

*STRUCTURED
ANALYSIS &
STRUCTURED
DESIGN*

T12

200960160고박우

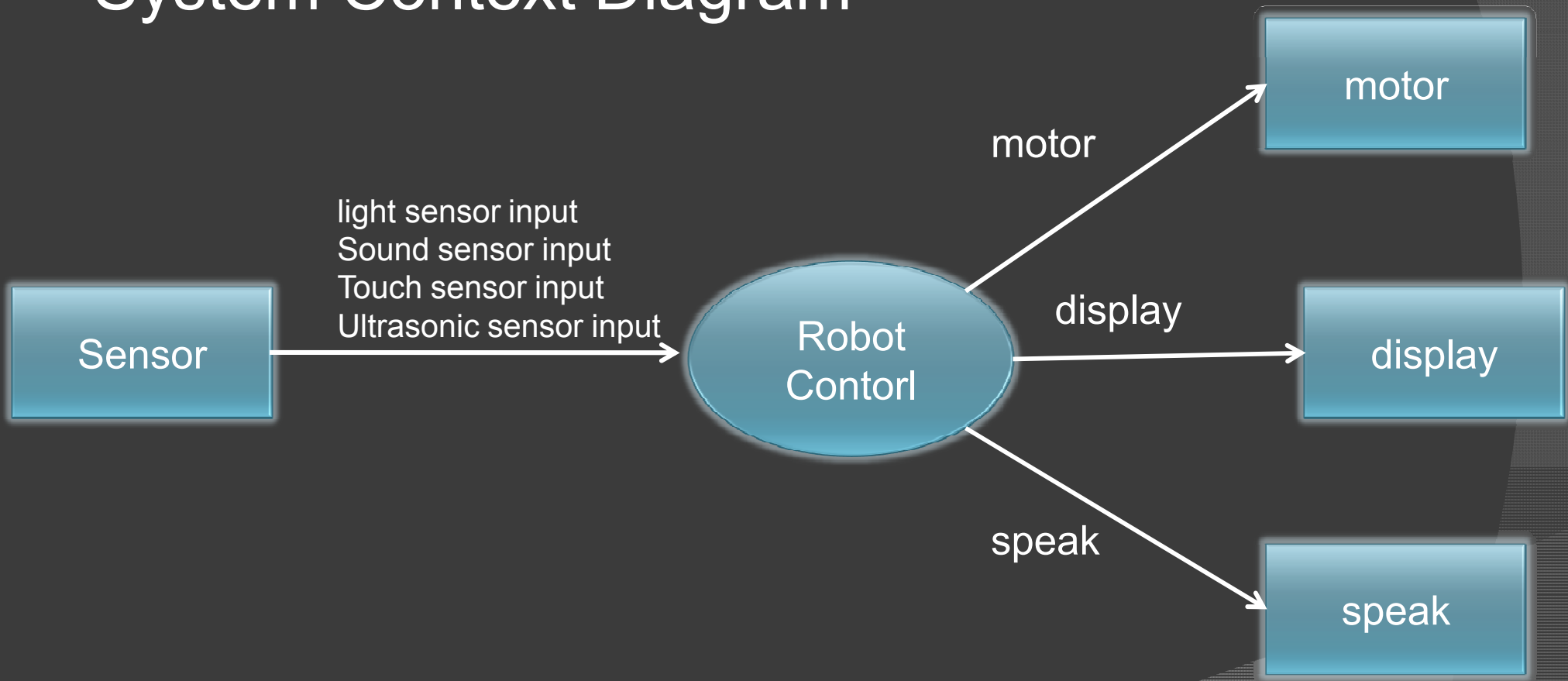
200960163장권

200518036곡진화

Structured Analysis

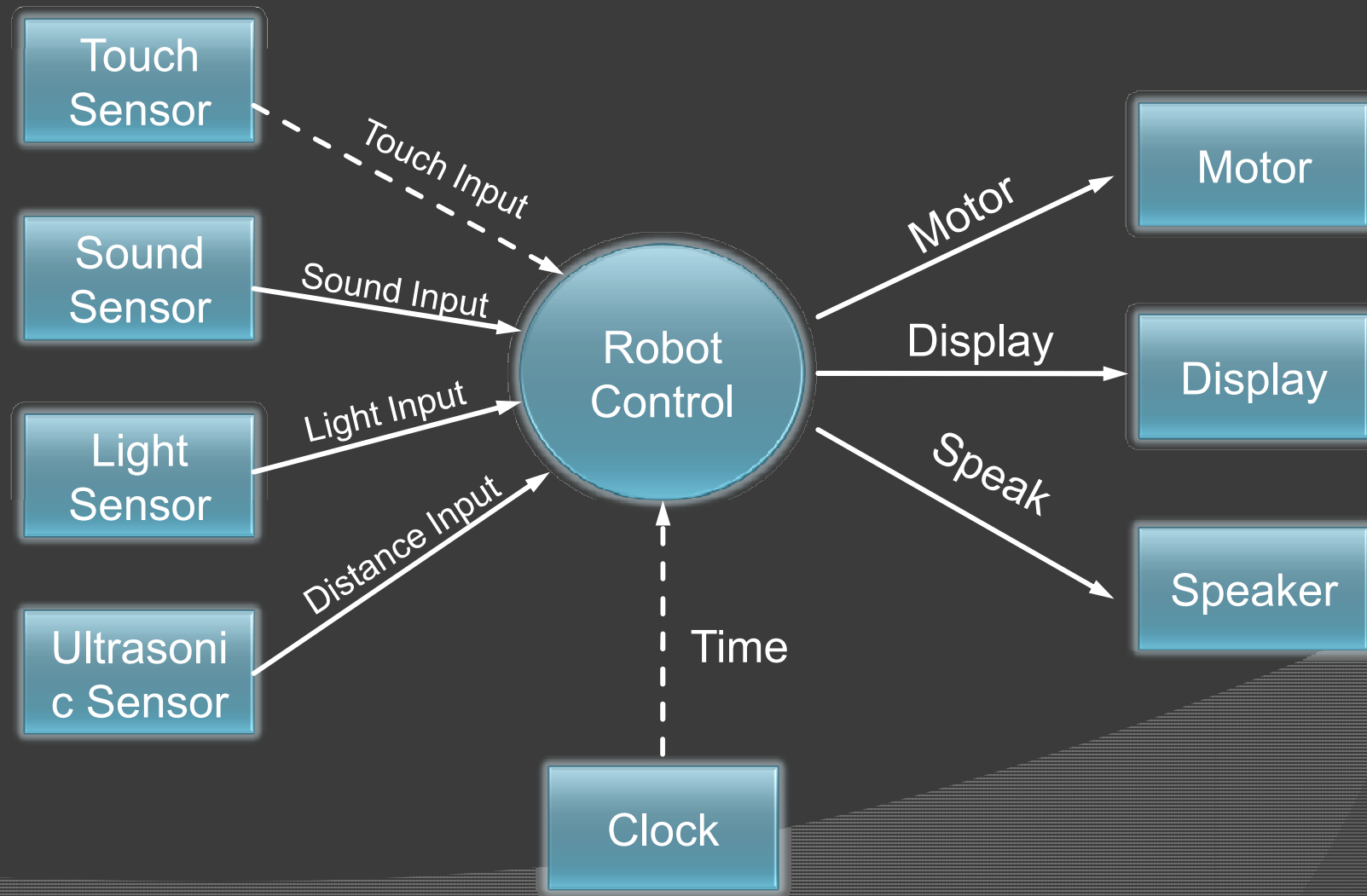
Structured Analysis

System Context Diagram



Structured Analysis

DFD Level 0



Structured Analysis

DFD Level 0--Information

Input Event	Description	Format/Type
Touch Input	Detects a touch, whenever the robot hits an object	True/False Interrupt
Sound Input	Detects ambient sound	Int/Periodic
Light Input	Detects ambient light	Int/Periodic
Distance Input	Detects exact distances between robot and obstacles	Int/Periodic
Time	Ticks in increments of 1/1000 of a second	trigger/Interrupt

