



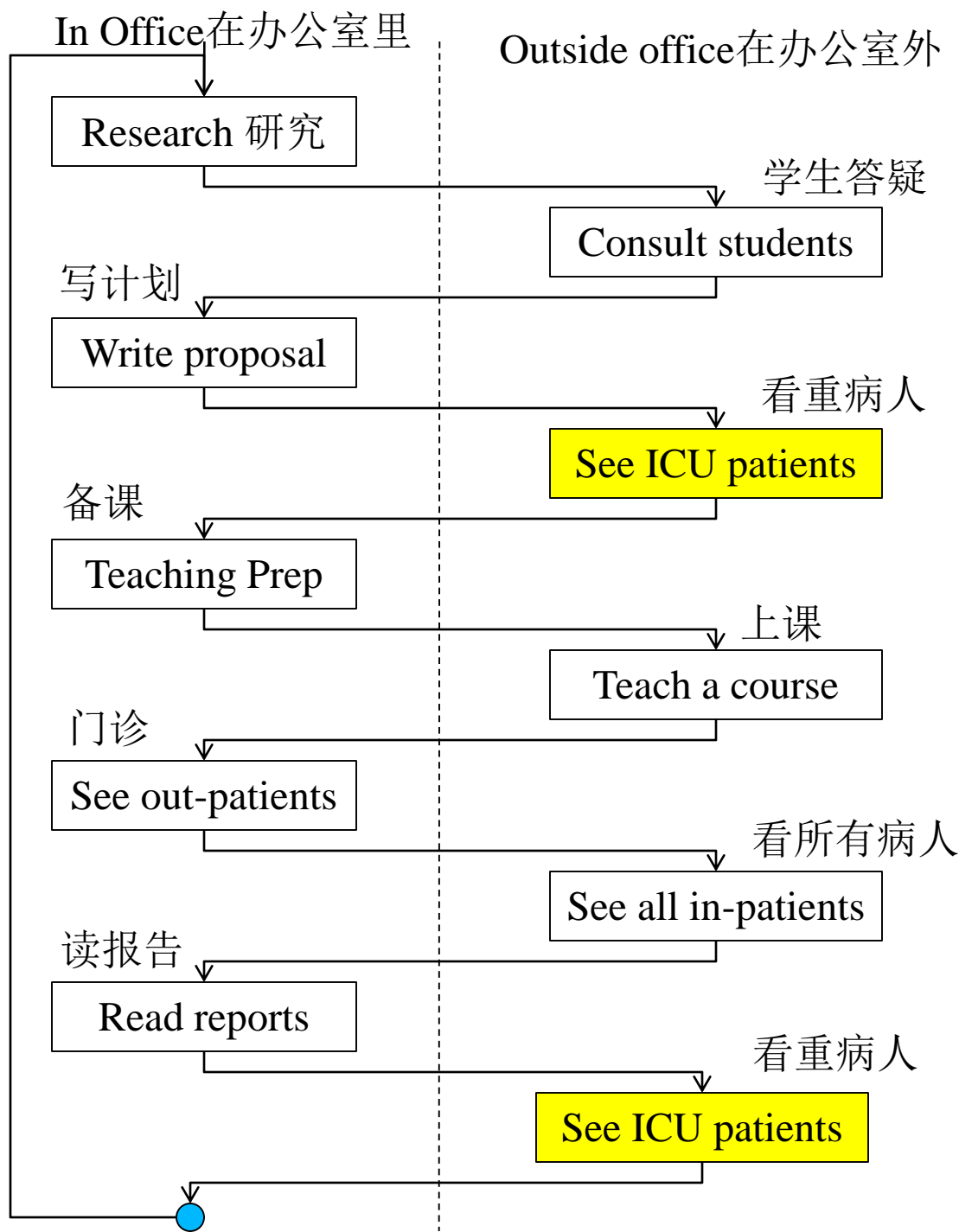
Event-Driven Problem Solving

事件驱动的问题解决方案

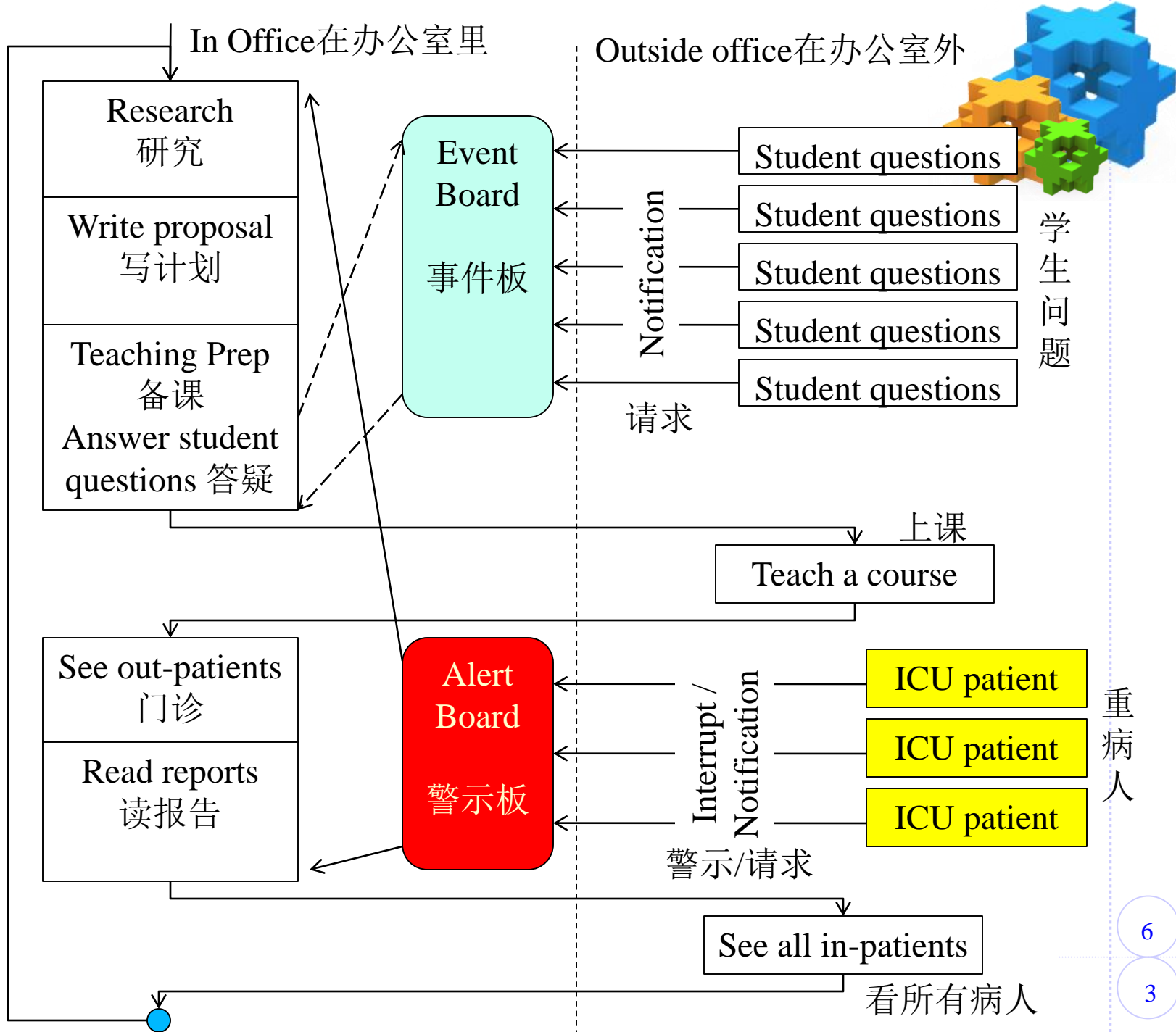
Yinong Chen

Routine of a Medical Professor in Control Flow Mode

一个医学教授在控制流模式中的一天



Routine of Medical Professors in Event-Drive Mode



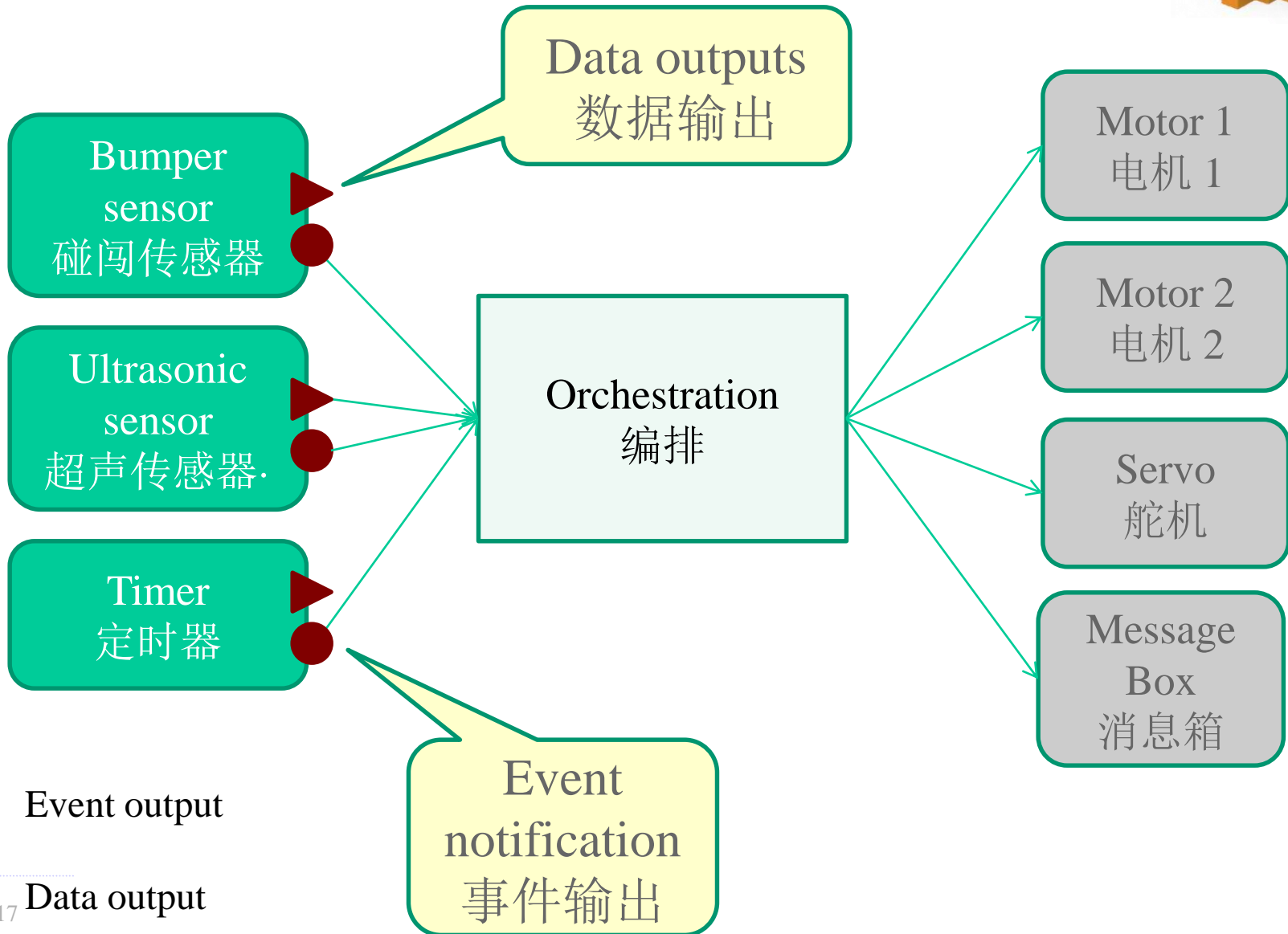
