CSE360 Final

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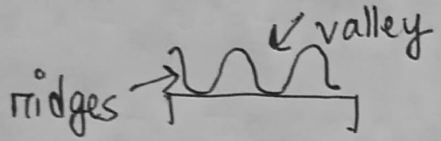
Answer to the Q. No 1

(a)

They can use a capacitive fingerprint sensor which is safer and accurate rather than optical finger print sensor.

Mechanism: Everyone's finger has ridge and valley.



Depending on ridge and valley, when anyone press the sensor, the sensor creates a electrostatic field like ridge = 1 and valley = 0 and by using those value it create a digital image which is saved in a database.

Now, we can connect this with arduino. Because, we know arduino requires a small processing unit. It will be connected through a analog pin of arduino. Here the data will come from sensor in non electrical form. Then arduino will process the data. The arduino can be connected to computer

where database of fingerprint is stored. And it will help to match with previous record and only give access to the authorised students. The arduino will provide a green LED if the student is authorised which will be connected # with digital pin. As arduino is a open source microcontroller it can process and provide faster interfacing with such sensors with its Atmega 328 controller.

(b)

Inductive proximity sensors are used for non-contact detection of metalic objects, on the other hand capacitive proximity sensors are used for non-contact detection of both metalic and non-metalic objects for example: paper, liquid etc.

Answer to the Q. No 2

ⓐ

John use SPI protocol and Jack use I2C protocol.

ⓑ

Here Jack use I2C protocol. For I2C protocol →

1. First, the master sends the start condition to every connected slave by switching the SDA line from a high voltage level to a low voltage level before switching the SCL line from high to low.

2. Then, the master sends each slave the 7 or 10 bit address of the slave it wants to communicate with along with the read/write bit.

3. Moreover, each slave compares the address sent from the master to its own address. If the address matches, the slave returns an ACK (acknowledgment) bit by pulling the SDA line low

for one bit. If the address from the master does not match the slave's own address, the slave leaves the SDA line high.

4. Furthermore, the master sends or receives the data frame.

5. After each data frame has been transferred, the receiving device returns another ACK bit to the sender to acknowledge successful receipt of the frame.

6. Lastly, to stop the data transmission, the master sends a stop condition to the slave by switching SCL high before switching SDA high.

(c)

John use SPI protocol:

Advantages:

(i) Low power.

(ii) No start and stop bits, so the data can be streamed continuously without interruption.

(iii) High data transfer rate than I2C.

(iv) Not limited to 8 bit words in case of bit transferring.

Disadvantages:

(i) It requires more pins than I2C.

(ii) No hardware flow control.

(iii) No slave acknowledgement.

(iv) Multi Master difficult to implement.

Answer to the Q. No 3

(a)

I would prefer SSD. Because, for magnetic, their file copy speed ranges from 50-120 MBs, while SSDs have a writing speed of more than 200 MBs up to 550 MBs. As my priority is speed and portability, that's why I choose SSD.

(b)

I can retrive using TRIM concept. When we delete a file from windows on a typical hard drive, the file ~~doesn't~~ isn't deleted immediately. Instead, the OS tells the hard drive it can overwrite the physical area of the disk where that data was stored the next time it needs to perform a write. This is why it's possible to undelete files. With a traditional HDD, the OS doesn't ~~pa~~ need to pay attention to where data is being written

or what trim command actually does, when we give modify command trim will mark some pages which are outdated for erase. The TRIM command allows the operating system to tell the SSD it can skip rewriting certain data the next time it performs a block erase.

(c)

NAND flash memory is the key component of SSD. Because all data is stored here. It contains two transistors ① control gate. ② Floating transistor. Here the principal operation is based on MOSFETS.

Data storing: We have different configuration of storage like SLC, MLC, TLC, QLC. SLC stores one bit in a cell, MLC stores 2 bits, TLC 3 bits, QLC 4 bits in a cell. To write data here the data comes in voltage format and in floating gate resistor the change of the electron changes and our data is stored. We write data page wise. Since it's non-volatile the data is stored even after power gets off. So, according to SLC, MLC, TLC, QLC format a certain amount of data is stored. here QLC requires precise amount of voltage since it can have $2^4 = 16$ different combination of bits. This way, writing varise from one format to another.