

Technology in Neurology and Psychiatry



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INFODEMIOLOGY

- ❑ It is the new field where internet and social media are used to explore distribution and determinants of health information.

THE MODERN MEDICI EFFECT

- ❑ Merging of neuropsychiatry and technology creates innovation, same as with convergence science

- ❑ The advantages of these technologies include cost and travel savings, as well as basic accessibility to therapy in remote areas lacking clinical facilities.

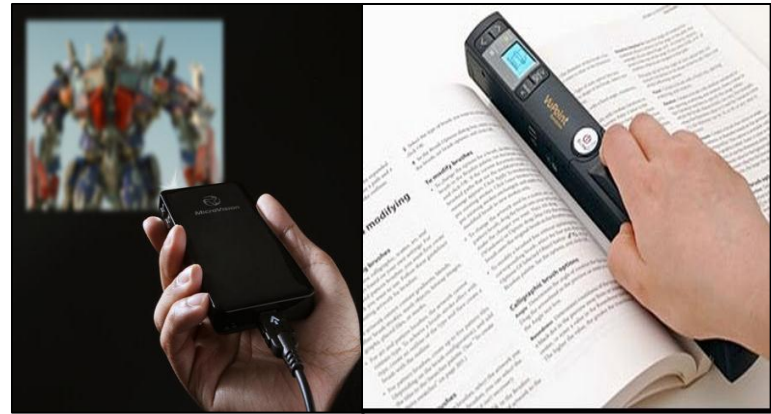
Classification

- ❑ Personal
- ❑ Office
- ❑ Academics
- ❑ Recreational

- ❑ Online simulations may be used to train counsellors, helping them conquer the common misconceptions in a “mistakes allowed atmosphere.”
- ❑ Forums connect students in the field with each other, their supervisors, and their professors.

Non medical gadgets

- ❑ Speech to text recorder
- ❑ Portable scanner
- ❑ Portable projector
- ❑ Portable printers
- ❑ Security Cameras with remote monitoring function via mobile phone



Medical gadgets

- ❑ Lens to convert Mobile phone camera to direct ophthalmoscope – PEEK Retina
- ❑ Mobile apps to examine visual acuity, color vision
- ❑ Pulse oximeter
- ❑ Fitness trackers – Wearable devices
- ❑ Portable Echo/Ultrasound



Apps

- ❑ Doctor apps.

- ❑ Patient apps.

“Doctor” medical applications

Category	Description	Application name	iPad	Price, USD	iPhone	Price, USD	Android	Price, USD
	Anatomy	Essentials of Clinical Anatomy By Inkling	Y	9.99-64.99	N		N	
	Meds	ePocrates	N		Y	Free	Y	Free
	Labs	ARUP Consult	Y	Free	Y	Free	Y	Free
Academic	Journal	<i>Neurology</i> [®]	Y	Fees	N	Fees	N	
	Journal	<i>Neurology</i> [®] : Clinical Practice	Y	Fees	N	Fees	N	
	Journal	<i>Neurology</i> [®] : Continuum	Y	Fees	N	Fees	Y	Fees
	Journal	<i>Lancet (Neurology)</i>	Y	Fees	N	Fees	N	
References	Textbook	Manual of Neurologic Therapeutics	Y	72.99	Y	72.99	Y	72.99
	Textbook	Evidence-Based Medicine Guidelines-Neurology	Y	39.99	Y	39.99	Y	39.99
	Textbook	Meritt's Neurology Handbook	Y	77.5	Y	77.5	Y	77.5
	Textbook	5-Minute Neurology Consult	Y	94.99	Y	94.99	Y	92.95
	Writing-research	PubGet	Y	Fees	N		N	
Communication	Curbside	Sermo	Y	Free	Y	Free	N	Free
	Curbside	QuantiaMD	Y	Free	Y	Free	Y	Free
	Curbside-phonebook	Doximity	Y	Free	Y	Free	Y	Free
Classroom	CME	Living Medical Textbook	Y	Free	Y	Free	N	
	CME	MyCME	Y	Free	Y	Free	Y	Free
	CME	OpenCME	Y	Free	Y	Free	N	

“Patient care” medical applications

Category	Description	Application name	iPad	Price, USD	iPhone	Price, USD	Android	Price, USD
Localization-examination	Neuromuscular	Nerve whiz	N		Y	Free	Y	Free
	Neuro-ophthalmology/otology	aVOR	Y		Y	Free	N	
	Neuro-ophthalmology	Eye Handbook	N		Y	Free	Y	Free
Documentation-administrative	Patient log/notes	Clinical Log	N		Y	Free-19.99	N	
	Patient log/notes	MyPatientLogs	N		Y	1.99	Y	2.99
	Billing	IDC9_HCPCS	Y	Free	Y	Free	N	
	Billing	ICD9 Consult 2012 Free	Y	Free	Y	Free	N	
Monitoring-analytics	Headache log	iHeadache	N		Y	4.99	N	
	Stroke	Stroke track	N		Y	Free	N	
	Angiography	Angio Suite-Neuro Ed.	N		Y	Free	N	
Advising-teaching	Brain diseases	FINR Brain Atlas	Y	1.99	Y	1.99	N	

TECHNOLOGY IN NEUROLOGY

Neurology apps - los



□ NEURO LOCALIZER



□ INTERACTIVE NEUROANATOMY



□ PARKINSONS DIARY



□ EPIWATCH



□ mPOWER

NEUROLOGY APPS - ANDROID



3D Brain
DNA Learning Center

★★★★☆ FREE



Neurology®
Wolters Kluwer Health |

★★★★☆ FREE



Neurology® Clinical
Wolters Kluwer Health |

★★★★☆ FREE



Neurology Now®
Wolters Kluwer Health |

★★★★☆ FREE



Continuum®
Wolters Kluwer Health |

★★★★☆ FREE



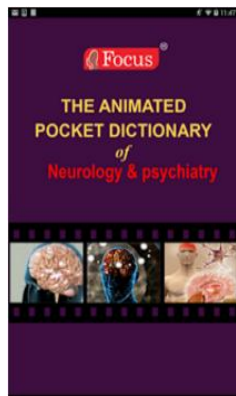
Neurology® Neuro
Wolters Kluwer Health |

★★★★☆ FREE



Neurology Today®
Wolters Kluwer Health |

★★★★☆ FREE



Guideline Central
Guideline Central

★★★★☆ FREE



5-Minute Neurology
Aptus Health, Inc.

