

A Framework for Seamless Human-Content-Environment Interaction

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Abstract. In this paper, we propose a new framework which can support seamless human-content-environment interactions in ubiquitous computing environments. Although there have been many research activities on concepts of computing (virtual reality, augmented reality, mobile, wearable, and ubiquitous computing), they have focused on development of technologies in their territories. There have been a few research efforts on the concept of natural human-content-environment interaction in a unified way with a user-centered perspective. The proposed framework provides seamless interactions with a consistent and a unified way by taking into account mobile/wearable computing as users, VR/AR as contents, and ubiquitous computing as environments, respectively. To support the consistent and unified perspective for developers, users, contents, and environments can be modeled by a set of sensors and services as well as the interaction among them can be modeled by user-centric context. We believe that the proposed framework can be an initiative interaction paradigm for user-centric ubiquitous computing environments.

Keywords: Seamless interaction, personalized user interface, responsive content, harmonious service environment

I. 가 . (,)
 (Human-Computer Interaction) 가)
 가 [1],[2].
 (Context-aware)
 [3],[4].
 (-狀況)
 (-脈絡)
 (Unified Context-aware Application Model, UCAM)
 [5]~ [7].
 (Context)
 Active Badge [8] 가 .
 PDA ParcTab
 [3] MIT Oxygen[9],
 CMU Aura[10], Berkeley GUIR[11]
 가 , 가
 / 가
 Context Information Service(CIS)[12], Conference Assistant(CA)[13] MIThrill[14] ()
 / (,)
 Oz [15],
 Creature Kernel(CK)[16], Personal Service Assistants (PSA)[17] . II
 가 , III
 UCAM IV
 Adaptive Control of Home Environment (ACHE)[18], Gaia[19], Reconfigurable Context Sensitive Middleware (RCSM)[20] VI V

VII

II.

가

가

3.

(Harmonious Service Environment)

가
가

1.

(Personalized User Interface)

(가 , 가)
가

가

가

가

2.

(Responsive Content)

(, ,)

III.

III

• Context Information Service(Pascoe, 1998)

[12].

CIS

가

(Access Point)

• Conference Assistant(Dey, 1999)

(Context Toolkit)

[13].

가

- MIThril(DeVaul, et.al, 2003)

[14]. MIThril

- ACHE(Adaptive Control of Home Environment, Mozer, 1999)

[18]. ACHE

4

3 가 가

. MIThril

- Gaia(Manuel, et.al, 2002)

[19].

- Oz (Bate, et.al, 1990~2002)
Bate

Tok [15].

가 가 가

Gaia Gia Gaia
. Gaia
. Gaia

가

- Creature Kernel(Yoon, et.al, 2000) 가

[16].
()
가

Clicker Training 가 가

- RCSM(Reconfigurable Context Sensitive Middleware, Stephen, et.al, 2002)

[20].

Ad-Hoc

Ad-Hoc

가 가

- Personal Service Assistants(Arafa, et.al, 2000)

[17].

1.

CIS(1998)		(,)	
CA(1999)			()
MIThrill(2003)			
Oz(1997)			
CK(2000)			
PSA(2000)		, ,	
ACHE(1999)		가	
GAIA(2002)			
RCSM(2002)			

(/ , 가 ,)

/ , 가 , ,

1 UCAM

1 UCAM ,
wear-UCAM, vr-UCAM
ubi-UCAM [21] ~ [23].

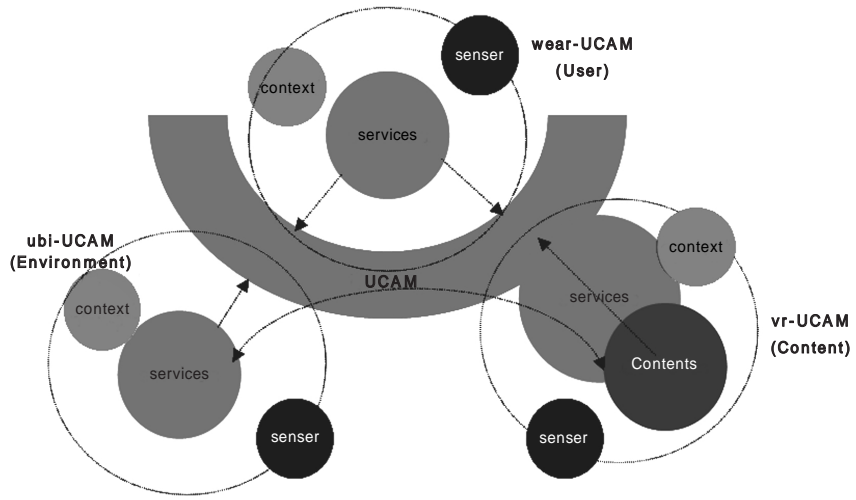
IV.

