



信息技术导论

-传感器基础知识

华中科技大学电信学院 2021级



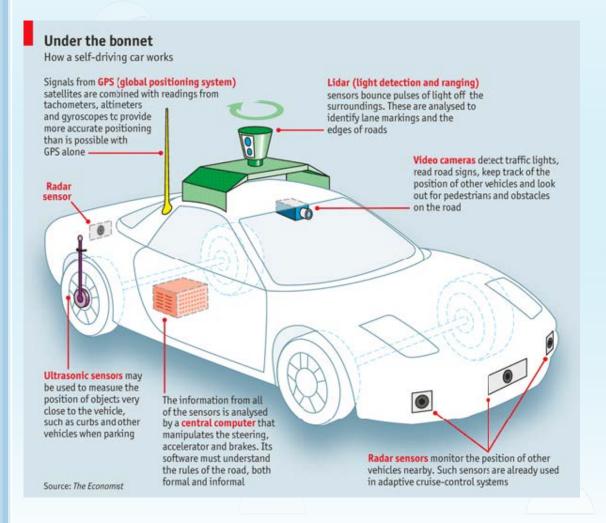






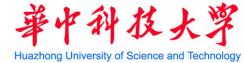
PART 1 传感器介绍

常用传感器



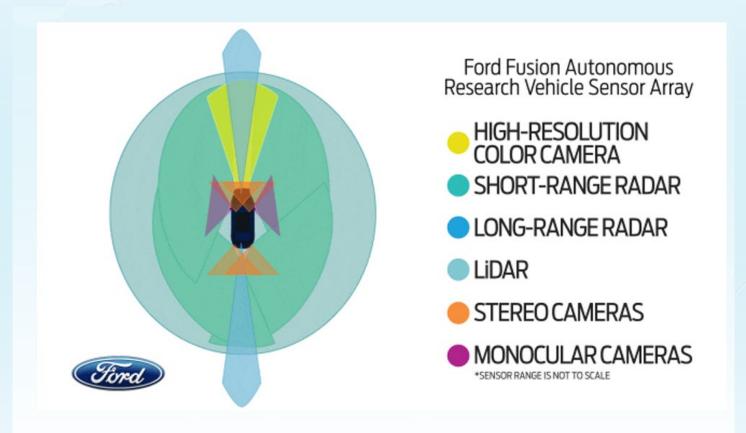
- 全球定位系统(GPS)
- 激光雷达 (LIDAR)
- 视频摄像头
- 超声波传感器
- •雷达传感器(Radar)

The Economist, "How does a self-driving car work?"