Event-Driven Programming 事件驱动编程



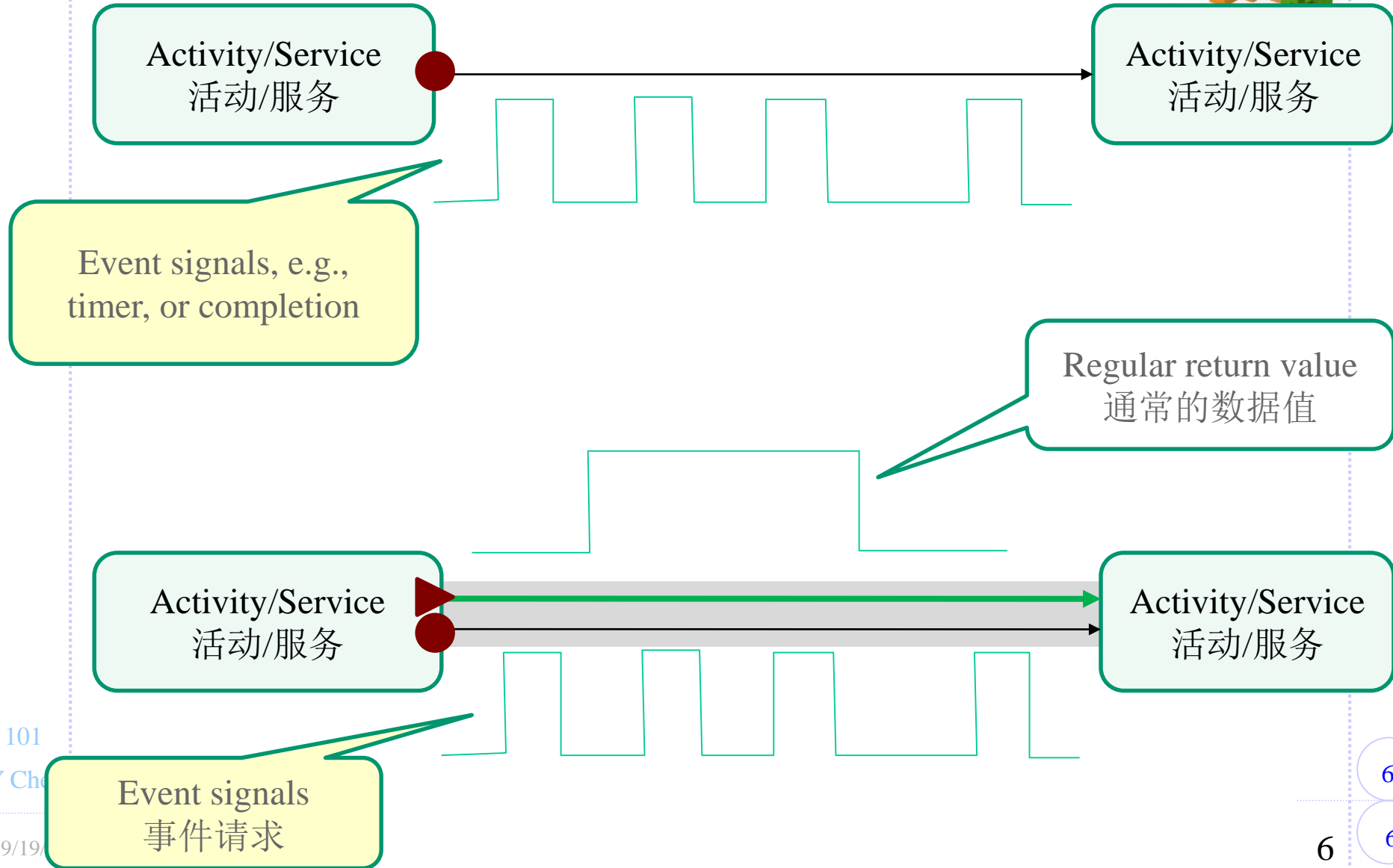
- Event-driven programming is a computing paradigm which allows interaction between the computer program and the user
事件驱动编程是一种允许计算机程序与用户交互的计算范型
- The execution flow of the program is determined by 程序的执行流取决于：
 - user actions, such as mouse clicks, key presses, sensor outputs (e.g., touch sensor), and
用户操作，如鼠标单击，按键，传感器输出（例如，触摸传感器）
 - messages from other programs 来自其他程序的消息
- It assumes that there are unlimited number of processors available, and the events can be handled immediately.
它假设有无限数量的处理器可用，事件可以立即处理