RS. 5,939.03



NIHSS
Chernyshkov Evgeny

★★★★☆ FREE



The Lancet
Elsevier Inc

★★★★☆ FREE



UpToDate for Andro
Wolters Kluwer Health |

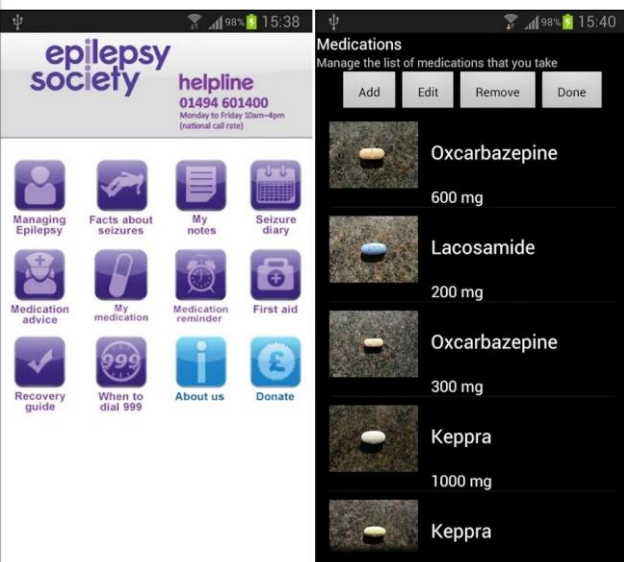
★★★★☆ FREE



Medscape
WebMD, LLC

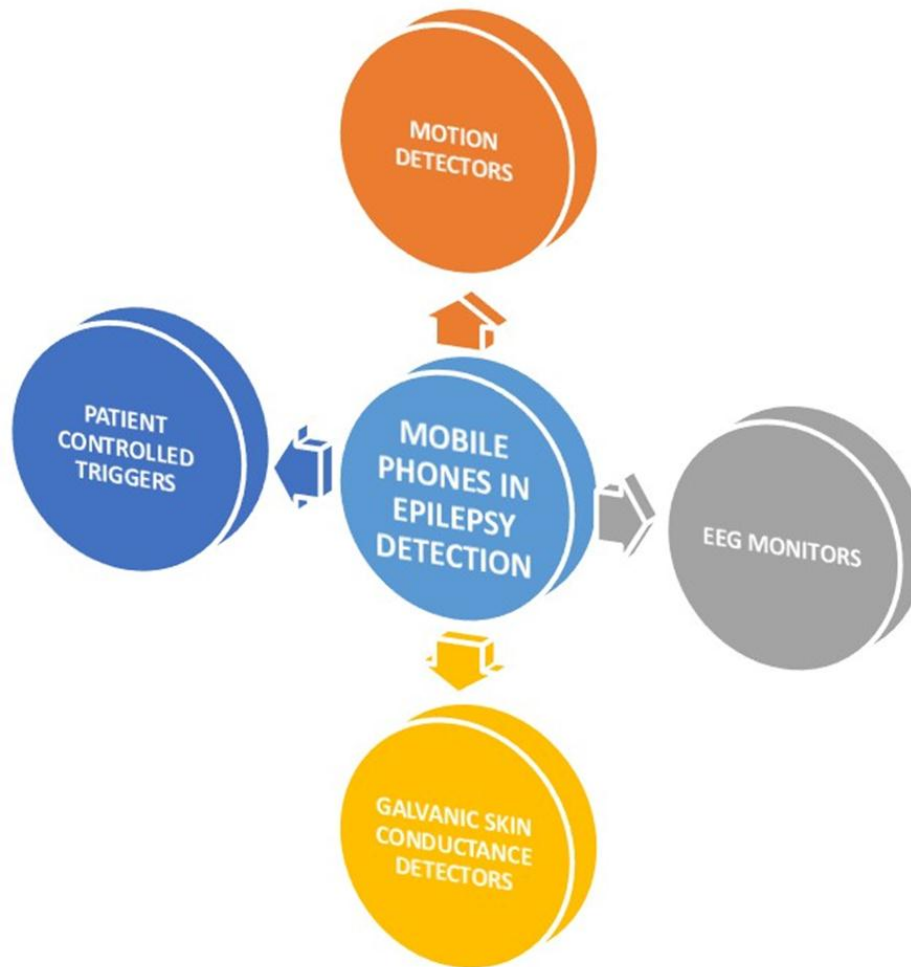
★★★★☆ FREE

Mobile apps for epileptic patients and their caregivers



- ❑ Currently a variety of apps like the *'epilepsy society app'* or *'my epilepsy diary'* are available in the market which can be used as seizure diaries allowing the patient or the caregiver to record
 - the time of the seizure,
 - length and type of an attack,
 - timing and dosage of medication taken prior to the attack, etc...

MOBILE PHONES IN EPILEPSY DETECTION



- ❑ **Epdetect** employs digital signal processing for detecting seizures.
- ❑ Movements in the frequency of 2 to 5 Hz lasting at least for 10 seconds are considered as potential seizures and any movement falling outside this criteria is ignored thus increasing the sensitivity and specificity of predicting seizures.