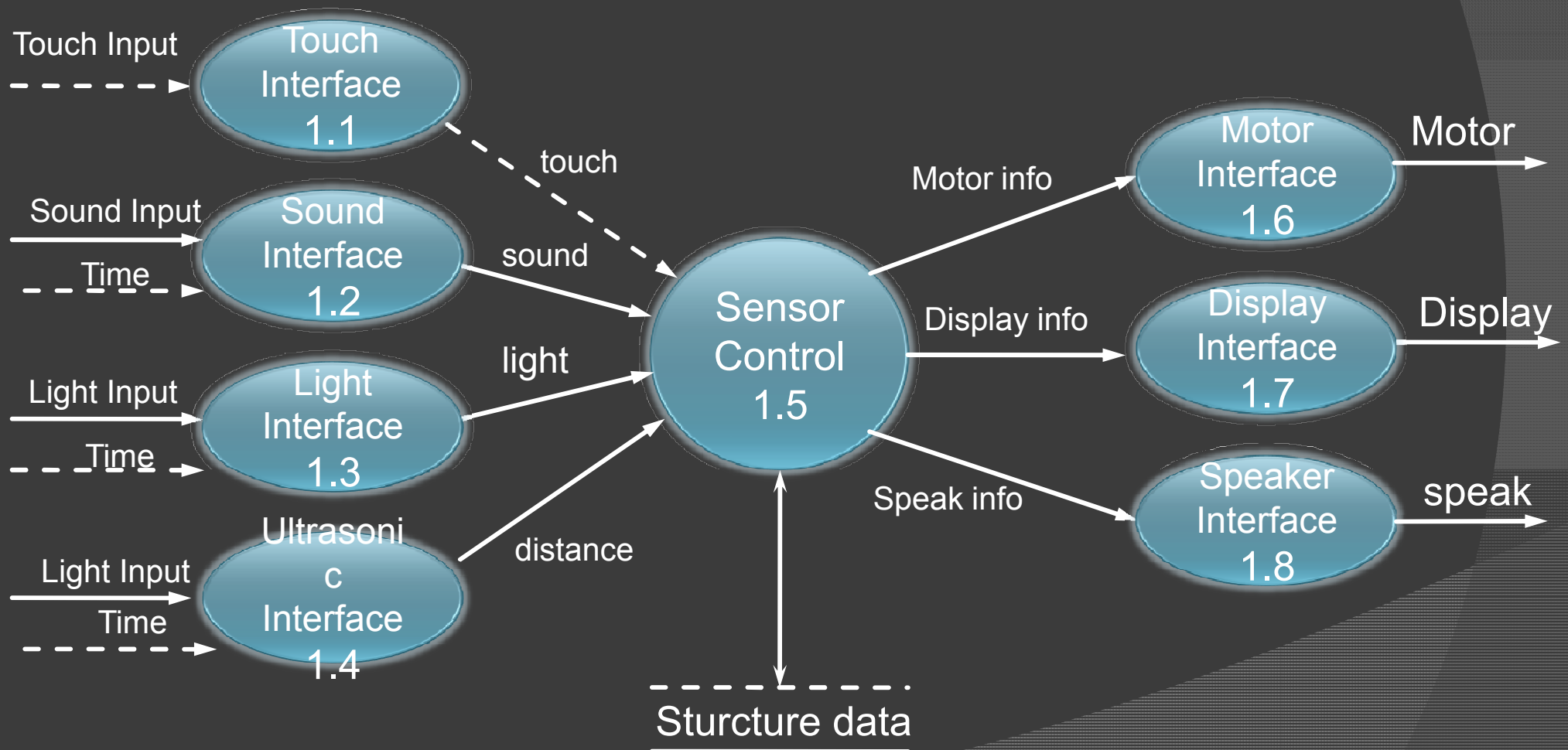
Structured Analysis

DFD Level 0--Information

Output Event	Description	Format
Motor	Move and Control direction	2 tracks, 1 brake
Display	Show the states of the Robot	Working, Sleeping
Speak	Speak the saved sentence	Thank You, Good Morning/Night

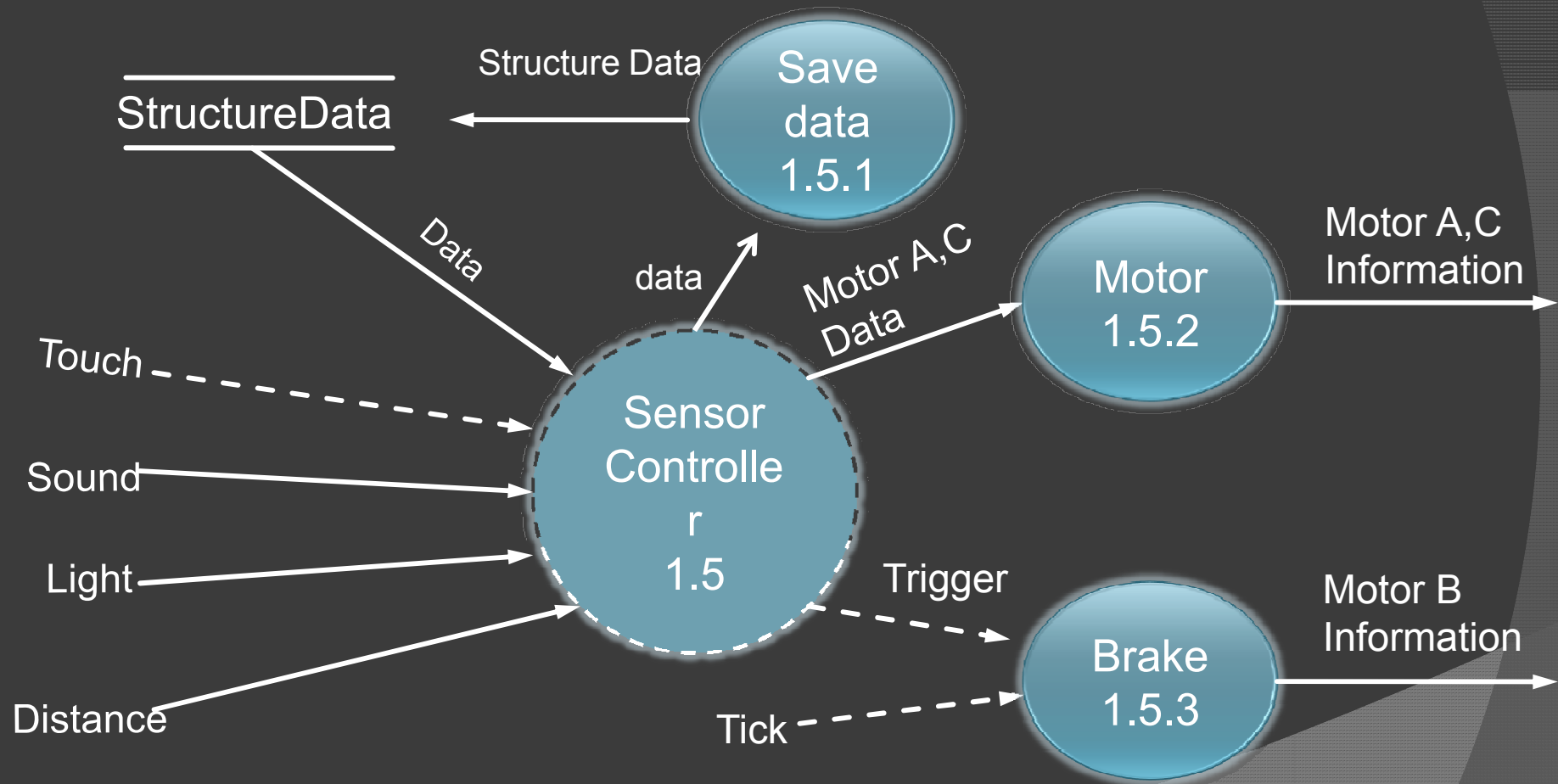
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DFD Level 1