Concurrency and Events in Robotics Programming

机器人编程中的并发性和事件



Event-Driven Notification 事件驱动的请求



Event-Driven Programming in VIPLE

VIPLE 中的事件驱动编程



VIPLE supports two types of events
VIPLE 支持两种事件

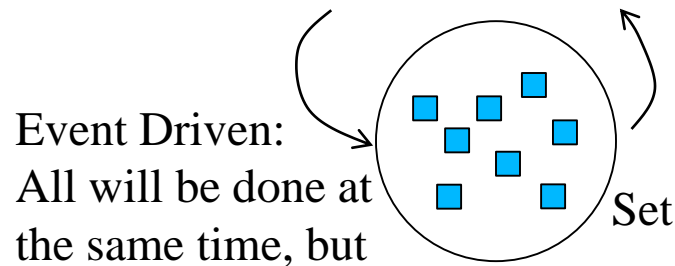
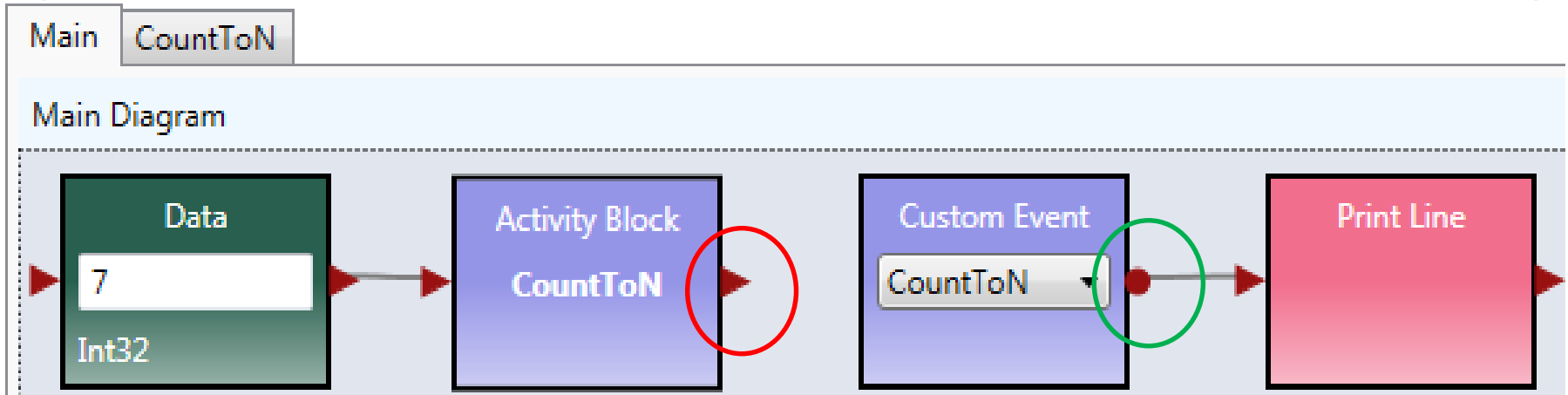
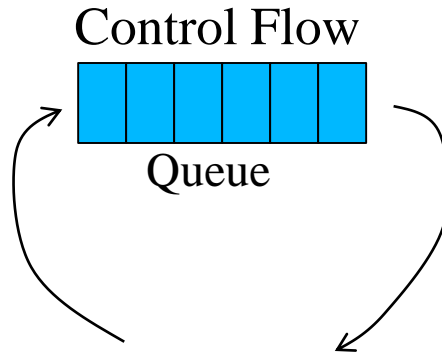
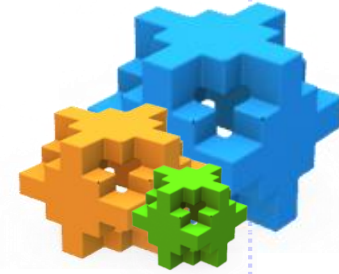
- Custom events 自定义事件:
Allow programmers to define an event as an activity's output
允许程序员将事件定义为活动的输出
- Built-in events 内置的事件:
Predefined services in the VIPLE service list that generate events
在VIPLE 服务列表中预定义的服务，他们能生成事件

General-purpose and event services

Custom Event
Key Press Event
Key Release Event
Print Line
Random
RESTful Service
Simple Dialog
Text to Speech
Timer