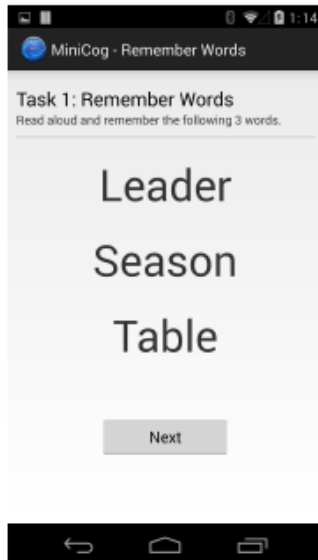


- ❑ Some devices like the ***'Affectiva's Q Sensor'*** use changes in galvanic skin response as opposed to motion detection to detect a seizure.
- ❑ The increase in skin conductance could predict the occurrence of a seizure and the degree of conductance is said to be proportional to the severity of an attack and to the degree of postictal EEG suppression.***

***Sascha Meyer and Matthias Strittmatter, Autonomic changes with seizures correlate with postictal EEG suppression, Neurology 2013;80; 1538-1539,



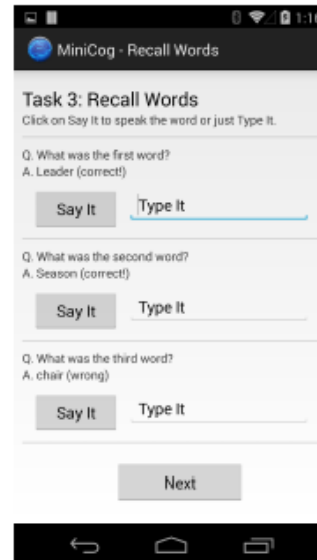
MOBI-COG application



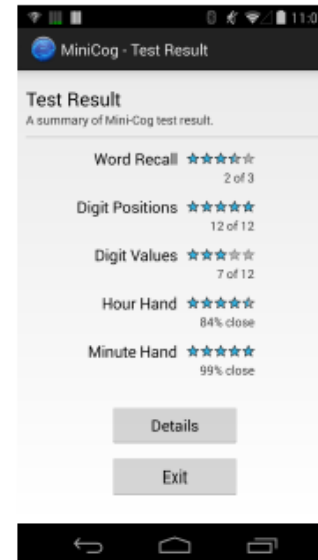
(a) Task 1 (Remember)



(b) Task 2 (Clock Draw)

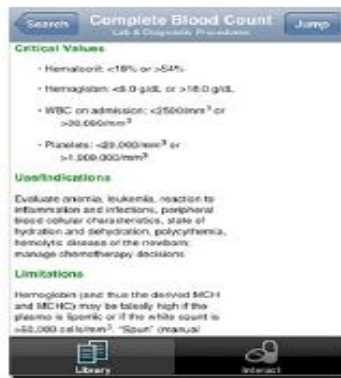
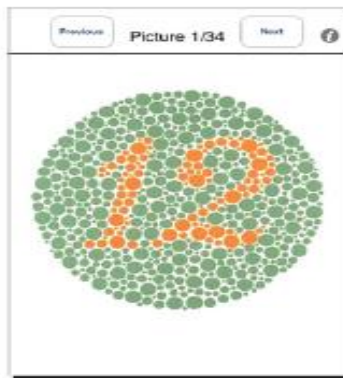


(c) Task 3 (Recall)



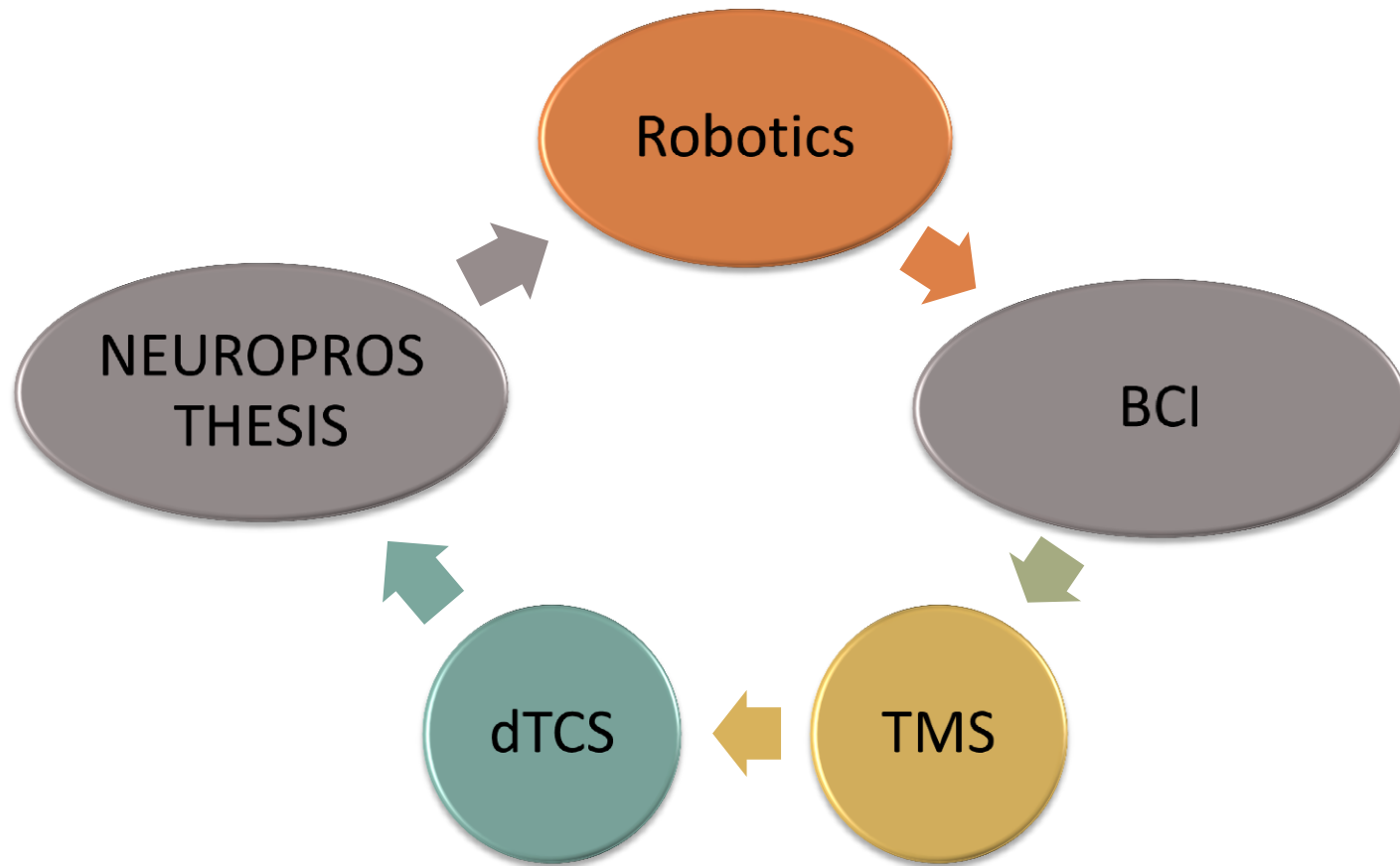
(d) Results

MOBI-COG which is an application that runs on a mobile device, such as a tablet or a smartphone, and provides an automated and instant dementia screening service. The MOBI-COG App is a complete automation of a widely used 3-minute dementia screening test called the Mini-Cog test, which is administered by primary caregivers for a quick screening of dementia in elderly.