UCAM(Unified Context-aware Application Model)

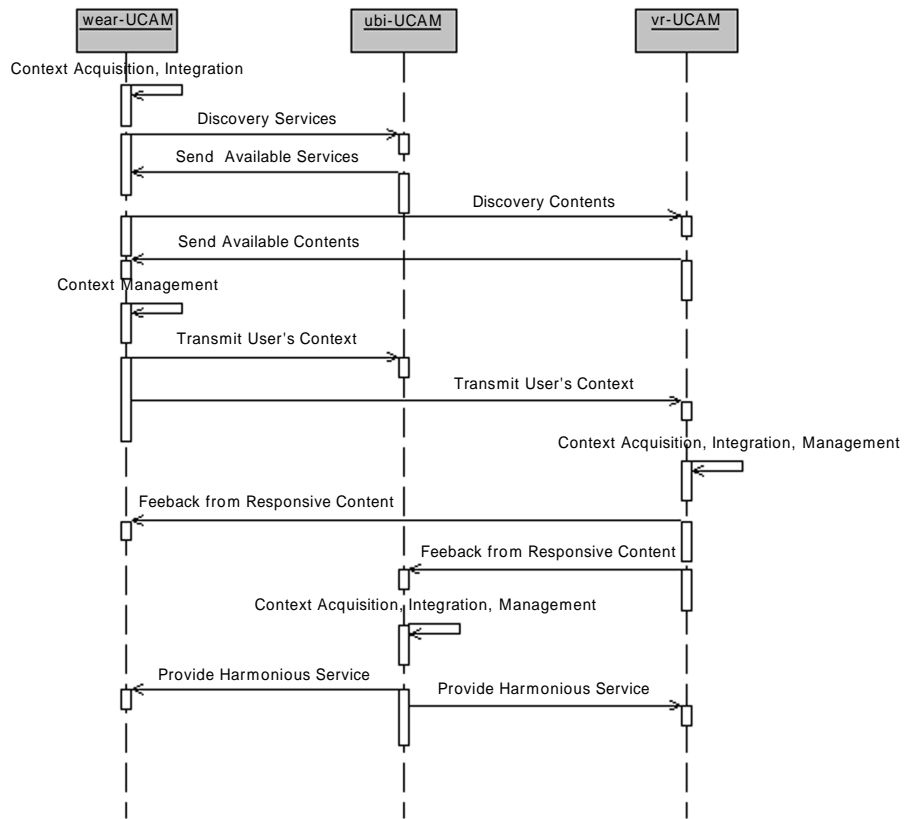
UCAM (UCAM)

UCAM

2 (wear-UCAM)
(PDA)
() (ubi-UCAM)
(vr-UCAM)

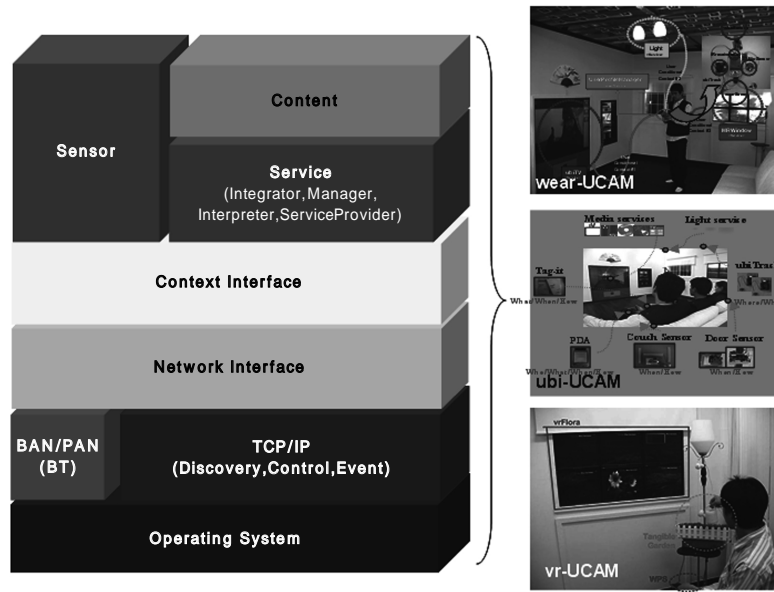


1. UCAM - -



2. UCAM

UCAM



3. UCAM

1. UCAM

2. (User-centric Context)

3. UCAM

wear-UCAM, vr-UCAM, ubi-UCAM

[24]~[26]. Schilit(1994)

[3]. Pascoe(1998)

[12]. Schmidt(1999) IT

[6]. Dey(2001)

[5]. Ghita(2004)

[27].

