國立政治大學 104 學年度碩士班招生考試試題

考試科目	新媒介與科技 51513	所別	數位內容碩士學位學程	考試時間	2月28日（六）第三節

第一大題：

智慧空間是目前熱門的數位內容研究項目，其範疇由小的室內空間，大到一個城市甚至整個地球都可以是智慧空間的應用範圍。例如之前上海跨年的踩踏意外事件，如果從移動通訊公司的使用者位置監測，其實可以計算出人群擁擠程度是否已經接近危險程度，並即時對用戶推播警告訊息。

試題：

1. 請以公共安全（如天災人禍，傳染病，犯罪，交通，恐怖攻擊等）與可攜型裝置（手持裝置與穿戴式裝置）為發想主題，設計一個可以增進大眾安全的創新應用。解釋其搭配的電子產品（例如手機，google glass，apple watch…等），使用此裝置的何種功能（心跳，血壓，定位服務…）與應用方式，和預期效果。可用文字，圖表與草圖來解釋您的設計。（三十五分）
2. 以上的應用，其實也可能是集權政府或大企業用來大規模監測人民的工具，請就此種應用可能引發的隱私與侵犯自由問題提出您的觀點，與可能的解決方案。（十五分）

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

考試科目	新媒介與科技 5153	所別	數位內容碩士學位學程	考試時間	2月28日（六）第二節

第二大題：

1. 由高科技巨擘 Google 所研發，成本只有10美元的 Google Cardboard，現在可以透過普通的智慧型手機，即可看到 Google 地圖上設定位置的 360 度 3D 街景圖，這意味著您可以悠哉地待在台北住家裡，透過 Google Cardboard 親臨遠在紐約的時代廣場。

近年來，高速行動網路與 Android 開放平台的成長，創造了虛擬實境的機會。請您簡要說明 Google Cardboard 的運作原理，並以 Google Cardboard 為例，請舉出兩種未來可能的應用情境。（20 分）

2. 承接上題，請您針對 Google Glass、Oculus Rift 、Windows HoloLens 這三種劃時代性的穿戴式智慧型眼鏡，就 1.工作環境 2.未來可能的商業運用模式 兩方面，分析與比較它們的優點與缺點。（30分）

備註	一、作答於試題上者，不予計分 二、試題請隨卷繳交。

國立政治大學 104 學年度碩士班招生考試試題

考試科目	媒介敘事 51514	所別	數位內容碩士學位學程	考試時間	2月28日（六）第四節

申論題

第一題（內有三子題，佔總分 50%）

說明：

- 傳播學者麥克魯漢主張：「媒介就是訊息」(Medium is the message.)
- 社會學者齊格蒙・鮑曼論及網路社群媒介時，則主張："We belong to talking, not what talking is about. Stop talking-- and you are out. Silence equals exclusion."（翻譯：「我們屬於不停說話的一群，說什麼內容，無關緊要。不說話，你就出局。沈默等於被排除在外。」）

請回答下列三個子題：

1. 請分別闡述兩位學者的主張。
2. 請分別舉一個例證，說明兩位學者的主張。
3. 請表示你個人的看法：你是完全同意、或完全不同意兩位學者的看法，或者，你只同意其中一位學者的看法。為什麼？也請舉例證說明。

第二題. （20%）

請舉例說明為什麼某些故事在網路上廣被流傳？ 並歸納分析具有社群媒介散播力的故事元素可能有哪些？

第三題. （30%）

產品目標：試為7~10歲小學生在iPad上設計一款觸控式故事互動機.

請以手繪草圖, 說明故事互動機的介面呈現, 互動選擇, 以及有哪些功能？

條件：(a) 具高黏著度, 可以一玩再玩;

(b) 故事產出的形式要有文字、圖像及聲音.

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

國立政治大學 104 學年度碩士班招生考試試題

考試科目	計算機概論（網路與多媒體） 5/523	所別	數位內容碩士學位學程 資訊技術組	考試時間	2月28日（六）第3節

以下問題可用中文或英文回答。

1. **(10 points; 2 points for each) True or False.** Please write **O** (for true) or **X** (for false) as an answer to each of the following statements.
   - **(1)** The value 1001101 based on 2 is equivalent of the base 8 value 111.
   - **(2)** The smallest integer represented by 8 bits in two's complement format is -128.
   - **(3)** For solving a problem, the divide-and-conquer approach first divides the given problem into sub-problems, conquers or solves each sub-problem, and then combines solutions for sub-problems into a solution for the given problem.
   - **(4)** Data structures *queue* and *stack* behave in the same way, because they both are used to hold a collection of data items and allow data items to be inserted into as well as removed from a collection in an arbitrary order.
   - **(5)** For a singly linked non-circular list, the time required to remove the first data item from the list depends on the number of data items in the list, i.e., the time complexity is O(n).