Neurology applications for smartphones. (Top row, left to right) Test for color vision, database of laboratory tests, and ICD-9-CM (diagnosis codes) database. (Bottom row, left to right) NIH Stroke Scale calculator, drug database, and evaluation and management CPT code calculator. These examples are for the iPhone. Similar applications may be available for other smartphones.

Gadgets in neuro rehabilitation.



Robots for Neurorehabilitation

- ❑ Can be divided
- ❑ **In terms of the body functioning that they aim to rehabilitate** - primarily between robots for upper limbs and those for lower limbs, with a subdivision between bilateral and unilateral robots
- ❑ **In terms of their design** - usually divided robots in exoskeletons and controller of endpoint trajectories.
Typical examples of these robots are Lokomat as exoskeleton for lower limbs, Gait Trainer (or Gang Trainer) as end effector for lower limbs, ARMin III as exoskeleton for upper limb, and MIT-Manus as an end effector for upper limb, but many other commercial robots or specific prototypes exist.

Noninvasive Brain Stimulators

- ❑ The use of electrical currents or magnetic fields can modify the functional activities of the brain, and it is known by almost two centuries, but in the last decade this approach, known as noninvasive brain stimulation (NIBS), has rapidly gathered a worldwide interest in therapeutic field.
- ❑ NIBS consists principally of two techniques :
 - **Repetitive Transcranial Magnetic Stimulation (rTMS)**
 - **Transcranial Direct Current Stimulation (tDCS)**
- ❑ both these techniques have showed potential benefits as adjunctive treatment of several psychiatric and neurological disorders, and now researchers

Neuroprosthesis

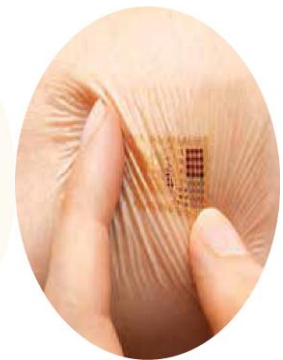
- ❑ Neuroprosthesis (or neural prosthesis) is a general term referring to devices that cannot only receive output from the nervous system (such as BCI), but can also provide input, with the possibility to interact with the peripheral and central nervous systems
- ❑ Some neuroprostheses are based on the principle of functional electrical stimulation (FES), and in the recent years it has been used in stroke rehabilitation.
- ❑ Recently It has been shown that the use of FES for 3 months increases the maximum voluntary contraction and the motor-evoked potentials

Virtual Reality

- ❑ The expression virtual reality (VR) should refer to a high-end user-computer interface involving real-time stimulation and interactions of an embedded subject through multiple sensorial channels (visual and auditory, sometimes haptic, smell and taste if possible), based on a synthetic environment in which the subject feels his presence
- ❑ Similar to the three Ds of robotic works, VR is based on three I's defining its features:
 - **Immersion, interaction, and imagination**

Future devices

- ❑ Wearable Seizure detection devices – EMBRACE, SMART WATCH, SEIZALARM
- ❑ BIOSTAMP - contains sensors that collect data on movement and activity in the brain and muscles, which is then wirelessly uploaded to a nearby smartphone
- ❑ BRAIN SENTINEL -uses electrodes attached to the biceps to detect signs of tonic-clonic seizures
- ❑ Portable EEG - Brainscope



TECHNOLOGY IN PSYCHIATRY



Figure 2 The custom-made belt-worn device incorporating accelerometer, microphone and light sensor.

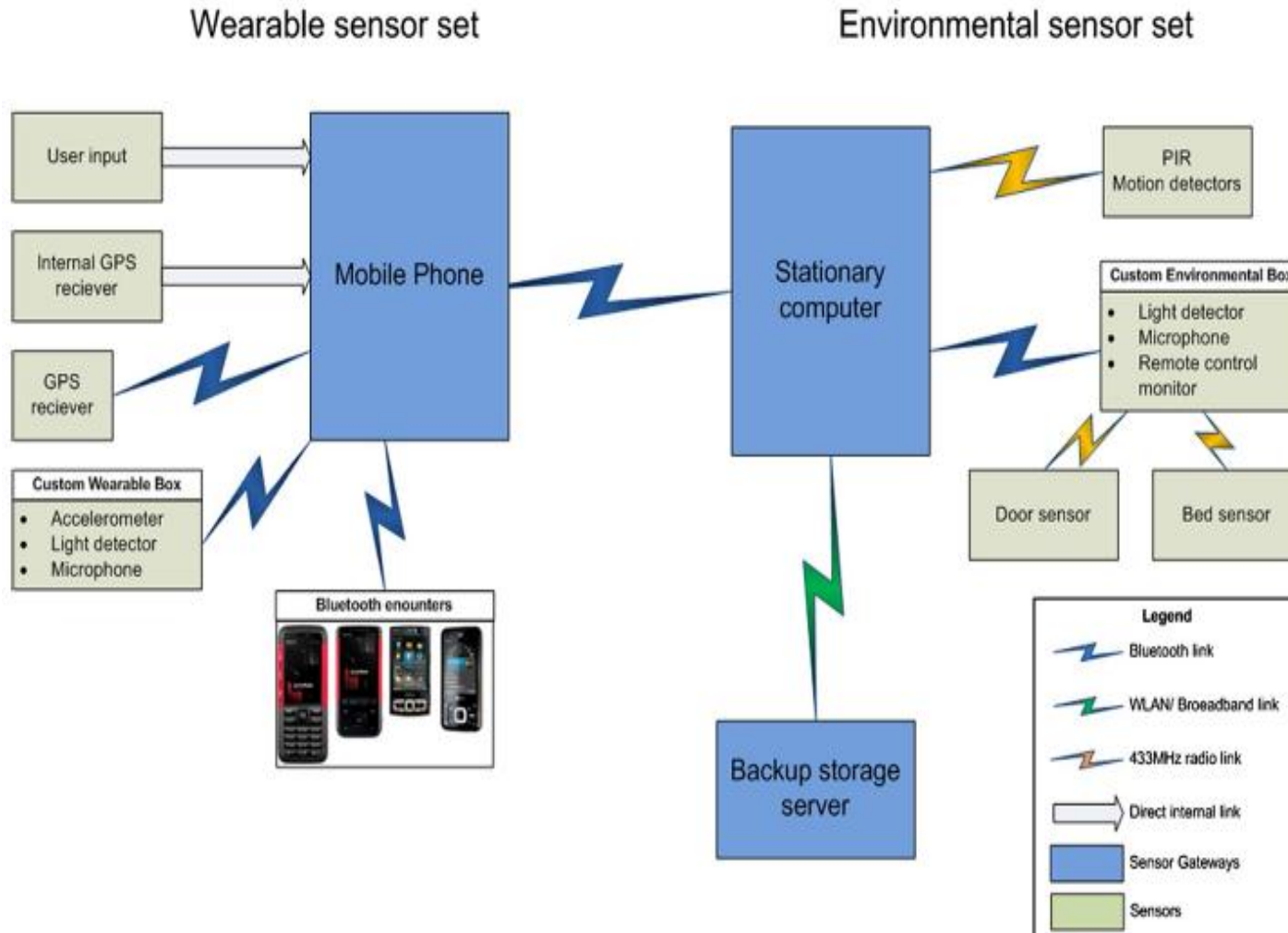
Table 1 Bipolar syndromes matched with sensors (M – manic episode, D- depressive, M/D – applies to both)

