slave device sends back an acknowledgment? (5 pts)

   8

5. How many bits is the default temperature output? (5 pts)

   13

6. How do you set the address of the temperature sensor? How many different addresses can be used to communicate with sensor? If there are more than 1, why do you think there are multiple possible addresses? (5 pts)

   Pin A1 and Pin A0 set the two LSBs. These pins can be configured two ways, low and high, to give four different address options. Address are shown below.

Binary							
A6	**A5**	**A4**	**A3**	**A2**	**A1**	**A0**	**Hex**
1	0	0	1	0	0	0	0x48
1	0	0	1	0	0	1	0x49
1	0	0	1	0	1	0	0x4A
1	0	0	1	0	1	1	0x4B

If there are multiple possible addresses for one sensor, we can connect several same kind of sensors to the PCs and each sensor takes one address.