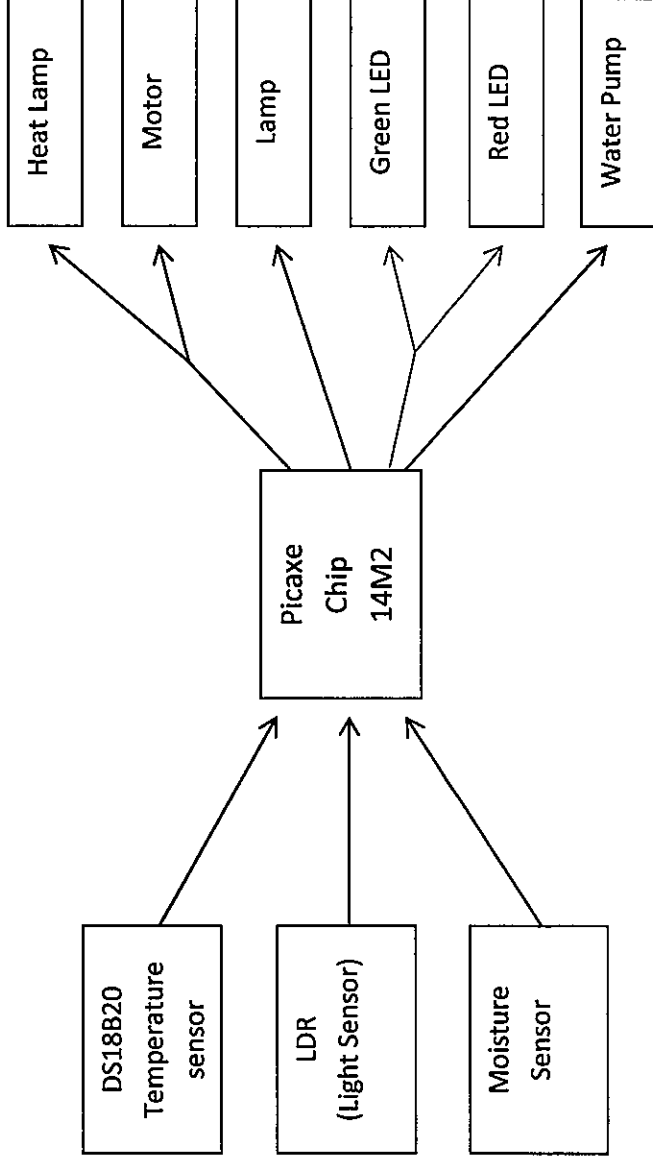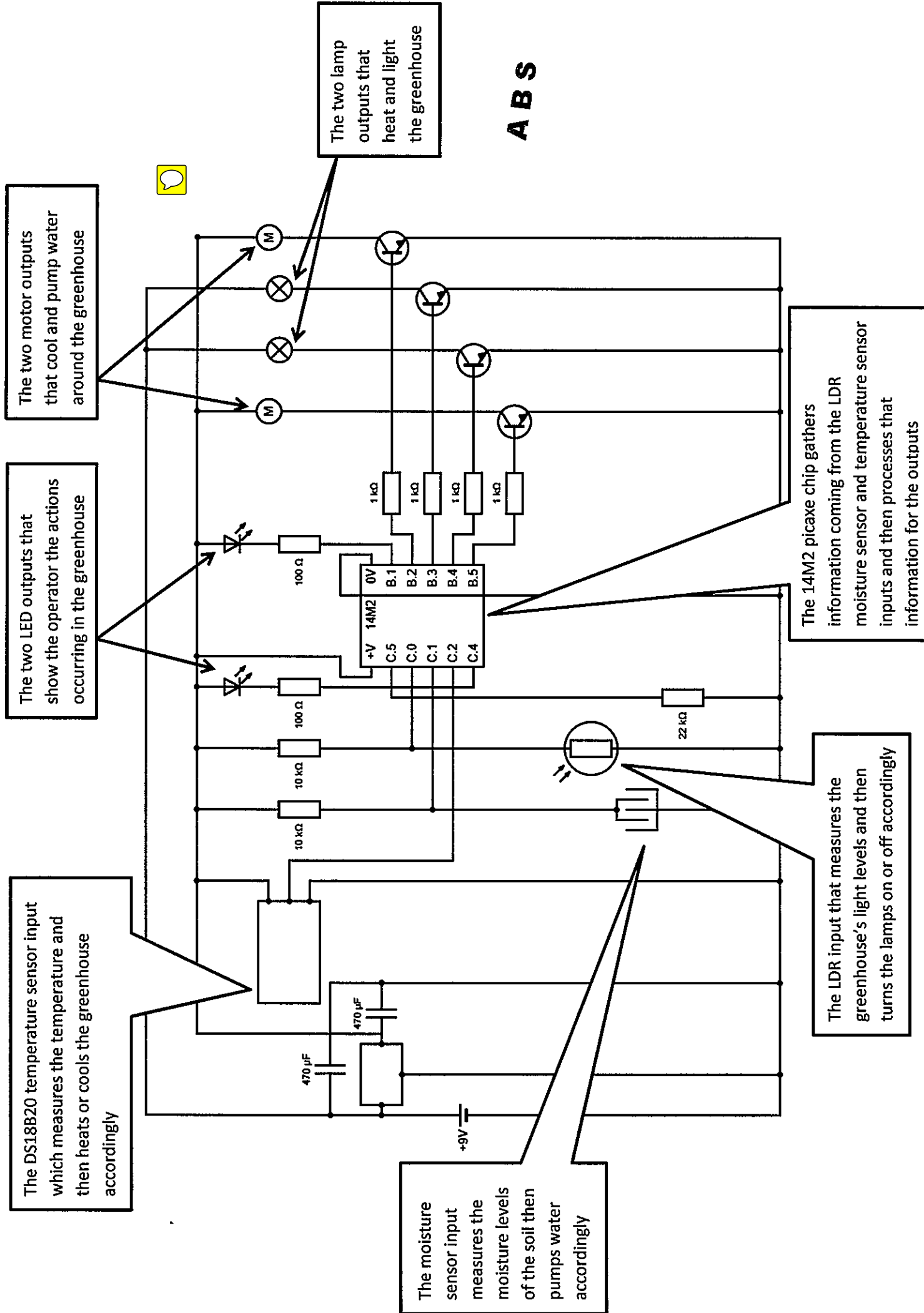# 1.7 Subsystems