Type	Syndrome	Possible sensor
M/D	Altered sleep patterns - insomnia, hypersomnia, self-deprivation of sleep	Possible to monitor with bed sensors as well as light detectors installed in the patient's home. Effective monitoring of this sleep patterns is of particular importance. Firstly, disturbed sleep can trigger an onset of an episode [25,26]. Secondly it is an important diagnostic indicator that an episode of either kind is occurring [22].
M	Flight of ideas - increased goal oriented activity, euphoria	Monitoring social activity via, e.g., number of visited places (especially in a patient's free time), number of calls and text messages and their recipients, Monitoring usage of keyboards and household remote controls should also be included, as buttons are likely to be pressed harder and faster.
M/D	Psychomotor agitation (or retardation)	Body (e.g. wrist) worn accelerometer will detect restless behaviour and increased activity. Motion detection can also be of use.
M	Increased (excessive) social activity	Likely to manifest itself in geospatial and temporal patterns (number of visited places). Patients, in their free time, will visit more unusual places and meet new people. These can be monitored via location (e.g., GPS-based) tracking. Identification of crowded places (e.g. clubs) can be achieved through the patient's mobile device scanning for other devices [27] or quantifying the noise level of the place where the patient is
M	Talkativeness – a pressure to talk louder	Monitored by microphones designed to extract the pitch and volume of speech (and not the content).
D	Concentration problems – indecisiveness	All activities performed on a computer become only related to work duties (e.g. when using of email and web) and they become slow; monitoring keyboard strokes can show decreased speed of typing. Monitoring of household remote controls may indicate lower use.
D	Lack of interest in social and other activities	Monitoring social activity via, eg., number of visited places will drop as well as the number of Bluetooth encounters [27].
D	Diminished appetite and loss of weight	Regular weight measurements can be automated as well as basic usage of kitchen appliances being monitored.

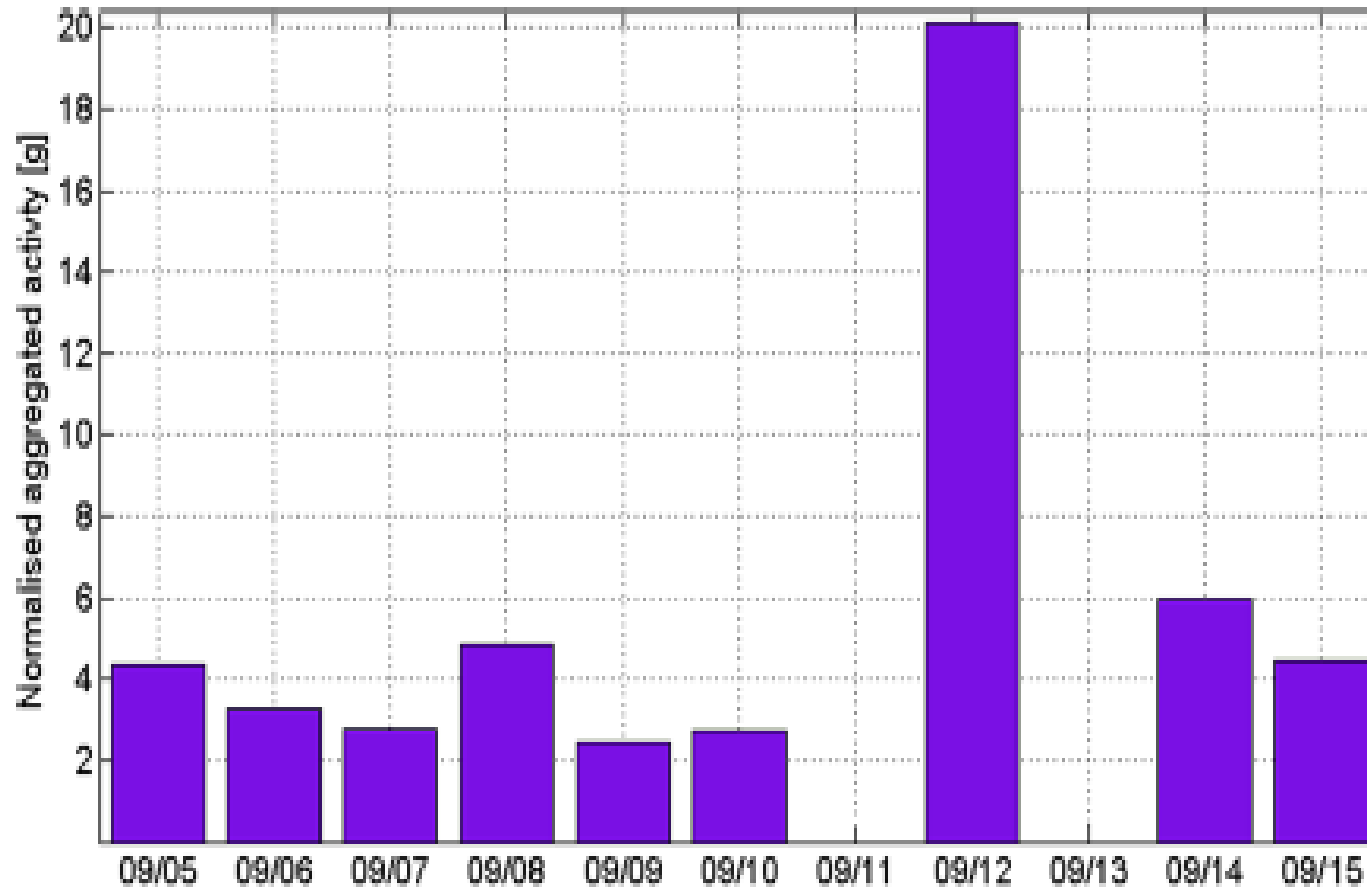
Table 2 Sensors constituting the personalised ambient monitoring prototype