2. **(30 points; 3 points for each) Single Selection.** Please select one of the choices for each of the following questions.
   - **(1)** Which one of the following binary numbers is the result of the binary number 0011 XOR (the logical operation *exclusive or*) the binary number 0111?
     (a) 1100 (b) 1010 (c) 0110 (d) 0100
   - **(2)** What is the largest integer represented by 8 bits in two's complement format?
     (a) 127 (b) 128 (c) 255 (d) 256
   - **(3)** Which one of the following sorting algorithms is the most efficient one in the worst case?
     (a) Selection sort (b) Quick sort (c) Merge sort (d) Insertion sort
   - **(4)** Which one of the following techniques is the most similar to the technique of web proxy?
     (a) Cache (b) Virtual machine (c) Multi-core processors (d) Cloud computing
   - **(5)** What is the data type of the following C codes: **int *ptr;**
     (a) int (b) address (c) pointer of int (d) None of the above
   - **(6)** Which one of the following methods is the best way to select a pivot key for quick sort?
     (a) Mode (b) The largest number (c) The smallest number (d) Median
   - **(7)** Which one of the following programs is NOT a compiler?
     (a) GNU Compiler Collection (b) Firefox (c) Javac (d) Psyco
   - **(8)** Which one of the following programming languages is NOT an object-oriented programming language?
     (a) Java (b) Fortran (c) C# (d) Python

國立政治大學 104 學年度碩士班招生考試試題

考試科目	計算機概論（網路與多媒體） 51523	所別	數位內容碩士學位學程 資訊技術組	考試時間	2月28日（六）第3節

(9) In the OSI (Open Systems Interconnection) 7-layer reference model for communication systems, on which of the following layers are Wi-Fi (IEEE 802.11) and HTTP (Hypertext Transfer Protocol) working respectively?
(a) Physical Layer and Application Layer
(b) Physical Layer and Transport Layer
(c) Network Layer and Application Layer
(d) Network Layer and Transport Layer

(10) Why the IP address, 103.46.266.70, is INCORRECT?
(a) It has too few parts.
(b) It contains an invalid value.
(c) The numbers should add up to an even number.
(d) The last number should end with 254.

3. **(25 points; 5 points for each) Term Explanations.** Describe your understanding about the terms.
(1) VPN
(2) CPU
(3) DNS
(4) FTP
(5) SSH

4. **(15 points)** Draw the basic computer architecture (also called Von Neumann architecture), and briefly describe the function of each component in the architecture.

5. **(10 points)** Model-View-Controller (MVC) is a popular software architectural pattern for implementing web applications. Please describe the main concepts of the design pattern.

6. **(10 points; 5 points for each) Digitization.**
(1) What is the difference between the following two digital image files: bitmap and vector images?
(2) Calculate the file size of a true color (24-bit) image in pixel 512x512. (1 KB = 1024 bytes)

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。

國立政治大學　104　學年度碩士班招生考試試題

考試科目	程式設計與資料結構 51524	所別	數位內容碩士學位學程/資訊技術組	考試時間	2月28日(六) 第四節

1. (10%) Rewrite the following program so that it computes a greatest common divisor using recursion instead of iteration.

```
unsigned greatest_common_divisor (unsigned a, unsigned b) {
  while (a != b)    {
    if (a > b)      {
      a -= b;
    } else if (b > a) {
      b -= a;
    }
  }
}
```

2. (10%) Rewrite the following program so that no "nested" conditional statement is used. Namely, you have to remove the nested if statements without affecting the semantics of the program.

```
double getPayAmount() {
  double result;
  if (_isDead) result = deadAmount();
  else {
    if (_isSeparated) result = separatedAmount();
    else {
      if (_isRetired) result = retiredAmount();
      else result = normalPayAmount();
    };
  }
  return result;
};
```

3. (5%) Match the programming paradigms (Object-oriented, Imperative, Functional, and Logical) supported by the corresponding languages. Note that one programming language may have multiple paradigms:
   Scala:
   Prolog:
   Java (before JDK7) :
   C (ANSI):
   Python (version 2):

4. (15%) Arduino is a very important rapid-prototyping platform in DCT (Digital Content and Technologies) research field. For example, a PIR (Passive Infrared) sensor can be used to detect presence of a human. If the