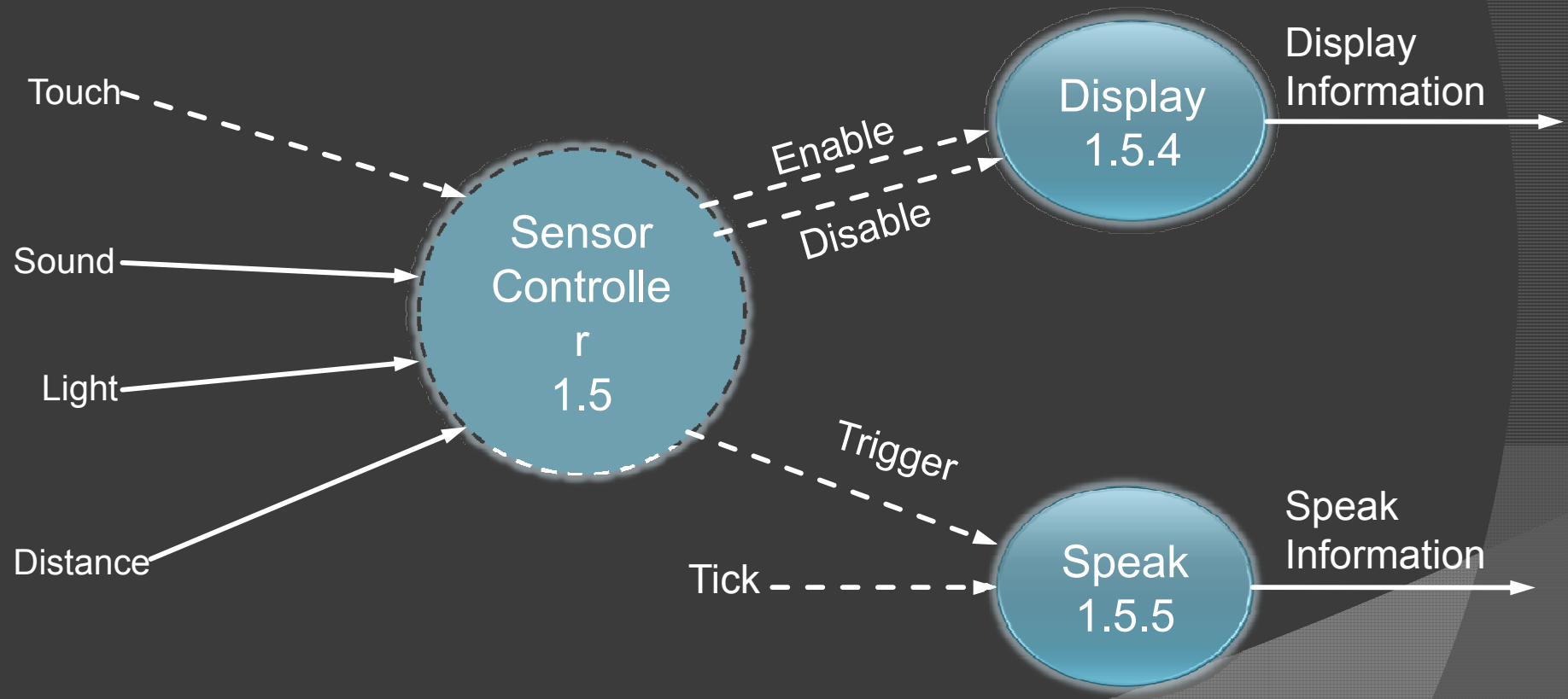
Structured Analysis

DFD Level 2

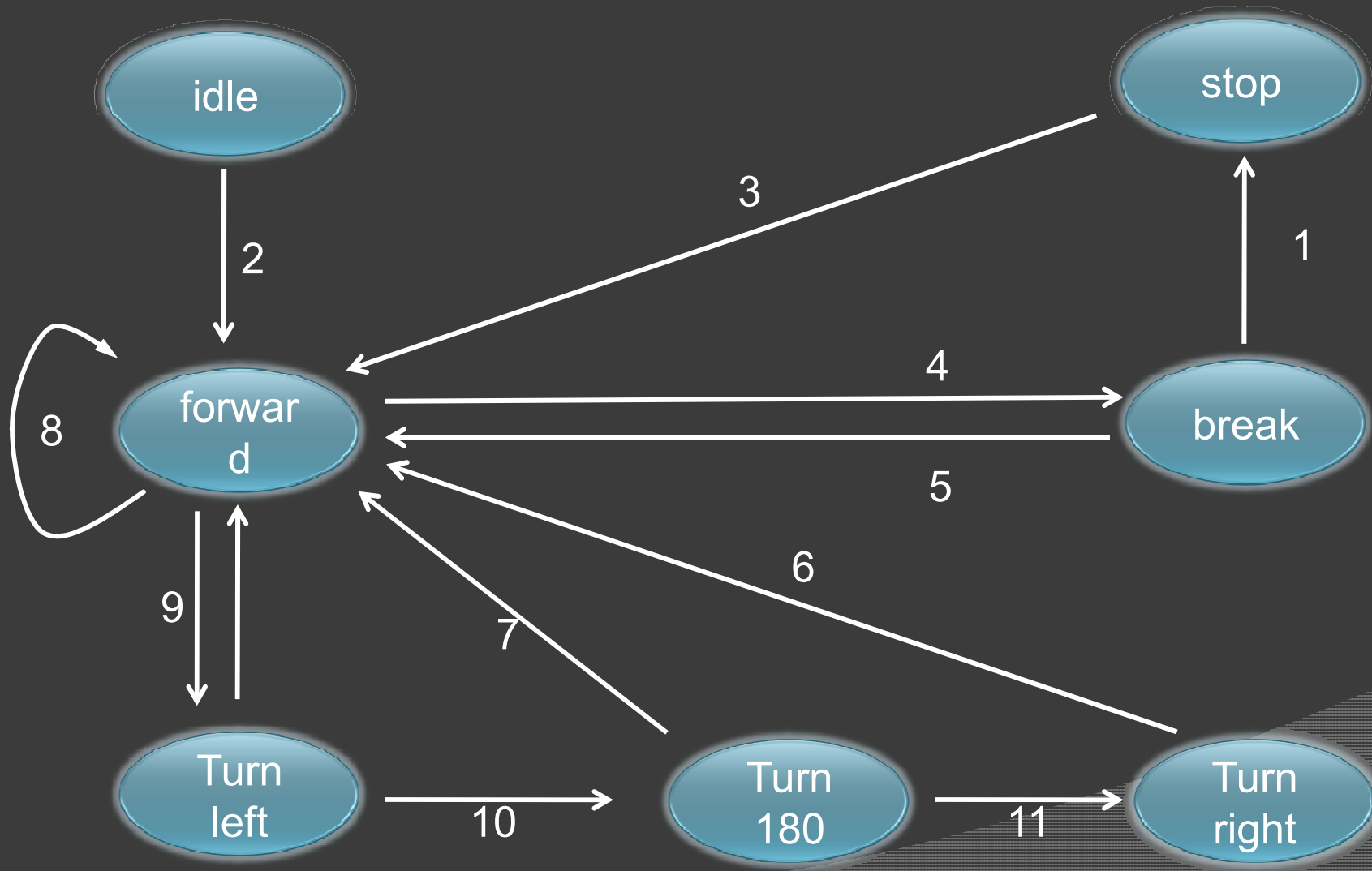


Structured Analysis

DFD Level 2



Structured Analysis State Machine



Structured Analysis

State Machine Description

State No.	Description
1	Timeout(5) [Light<=40&& dark = 1] / save data(data), motor A(a motor data),motor C(c motor data), motor B trigger "Break off", Timeout(1) trigger "Break stop",Disable "Display Work",Enable "Display Sleep",Trigger "Speak Night"
2	Touch[Light>40] / save data(data), motor A(a motor data),motor C(c motor data),Enable "Display Work"
3	Light>40 / save data(data),motor A,motor C,Disable"Display Sleep",Enable "Display Work",Trigger "speaking Morning"
4	[Light<=40 && dark=0] / save data(data), motor A(a motor data),motor C(c motor data), motor B trigger "Break on"
5	Timeout(5) [Light>40] / save data(data), motor A(a motor data), motor C(c motor data)
6	[distance > 10] / save data(data),mptor A(a motor data),mottor C (c motor data)

Structured Analysis

State Machine Description

State No.	Description
7	[distance > 10] / save data(data),motor A(a motor data),motor C(a motor data).
8	Touch [Light>40 && distance >10] / save data(data), motor A(a motor data),motor C(c motor data),bright>40 && distance >10 && sound>=70] / save data(data), motor A(a motor data),motor C(c motor data),Trigger "Speak Thank"
9	[Light>40 && distance<=10 &&direction count =0]/ save data(data),motor A(a motor data),motor C(c motor data),
10	Timeout(2) [distance<=10 && direction count= 1]/ save data(data),motor A(a motor data),motor C(c motor data)
11	Timeout(2) [distance<=10 && direction count= 2]/ save data(data),motor A(a motor data),motor C(c motor data)

Structured Analysis

Process Specification

PSpec 1.1	Touch Interface
Stereotype	Asynchronous Function
Input	Touch Input
Output	(bool)Touch
Description	Get Touch Input through touch sensor
PSpec 1.2	Sound Interface
Stereotype	Periodic Function
Input	Sound Input, tick
Output	(int) Sound
Description	Recognize sound patterns and identify tone differences through Sound Sensor

Structured Analysis

Process Specification

PSpec 1.3	Light Interface
Stereotype	Periodic Function
Input	Light Input, Tick
Output	(int) Light
Description	Enables robot to distinguish between light and dark
PSpec 1.4	Ultrasonic Interface
Stereotype	Periodic Function
Input	Distance Input, Tick