Sensor	Details	Subgroup
Accelerometer	Body worn tri-axis accelerometer can facilitate monitoring physical activity, posture and (if worn during sleep) sleep patterns.	Wearable
Global Positioning System	GPS can be used to obtain precise outdoor location. The information can be used to monitor changes in activity.	Wearable
Bluetooth scanning	Monitoring Bluetooth environment can provide insight into social encounters as well as augment the localisation process	Wearable
Light detector	The detector should distinguish between natural and artificial sources of light. Turning the light on and off can be a sign of insomnia, restlessness and other behaviours related to the disorder.	Wearable/ Environmental
Remote control devices monitor	An Infra-Red detector capable of determining the speed of pressing buttons on a remote control (see Chapter 3).	Environmental
Door switches	Simple on/off devices to monitor usage of household items and (if placed on cupboards in food preparation areas) to provide information regarding eating habits.	Environmental
Motion detectors	Passive Infra-Red (PIR) devices to monitor indoor mobility as well as unusual activity.	Environmental
Bed sensor	This can be a pressure mat under the bed or a capacitive presence sensor embedded in quilts	Environmental

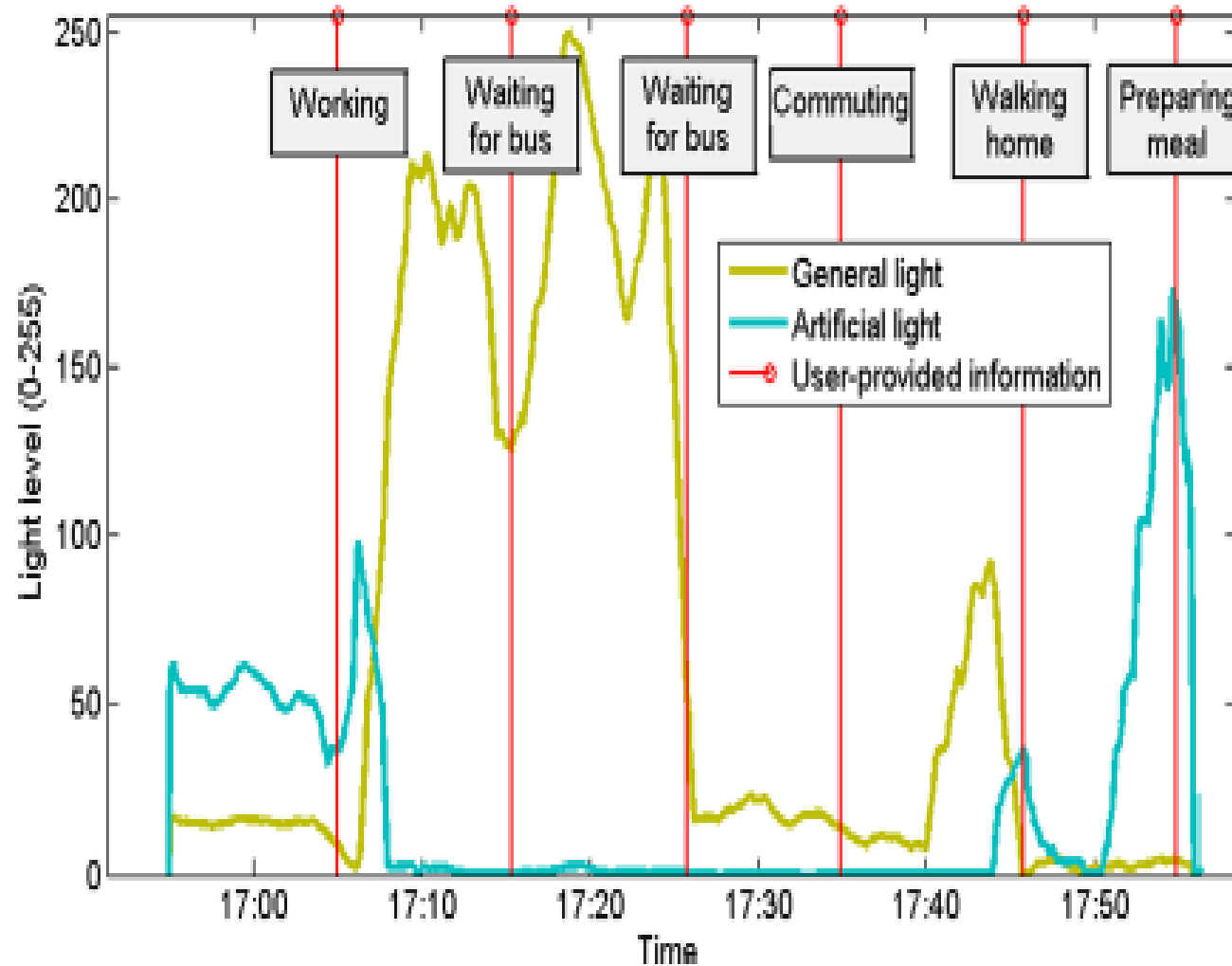
Overview of the sensor network prototype