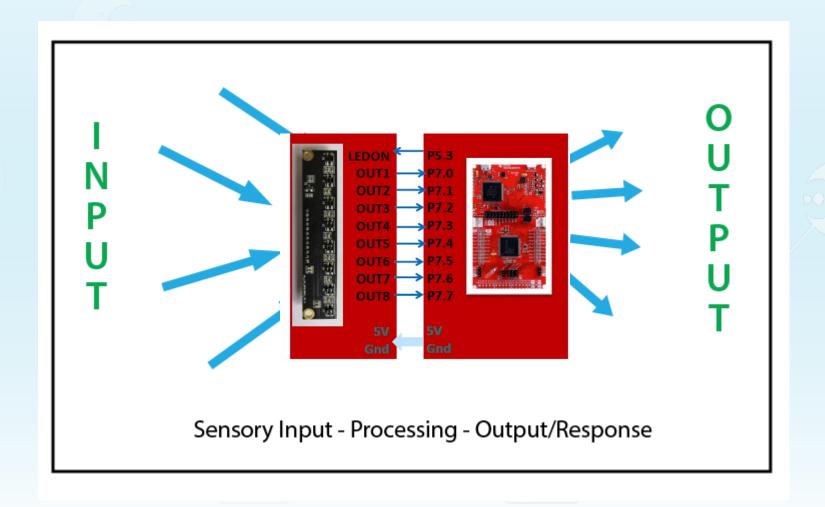


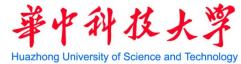
常用传感器





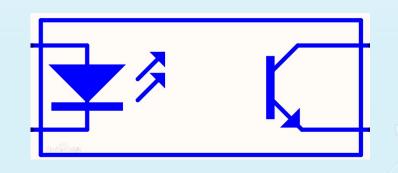
常用传感器

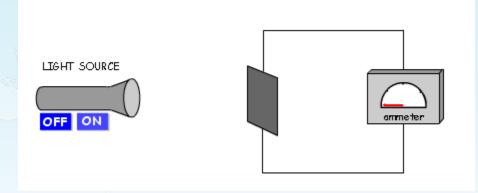


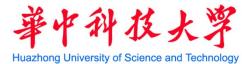


检测、判别物体

- 发光二极管发射光束(可见光或红外光束),光电接收管用于检测目标反射的光束。
- 非接触式探测



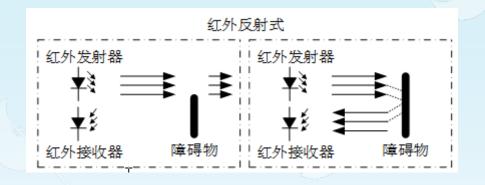






红外反射式光电对管

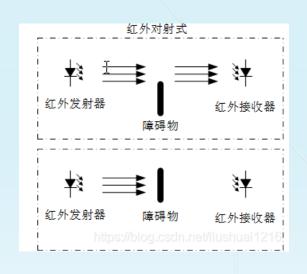
- ➤ 发射波长为780nm-1mm
- ▶ 检测反射光线的光强变化
- ▶ 检测效果受发射光强、距离影响
- ▶ 安装在没有强光直接照射 处

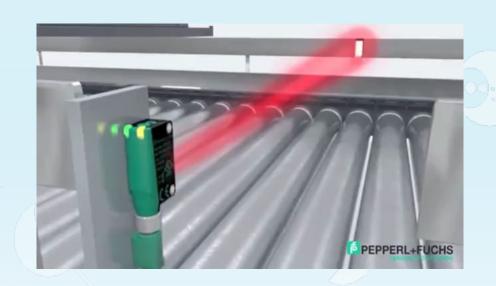


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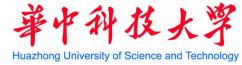


红外对射式光电对管



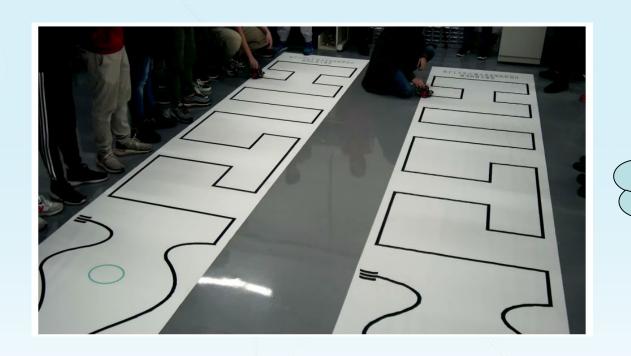


探测距离远, 灵敏度高, 安装需要防干扰





红外反射式光电对管

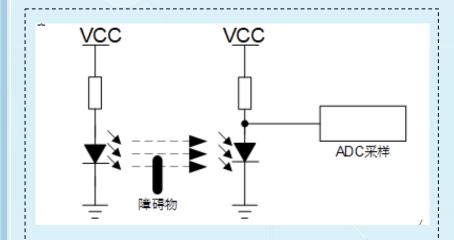


如果为红色 线,会是什 么结果?