Output	(int) Distance
Description	Judge distances and "see" where objects are

Structured Analysis

Process Specification

PSpec 1.5	Controller
Stereotype	Control
Input	(bool)Touch, (int)Sound, (int)Bright, (int)Distance, Structure Data
Output	Motor Data, Speed Data, Trigger
Description	The core component in design structure which converts input stimulation to output reaction

Structured Analysis

Process Specification

PSpec 1.5.1	Save Data
Stereotype	Synchronous Function
Input	(bool) Touch, (int) Sound, (int) Bright, (int) Distance, (bool) Touch_check
Output	Structure Data(bool, int, int, int, bool)
Description	Store the data from controller
PSpec 1.5.2	Motor
Stereotype	Synchronous Function
Input	Motor Data(bool, int)
Output	Motor Information(int, bool, int)
Description	Get input data from controller and make related movement

Structured Analysis

Process Specification

PSpec 1.5.3	Brake
Stereotype	Synchronous Function
Input	Trigger, Tick
Output	Motor Information(int, bool, int)
Description	Brake whenever get an interrupt of time or objects
PSpec 1.5.4	Display
Stereotype	Synchronous Function
Input	Enable / Disable
Output	Display Information(string)
Description	Control the display through controller
PSpec 1.5.5	Speak
Stereotype	Synchronous Function
Input	Trigger, Tick
Output	Speak Information(string)
Description	Control the speak through controller

Structured Analysis

Process Specification

PSpec 1.6	Motor Interface
Stereotype	Synchronous Function
Input	Motor Information(int, bool, int)
Output	Motor
Description	Control the movement by input data
PSpec 1.7	Display Interface
Stereotype	Asynchronous Function
Input	Display Information(string)
Output	Display
Description	Control the display by controller
PSpec 1.8	Speaker Interface
Stereotype	Synchronous Function
Input	Speak Information(string)
Output	Speak
Description	Control the speaker by controller

Structured Analysis

Data Dictionary

Data name	Definition
Touch	Get Touch Input through touch sensor
Sound	Recognize sound patterns and identify tone differences through Sound Sensor
Light	Enables robot to distinguish between light and dark
Distance	Judge distances and "see" where objects are
Data	Data sent to structure data from controller
Structure Data	Include touch Count, Dark, Direction Count, Speed, touch_check to in store data
Motor A,C data	Get input data from controller and make related movement