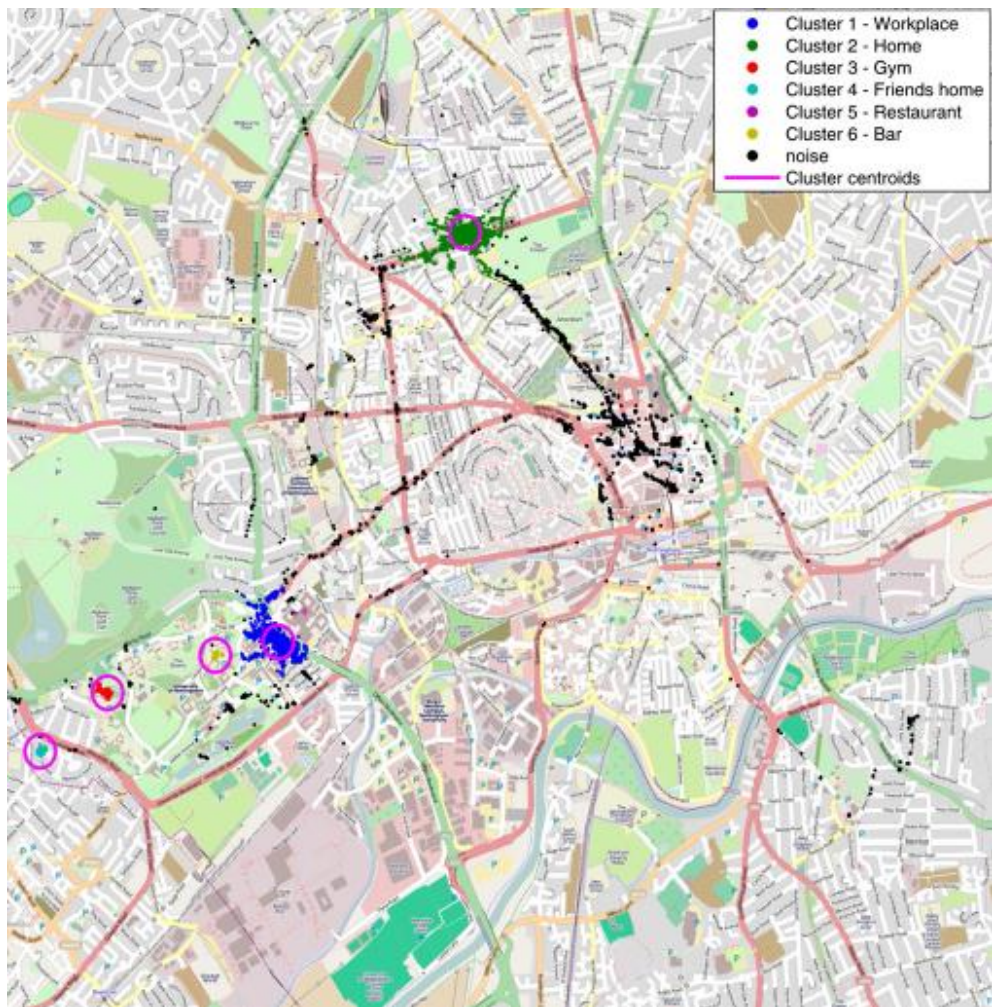
Daily activity based on acceleration



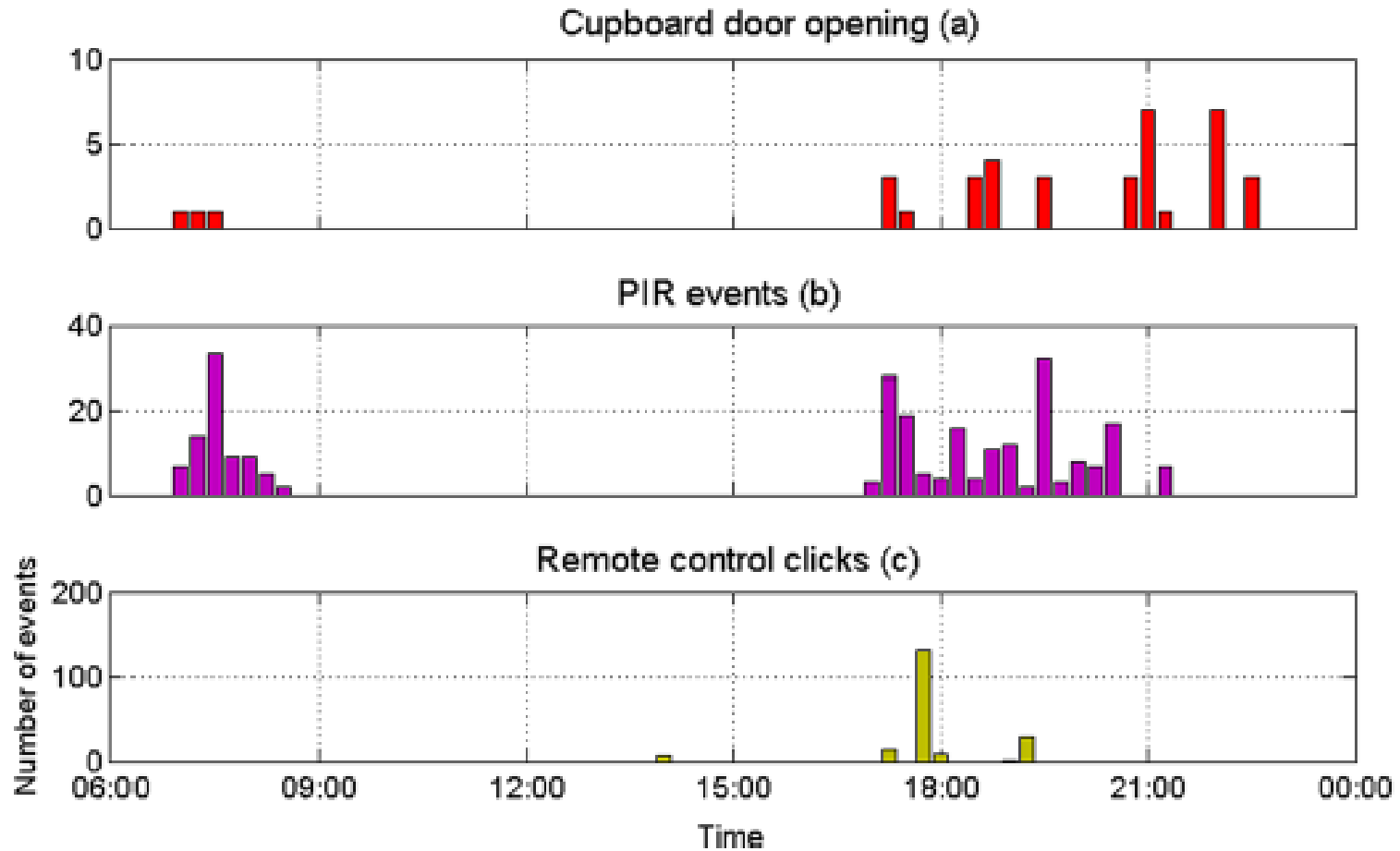
Wearable light sensor and daily activity