가

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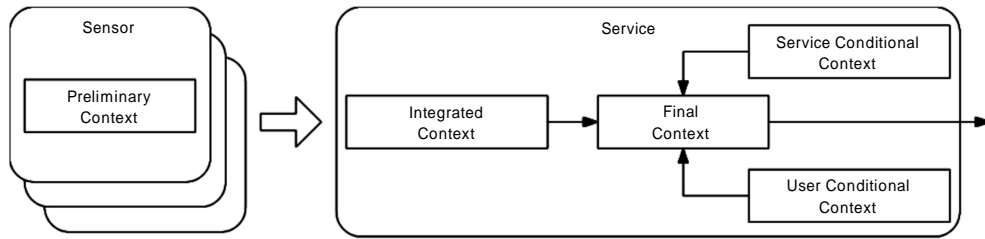
가

[28].

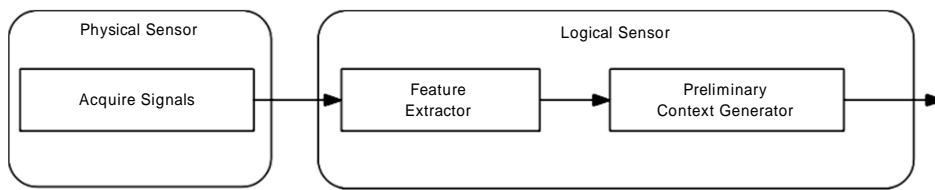
가

()

(User centric context is a set



4. UCAM



5.

of descriptions on user's states that influence an application's behavior interesting to the user)."

가

(,)
()

[29],[30].

5W1H(Who, What, Where, When, Why, How)

UCAM

5 UCAM

[31].

5

가

UCAM

5W1H

4 2

3. (Sensor)

UCAM

(,)
(, , ,)

4. (Service)

UCAM

(Container)

가

UCAM

가)

가

UCAM

2.

(PC: Preliminary Context)	
(IC: Integrated Context)	
(FC: Final Context)	
(UCC: User Conditional Context)	
(SCC: Service Conditional Context)	

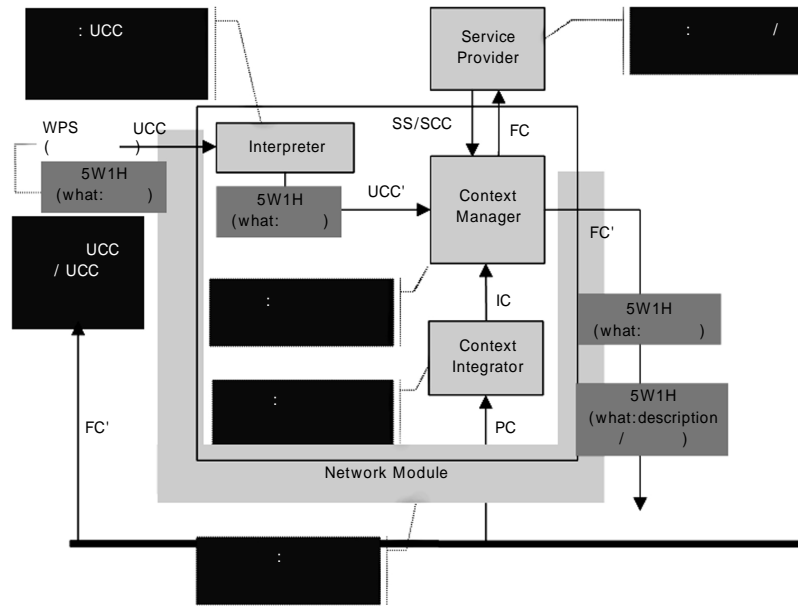
3.

(Context Integrator)			
(Context Manager)	(,) ,	,	
(Interpreter)	가		
(Service Provider)			

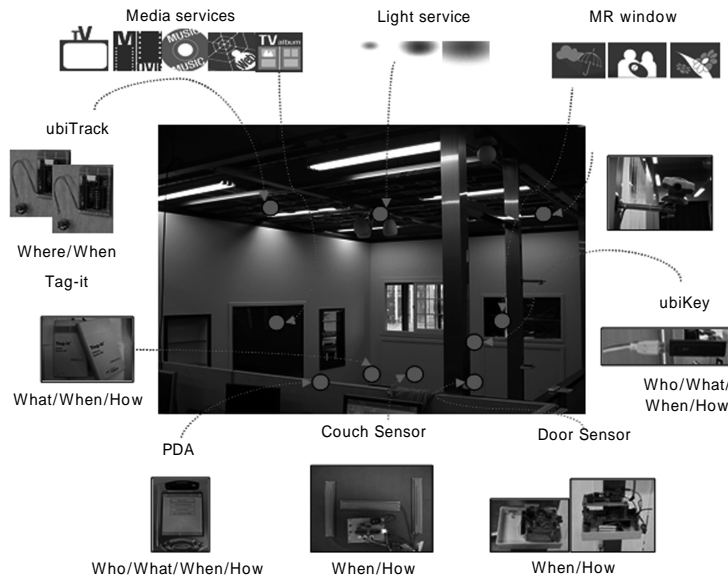
V. UCAM

6

6 (Context Integrator), (Context Manager), (Interpreter), (Service Provider) UCAM UCAM UCAM (ubiHome:) [32] 2002 가 UCAM UCAM 7 4 가 UCAM 1. (wear-UCAM) 3 가



6.