Structured Analysis

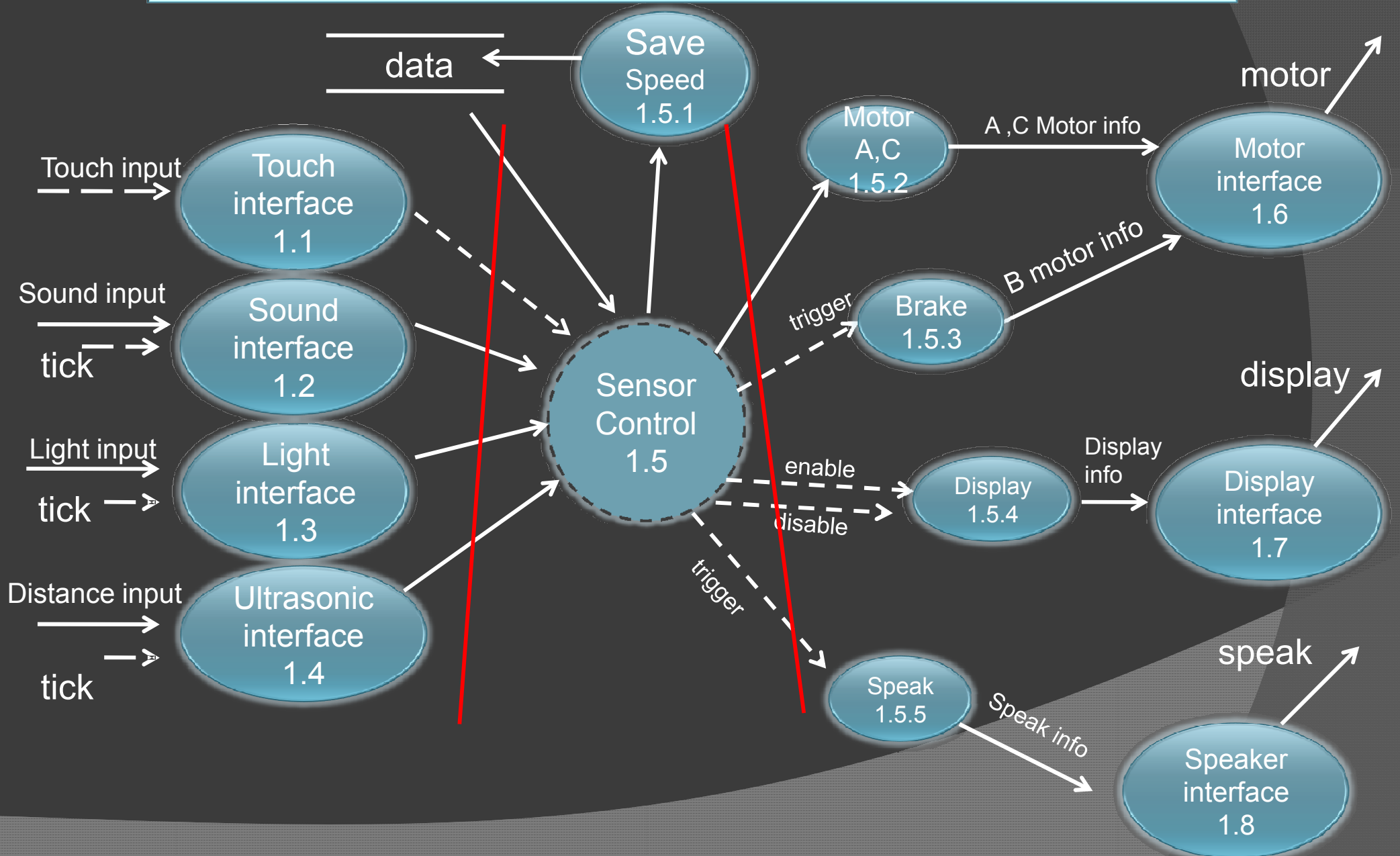
Data Dictionary

Data name	Definition
Motor B data	Brake whenever get an interrupt of time or objects
Motor A,C information	Control the movement by input data
Display Information	Control the display by controller
Speak Information	Control the speaker by controller