Control Flow versus Event Driven

控制流与事件驱动

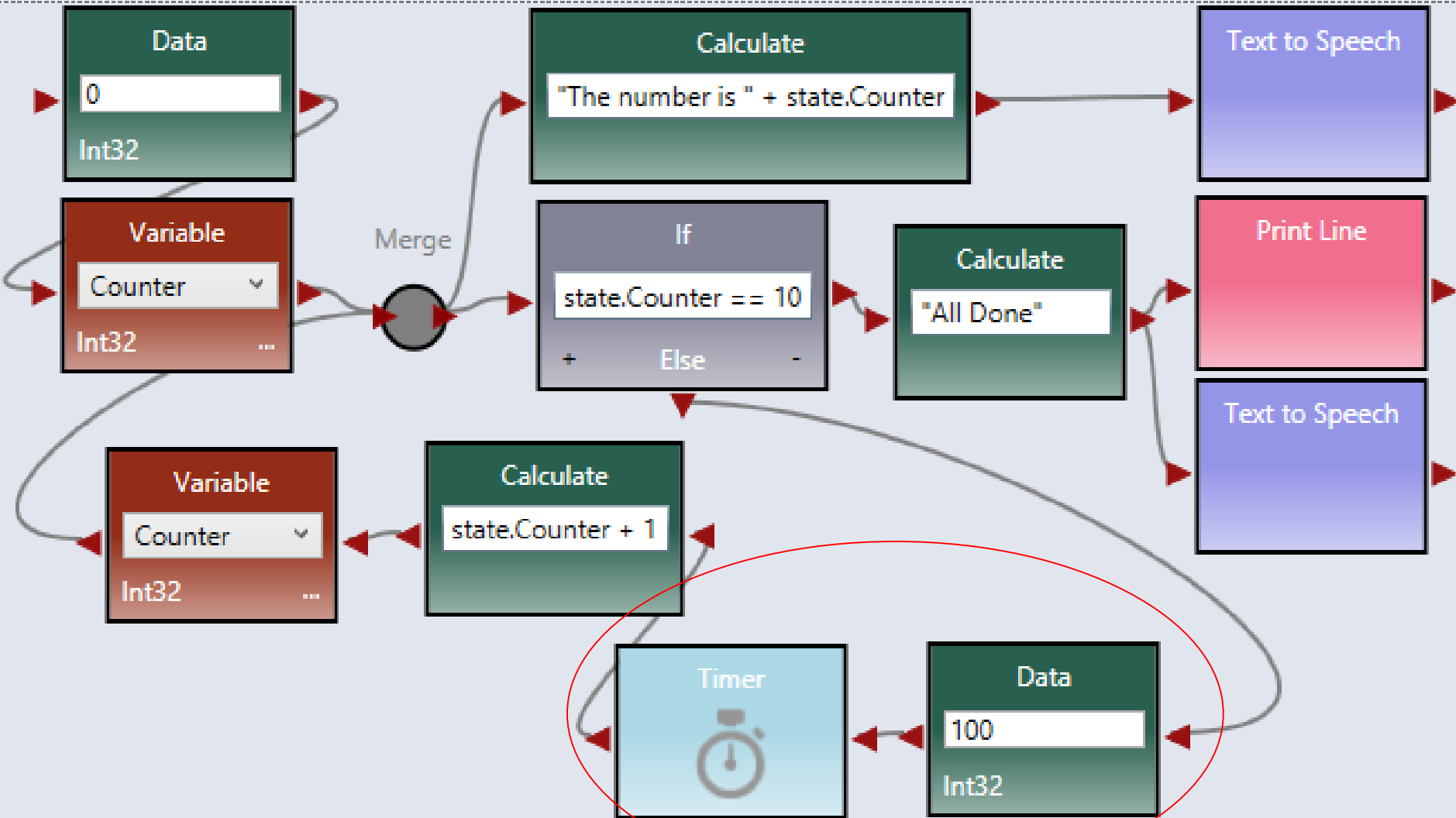


Add a Timer to Control the Execution Order

用定时器来控制顺序



Main Diagram



Event-Driven Programming: Custom Event

VIPLE 中的事件驱动编程



- Accessing the custom event 访问自定义事件

Custom events and built-in events

Services

Custom Event
Key Press Event
Key Release Event

Custom Event

CountToN

CountToN

如果计数器在每次迭代中生成不同的数据，无需使用事件，也能正常工作。

如果一个活动可以生成相同的数据，我们需要使用事件输出

Main CountToN

Main Diagram

Data

7

Int32

Activity Block

CountToN

Custom Event

CountToN

Print Line

6

11

Event-Driven Programming: Key Press/Release Event

事件驱动编程：按键/释键事件



General-purpose
and event services

Code Activity

Custom Event

按键

Key Press Event

释键

Key Release Event

Print Line

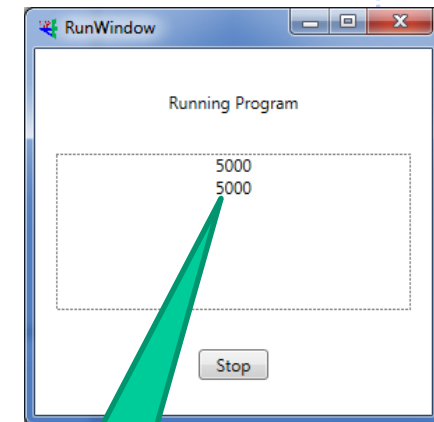
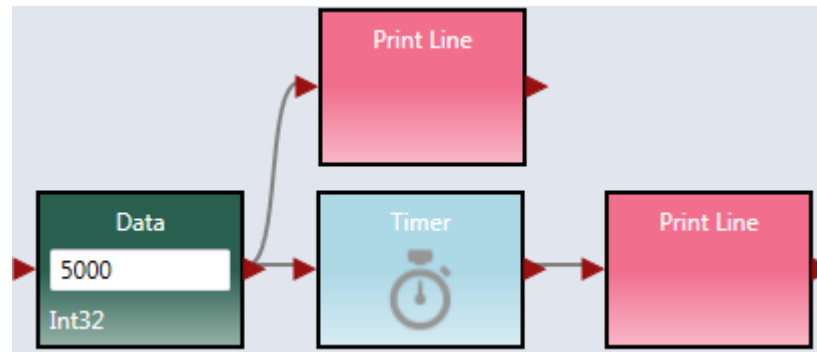
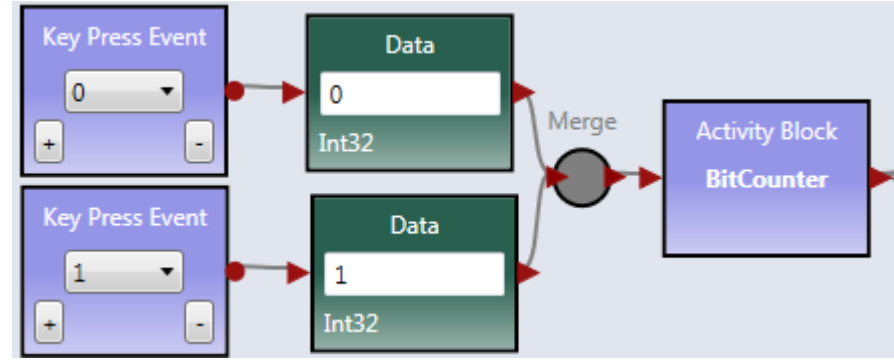
Random