A technological system is made up of a series of subsystems to carry out specific tasks. A system contains inputs, outputs and processes which make up subsystems.

My product is an automatic greenhouse control system which is made of a set of subsystems. The different subsystems that make up my automatic greenhouse system are temperature subsystem, light subsystem, moisture subsystem and an information subsystem. My greenhouse system processor which processes the inputs and out puts for each sub system is a 14M2 Picaxe chip. The temperature subsystem input is a DS18B20 temperature sensor and the outputs are a heat lamp and a fan. The moisture system input is a moisture sensor and the output is a water pump. The light subsystem input is an LDR and its output is a lamp. The information subsystem outputs are a green and a red LED.

These subsystems all work together to allow the technological system, the automatic greenhouse control system, to operate. The temperature subsystem records the temperature and then uses the picaxe chip to heat or cool the greenhouse according to the temperature. The moisture subsystem reads the moisture levels in the soil in the greenhouse and uses the picaxe chip to turn on the pump according to the moisture levels. The light subsystem records the light levels in the greenhouse and uses the picaxe chip to turn on the lamp accordingly. The information subsystem takes information from the picaxe chip and then displays specific information about the greenhouse to the user through LEDs. These subsystems work together to create a fully automated system for greenhouses. This system is illustrated in the circuit diagram below.

| DS18B20 Temperature sensor |
| LDR (Light Sensor) |
| Moisture Sensor |

| Picaxe Chip 14M2 |

| Heat Lamp |
| Motor |
| Lamp |
| Green LED |
| Red LED |
| Water Pump |

The two lamp outputs that heat and light the greenhouse

The two motor outputs that cool and pump water around the greenhouse

The two LED outputs that show the operator the actions occurring in the greenhouse

The DS18B20 temperature sensor input which measures the temperature and then heats or cools the greenhouse accordingly

The moisture sensor input measures the moisture levels of the soil then pumps water accordingly

The LDR input that measures the greenhouse's light levels and then turns the lamps on or off accordingly

The 14M2 picaxe chip gathers information coming from the LDR moisture sensor and temperature sensor inputs and then processes that information for the outputs

A B S

14M2

0V B.1 B.2 B.3 B.4 B.5
+V C.5 C.0 C.1 C.2 C.4

1 kΩ 1 kΩ 1 kΩ 1 kΩ

100 Ω 100 Ω 10 kΩ 10 kΩ

22 kΩ

470 µF 470 µF

+9V