Structured Design

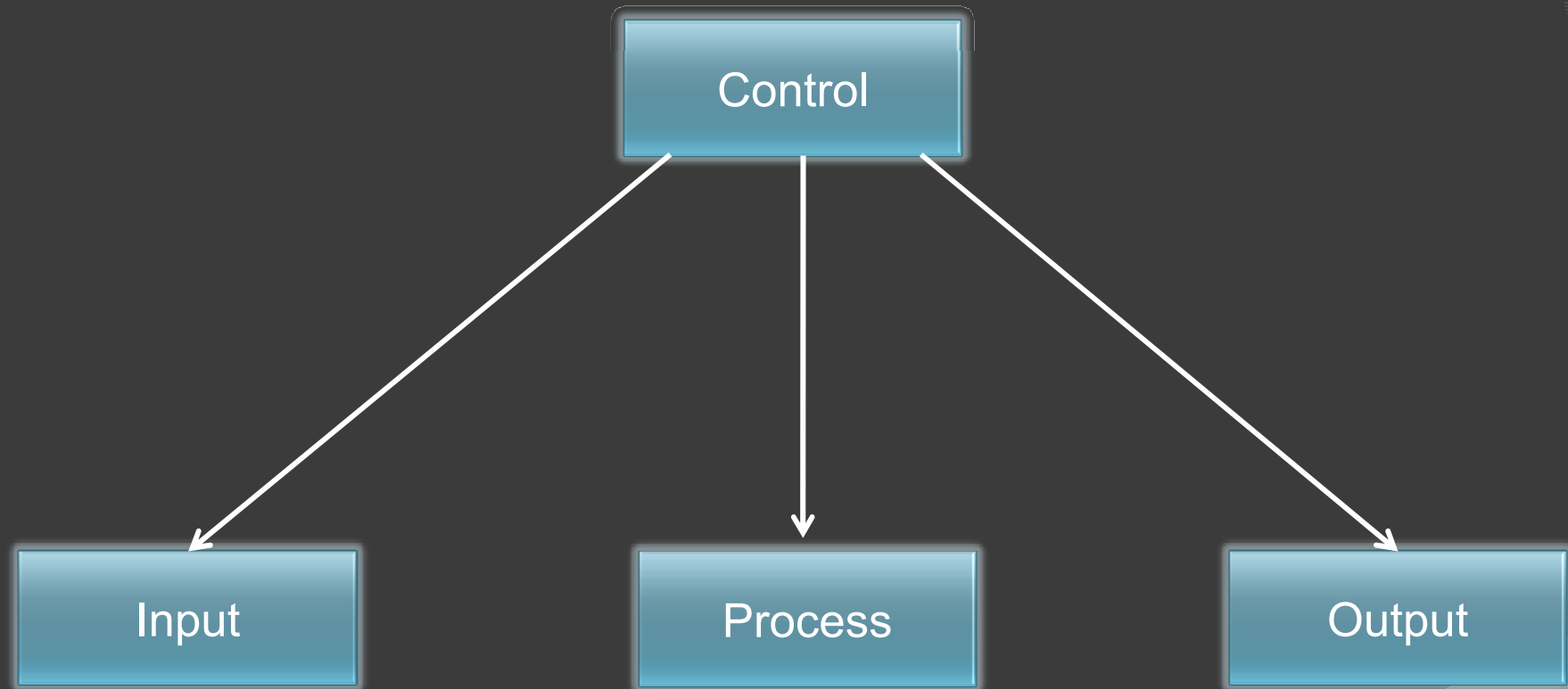
Structured Charts

Transform Analysis

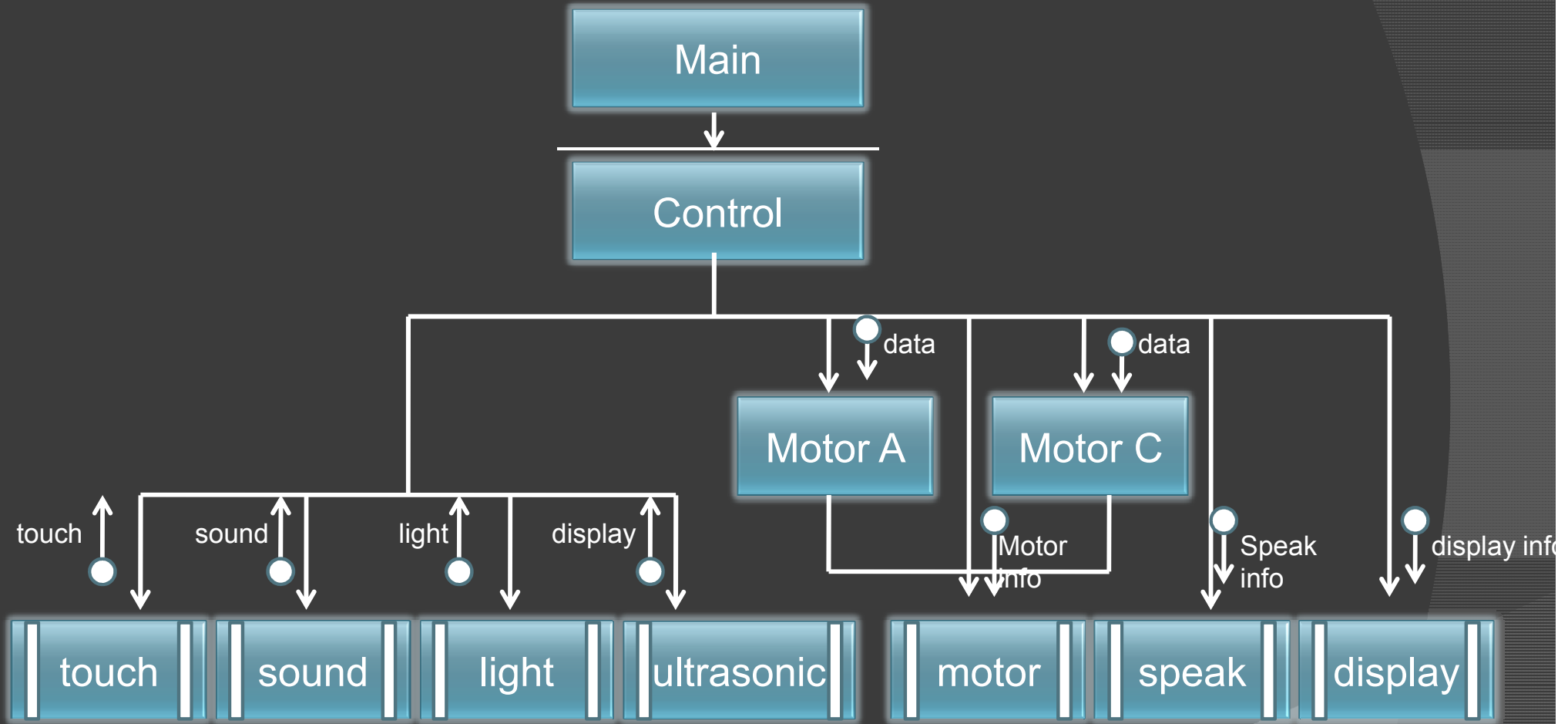


Structured Charts

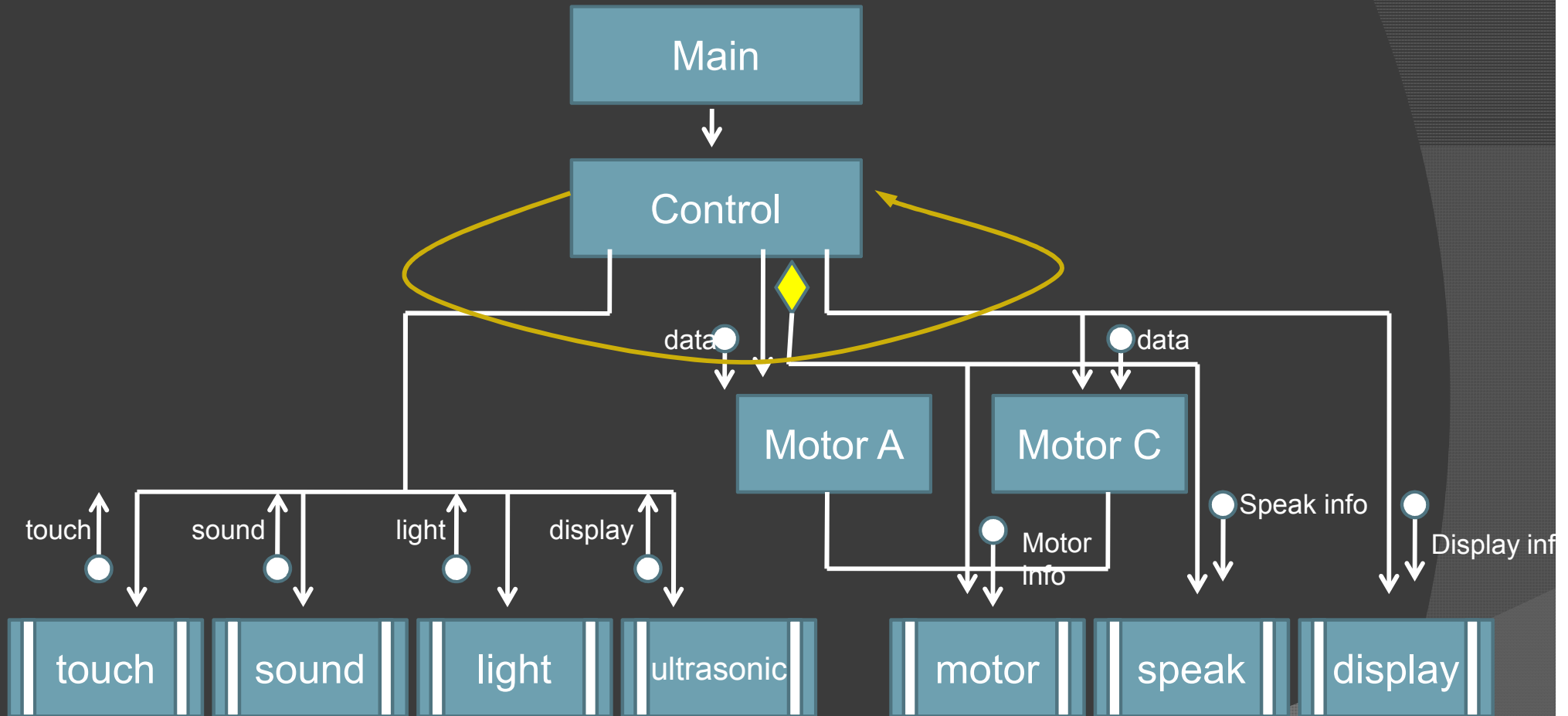
Transform Analysis



Structured Charts(Basic)



Structured Charts(Advanced)



Module Definition

Module Name	Main
Function	Control the controller
Interface	
Module Name	Controller
Function	Process data flow, send control flow
Interface	Start_controller()
Module Name	Controller
Function	Process data flow, send control flow
Interface	Start_controller()
Module Name	Touch
Function	capture touch input from Touch Sensor
Interface	Get_touch()

Module Definition

Module Name	Sound
Function	capture sound input from Sound Sensor
Interface	Get_sound()
Module Name	Light
Function	capture light input from Light Sensor
Interface	Get_Light()
Module Name	Ultrasonic
Function	capture distance input from ultrasonic Sensor
Interface	Get_distance()
Module Name	Motor A, Motor C
Function	Control movement and direction
Interface	Set_motor_A(int bool, int speed) Set_motor_C(int bool, int speed)

Module Definition

Module Name	Motor B
Function	Start/Stop, brake on/off
Interface	Set_motor_B(int bool, int speed)
Module Name	Speaker
Function	Speak on/off depends on sound and light input
Interface	set_speaker(string sp_info)
Module Name	Display
Function	Display sentences respectively depends on different situations
Interface	Set_display(string dis_info)

Data Definition

Data Name	Definition	Type
Touch	Output a variable depends on touch sensor input	bool
Sound	Output a variable depends on sound sensor input	Int (0~100)
Light	Output a variable depends on sound sensor input	Int (0~100)
Distance	Output a variable depends on sound sensor input	Int (0~255)
Motor Data	Control direction, state(move/stop/ brake)	Structure (bool direction, int speed)
Motor Information	Send data to motor interface	Structure(int choose, bool direction, int speed)
Speak Information	Send data to speak interface	String
Display Information	Send data to display interface	String

Thank you!

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