RESTful Service

Simple Dialog

Text to Speech

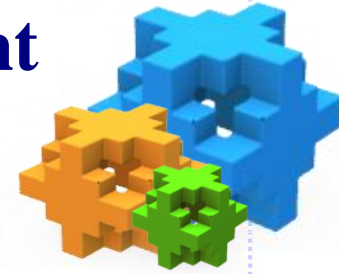
Timer



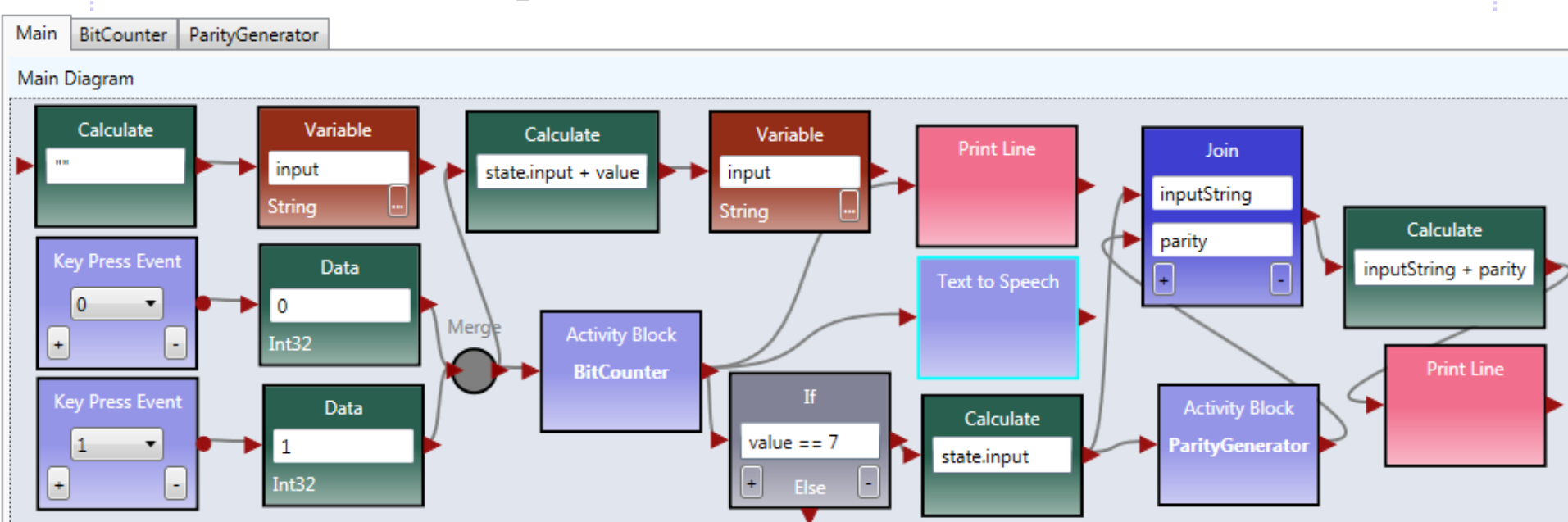
Printed 5
second later

Parity Bit Generation Using Key Press Event

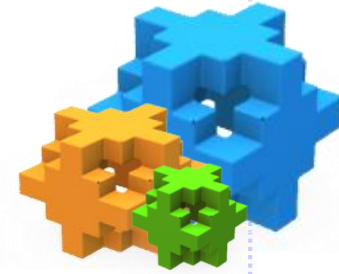
用按键事件生成奇偶校验位



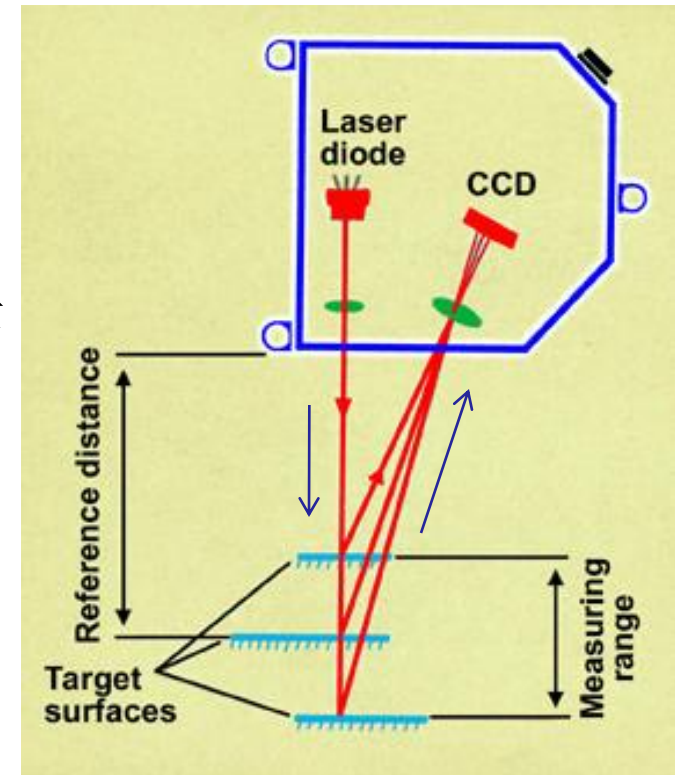
- An ASCII code consists of 7 bits of 0s or 1s.
- The 8th bit is often generated for parity checking:
 - If the first 7 bits has odd number of 1s, the 8th bit is 0, otherwise, it is 1, to keep the total number of 1s is an odd number.
- Write a VIPLE application to generate the odd-parity bit of an ASCII code. Example:



Types of Sensors 传感器的种类



- ❖ Ranging sensors 距离传感器, such as
 - Sonar 声纳,
 - Ultrasonic 超声波,
 - IR 红外, and
 - Laser 激光
- ❖ These sensors return the distance to the object. 这些传感器返回到目标的距离
- ❖ They typically have two lens (eyes). One sends out a light beam and the other receives the reflected beam. 他们通常有两个镜头（眼睛）。一个发出光束，另一个接收反射光束
- ❖ By measuring the time and angle of reflected beam, as shown in the Figure on the right, the sensors can measure the distance to the object