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信号采集

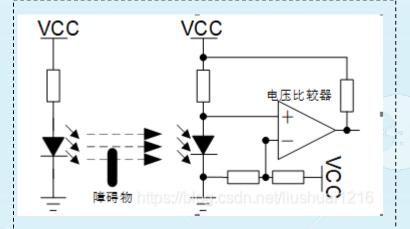




AD检测

ADC采样, 检测电压值,

灵敏度高,易受自然光干扰



电压比较 电压与设定的门限电压对比, 距离可调,易受自然光干扰

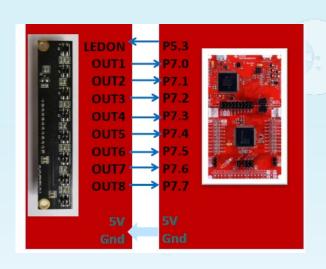
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PART 3 本周任务

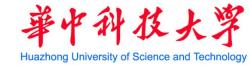


传感器数据采集实验

```
void Reflectance_Init(void){
    P5->SEL0&= ~0xFF;
    P5->SEL1&= ~0xFF;
    P5->DIR|= 0x08;
    P5->OUT&= ~0x08;
    P7->SEL0&= ~0xFF;
    P7->SEL1&= ~0xFF;
    P7->DIR&= ~0xFF;
}
```



思考:如何使用函数实现



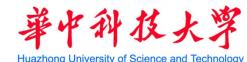


传感器数据采集实验

操作流程:

- 1) 设P5.3为高电平 (点亮红外LED)
- 2) 设P7.7 –P7.0为输出,并置为高电平 (给8 个电容充电)
- 3) 等待
- 4) 设P7.7 -P7.0为输入
- 5) 等待
- 6) 读取P7.7 -P7.0 输入 (将电压转化为二进制)
- 7) 将P5.3置为低电平 (关闭红外LED, 节省电力)







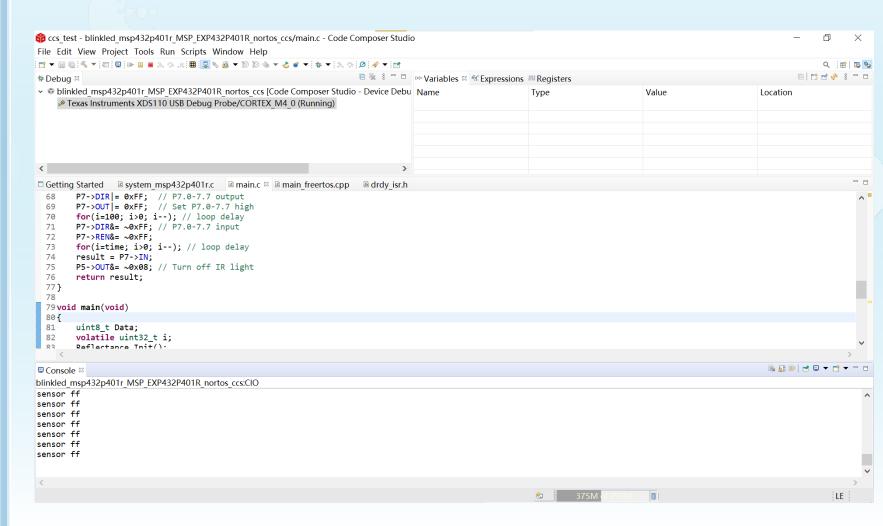
传感器数据采集实验

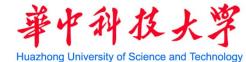
```
uint8_t Reflectance_Read(uint32_t time){
   uint8 t result;
   P5->OUT = 0x08; // Turn on IR light
   P7->DIR = 0xFF; // P7.0-7.7 output
   P7->OUT = 0xFF; // Set P7.0-7.7 high
   for(i=100; i>0; i--); // loop delay
   P7->DIR&= ~0xFF; // P7.0-7.7 input
   P7->REN&= \sim 0xFF;
   for(i=time; i>0; i--); // loop delay
   result = P7->IN;
   P5->OUT&= ~0x08; // Turn off IR light
   return result;
```



传感器数据采集实验

```
void main(void)
   uint8_t Data;
   Reflectance_Init();
   while(1){
       Data = Reflectance_Read(1000);
       printf("%02x\n",Data);
       for(int i=10000; i>0; i--); // loop delay
```









Thank You !