考試科目	程式設計與資料結構 51524	所別	數位內容碩士學位學程/資訊技術組	考試時間	2月28日(六) 第四節

data output of the PIR sensor is connected to pin no. 2 and there is an on-board LED occupying pin no. 13, then the following control program can direct Arduino to blink the LED when a human is detected:

```
void setup() {
  pinMode(13, OUTPUT);
  pinMode(2, INPUT);
}
void loop(){
  int val = digitalRead(2);
  if (val == HIGH) {
    digitalWrite(13, HIGH);
    delay(500);
    digitalWrite(13, LOW);
  }
}
```

Based on the example given above, please write a control program to read raw values from LM35, transform them to temperature values (in Celsius), blink LED, and then output via the serial port.

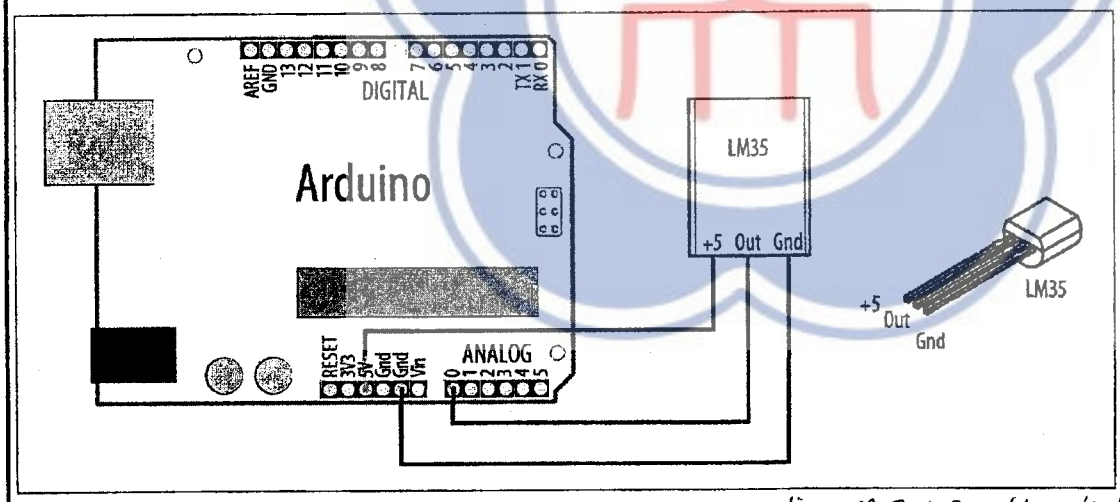

diagram source: Margolis M. Arduino Cookbook, 2/e oreilly, 2011.

Hint:

- The LM35 temperature sensor produces an analog voltage directly proportional to temperature (in Celsius) with an output of 1 millivolt per 0.1°C (10mV per degree). You can use (raw value/1024.0)*5000 to get the millivolt.
- Use Serial.print(...) for outputting data to serial port
- Since "Out" of LM 35 is attached to the analog pin, you should use analogRead(...) instead of digitalRead(...)
- Please use the following code template:

考試科目	程式設計與資料結構 5/524	所別	數位內容碩士學位學程/資訊技術組	考試時間	2月28日(六) 第四節

```
void setup()
{
 Serial.begin(9600);
}

void loop()
{
 //...(you code)
}
```

5. (5%) What is a "Callback" function? When do we need it?

6. Linked List and Array:

(1) (10%) Comparing Array and Linked List by filling in the form:

	Array	Linked List
Memory allocation	(a1)	(a2)
Data type of the elements	(b1)	(b2)
reliability	(c1)	(c2)
The speed of sequential access	(d1)	(d2)
The capability of Increasing space dynamically	(e1)	(e2)

(2) (16%)Please define data structures (in C programming language) that represents a Polynomial (ex: $3x^2+2y^3+1$) based on Array and Linked List, respectively.

(3) (4%) Based on the answer given in (2), give an exemplary Polynomial that wastes much memory space when implementing using Array.

7. B-Tree:

(1) (4%) What is the difference between B-Tree and M-way Tree?

(2) (6%) Given the following B-tree of order 4, please draw the results after inserting 888, 918, 938, and 999.

8. (5%) When shouldn't one pick the first element as pivot when using quicksort? Why?

9. (10%) What are the computational complexities for the following mechanism? (1) Worst case of Mergesort (2) Average case of Insertion Sort (3) Worst case of Heapsort (4)Deleting the whole Circularly Linked List

備註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。