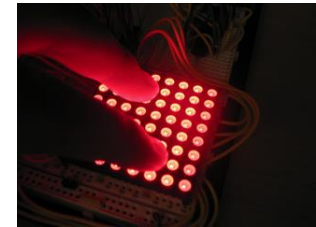
通过测量反射光束的时间和角度，如图所示，传感器可以测量到物体的距离

Types of Sensors 传感器的种类



There are many types of sensors

- Contact (touch) sensor 接触传感器:
A signal is generated when touched

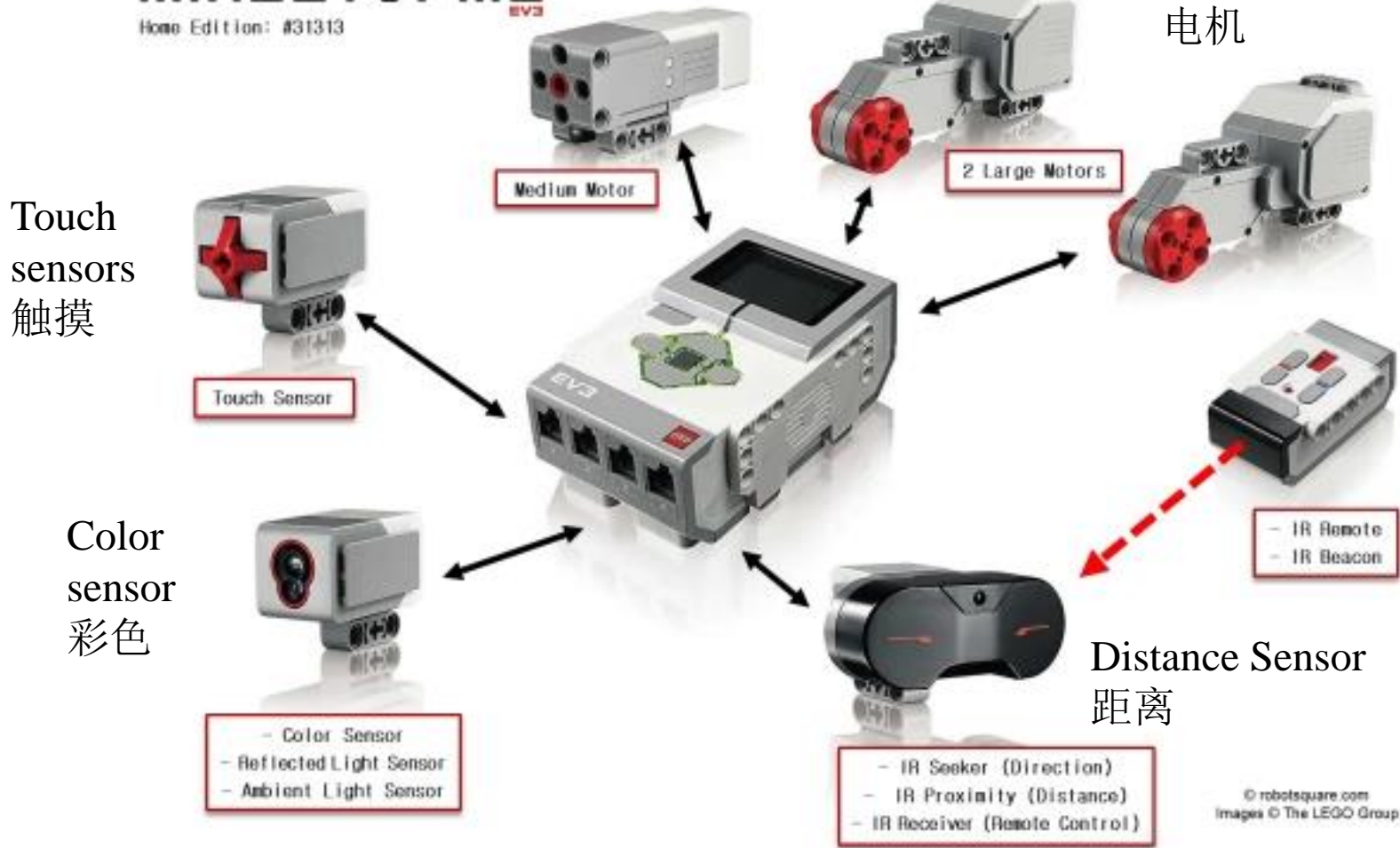


- Compass (magnetic) sensor 罗盘
- GPS (Global Positioning System)
- Color sensor 彩色传感器: return different value for different colors
- Temperature sensor 温度传感器
Return the temperature
- Vehicle accelerometer sensor 车辆加速度感测器
- Vehicle tire pressure sensor 车辆轮胎气压传感器
- ...