7. (ubiHome Test-bed)

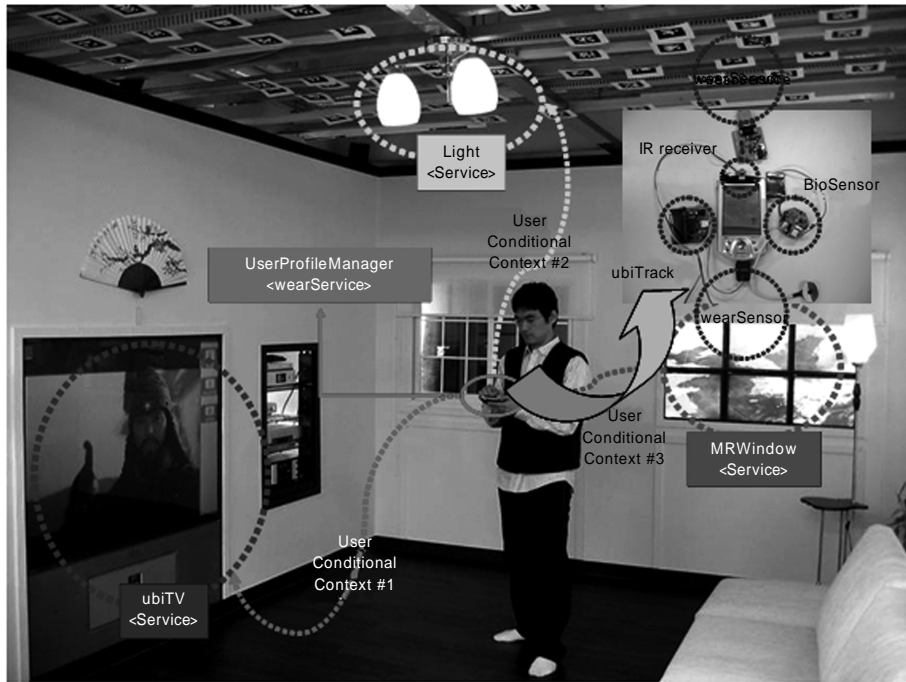
wear-UCAM

가

[21]. wear-UCAM

가

(User Profile) [35]



8.

4. 가

	ubiTrack[33]	
	Remote Controller[34]	
	Door Sensor	
	CouchSensor	
	Light	
	eMail	e-Mail
	TV	
	DVD	DVD
	Music	
	Album	
	Web	

[36]
[37]. 8 wear-UCAM

가 가

8
가

가
5 wear-UCAM

가

가



10. ubiTV

6. vrFlora

	/	
	PDA	(,)
	Tangible Garden	,
	vrFlora	

[39] [40]

vrFlora

가

[41]. ubiTV

6

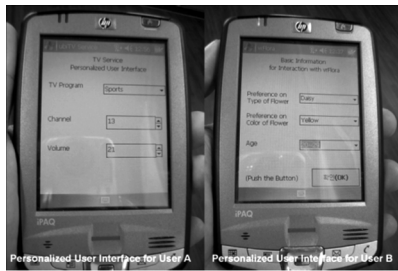
10 ubiTV

10 ubiTV

[32]. ubiTV

ubi-UCAM UCAM [23]. ubiTV TV

ubi-UCAM ubi-UCAM



(a)

(b)

11. - -

7. UCAM

	wear-UCAM	vr-UCAM	ubi-UCAM
(Context Integrator)		가	,
(Context Manager)		,	,
(Interpreter)			가
(Service Provider)			

ubiTV

7

가

4. UCAM

UCAM

7

7 UCAM
UCAM

vr-UCAM

8. - -

/			
	ubiTrack		wear-UCAM
	Tangible Garden		vr-UCAM
	CouchSensor	(,)	ubi-UCAM
	Personalized UI		wear-UCAM
	ubiTV	(TV, Movie, Music)	ubi-UCAM
	vrFlora		vr-UCAM

9. UCAM - -

(, GUI) 가 .

가

가 ,

VI.

UCAM

가

(wear-UCAM),
UCAM),

(vr-
(ubi-UCAM)

B

vrFlora

가

UCAM
UCAM

Tangible Garden

vrFlora

8
8

11 (b)

A B가

11

()

ubiTV

ubiTV

11 (a)

A B

가
(, ,)

3가
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- - 9 UCAM
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- - UCAM
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- - 21 , IT

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