Lego EV3 Sensors 乐高EV3传感器

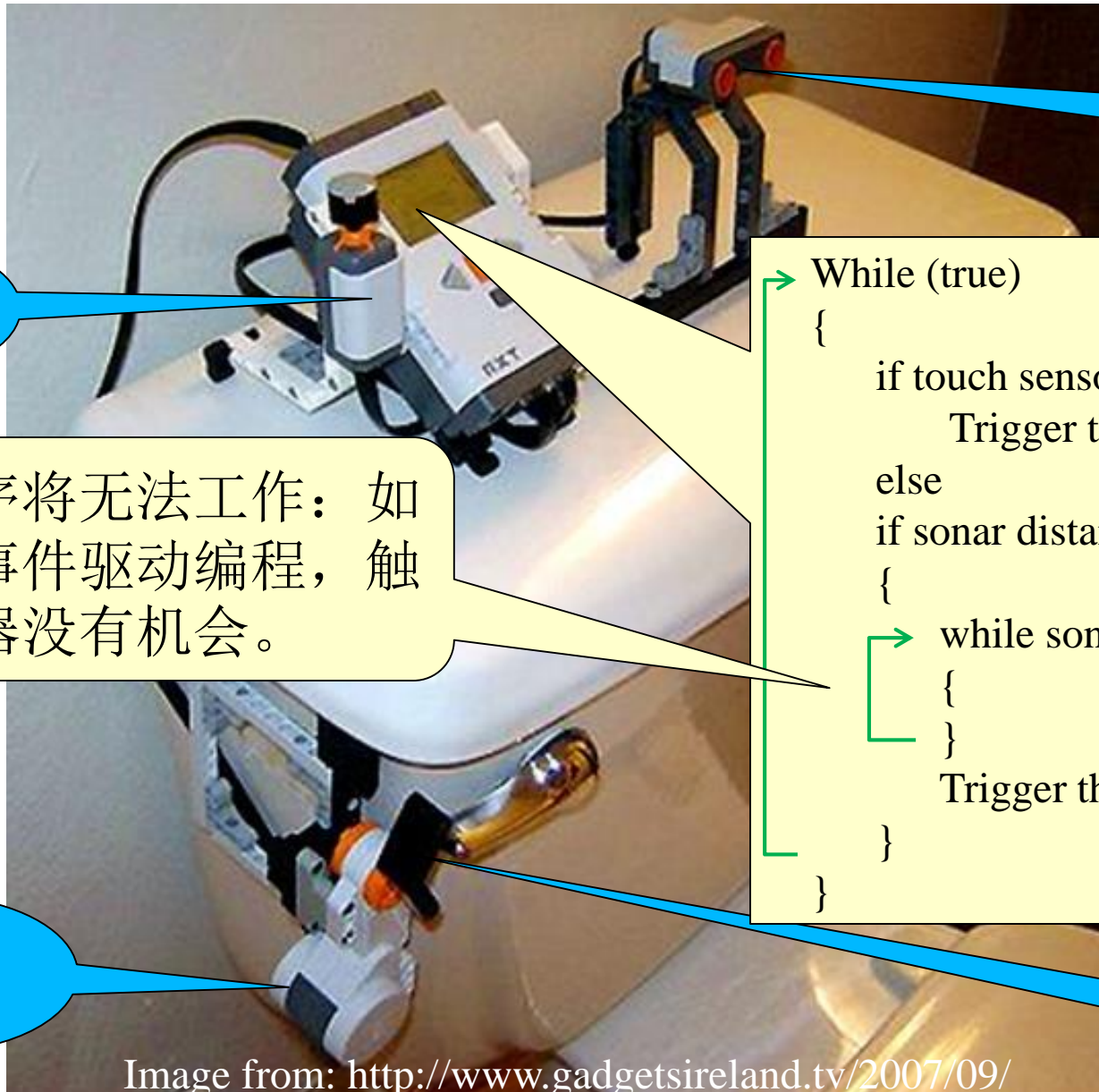


MINDSTORMS
EV3
Home Edition: #31313



© robotsquare.com
Images © The LEGO Group

Example: Robot and An Application



超声波

触摸

这个程序将无法工作：如果没有事件驱动编程，触摸传感器没有机会。

```
→ While (true)
{
  if touch sensor value == 1
    Trigger the motor;
  else
    if sonar distance < 3 feet
    {
      → while sonar distance < 5
      {
      }
      Trigger the motor;
    }
}
```

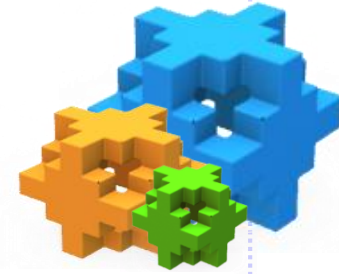
电机

执行器

Image from: <http://www.gadgetsireland.tv/2007/09/>

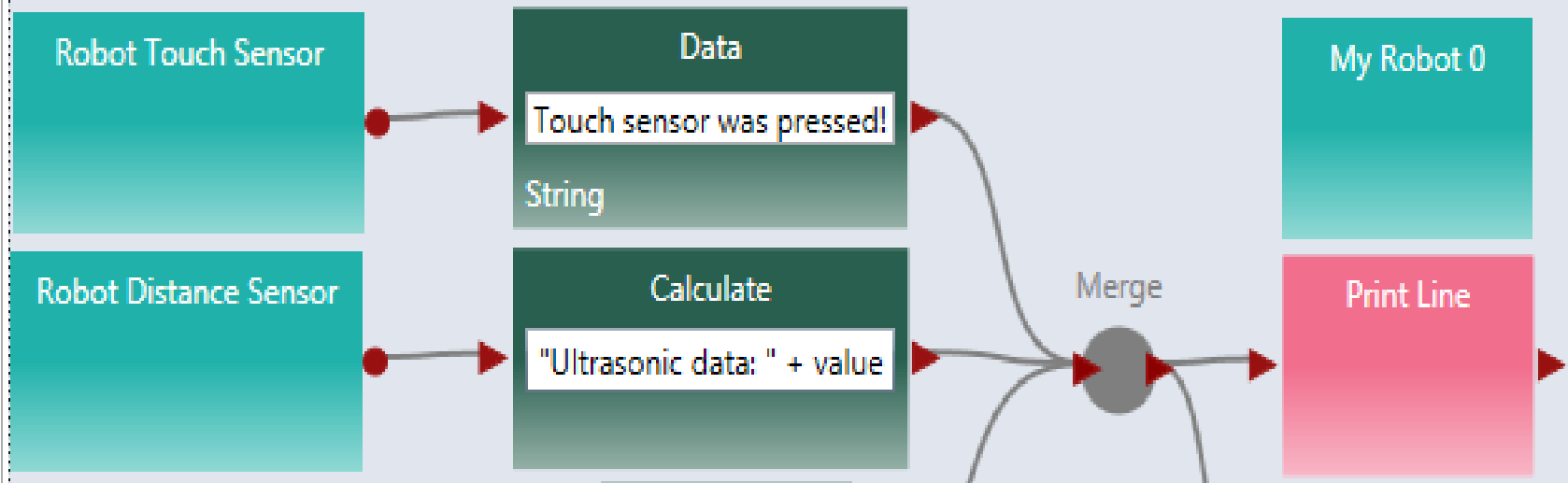
Test a Contact Sensor

测试传感器



Main

Main Diagram



Program and Test the Motors

编程和测试电机