Processed GPS tracks showing identified significant locations



Environmental sensor readings during a typical day



- ❑ A growing number of people have lived with the Internet all their lives, with concomitant increase in the use of new communications technologies can be used in therapy and in training mental health practitioners.
- ❑ These new applications are seen as supplementing, **not replacing, face-to-face therapy.**

- ❑ **Teletherapy** options are used to treat patients confined to their homes, whether as a result of physical limitations or of social anxiety disorders.

Types of Telepsychiatry

Inhome
Telepsychiatry

Forensic
Telepsychiatry

On demand
Telepsychiatry

Scheduled
Telepsychiatry

Remote modes of therapy or training can be

- ❑ Synchronous (as in chat, videoconferencing, or virtual reality sessions, where feedback is immediate).
- ❑ Asynchronous (as in e-mails and forums, where responses are delayed).

Advantages of synchronous modes:

- ❑ It creates a “being with” experience where participants address issues as they arise.

Advantages of asynchronous modes:

- ❑ Offers therapists more time to reflect on their responses and allows for more quality control in training.

Guides to help pick apps

- ❑ PsyberGuide.
- ❑ Anxiety and Depression Association of North America: Mobile Apps.
- ❑ Health Apps Library.

RATINGS KEYS UTILIZED IN GUIDES

- ❑ **Ease of Use** How easy was it to use this app at first?
- ❑ **Effectiveness** How likely will the content provide the tools or methods to accomplish its purpose?
- ❑ **Personalize** What is its ability to personalize an individual's needs?
- ❑ **Interactive/Feedback** How interactive is the app in giving feedback?
- ❑ **Research Evidence** Does scientific research demonstrate its effectiveness?



There are thousands of mental health apps

We help you choose the ones that are right for you and those you care about

Start by checking out our product guide

NEW PRODUCTS ADDED

Check out:
[MoodTools](#)
[Guided Mind](#)

RATE THE PRODUCTS

We'd love your help in finding out how useful the products have been for you - so you'll find an option to rate each product when you look at the product descriptions.

RECENT BLOG POSTS



[REEACT cCBT Trial](#)




[Wellocracy - Tra](#)

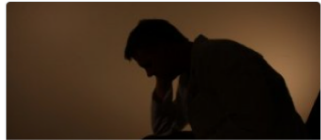
NEWS

PsyberGuide concluded an agreement with the [Queensland University of Technology](#) to enhance and improve the unbiased ratings of apps listed on this site. [More information about the project.](#)

Tweets by @PsyberGuide

PsyberGuide Retweeted


 **Erin Michalak** @erin_michalak
#Suicide survivors tell their stories on Reddit: [researchgate.net/blog/post/suic...](#) @cspyc @unsuicide @CASP_CA @NoStigmas @HealingStigma



Suicide survivors tell their stories on Reddit
Anonymous web platform provides the opportunity to open up about a much-stigmatized topic.
[researchgate.net](#)

22h

PsyberGuide Retweeted

 **Psychiatric Times** @PsychTimes
Facts and myths about decision-making capacity
[https://www.psychiatrytimes.com/2018/08/01/facts-and-myths-about-decision-making-capacity/](#)

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PsyberGuide is a consumer-friendly resource for finding out about the software and apps available for help in managing mental health conditions, and the research and views of experts on the usefulness of these products. PsyberGuide is a project of IMHRO.

DR. MICHAEL KNABLE EXPLAINS MORE ABOUT

EXCITING PROGRAM ON DIGITAL BRAIN HEALTH

 **IMHRO PRESENTS BRAIN WAVES**

New Brain Training Treatments for Psychiatric Illness



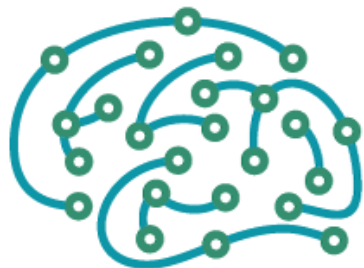
NEWSLETTER



Keep on top of what is happening in this fast-developing field - please sign up for our newsletter.

Product	PsyberGuide rating: research and support backing the product (more information)	Expert review available
Anti-Anxiety App	43%	YES
Anti-Depression App	50%	YES
Anxiety Release	36%	no
Anxiety/Panic Tracker	14%	no
Be Mindful	64%	YES
Beating Bipolar	29%	no
Beating the Blues	71%	YES
BrainHQ	71%	no
Breathe2Relax	57%	YES
buddhify	50%	no
Calm	50%	no
ClinTouch	57%	no
Cogmed	64%	no
CogniFit	79%	no
Cognitive Diary CBT Self-Help	57%	YES
Cognitive Enhancement Therapy	71%	no
COGPACK	86%	no
CopingTutor	57%	YES
DBSA Wellness Tracker	50%	no
DBT Self-Help	50%	no
Depression CBT Self-Help Guide	50%	YES
eCBT	36%	no
eMoods Bipolar Mood Tracker	43%	YES
FearFighter	86%	YES
Fit Brains	57%	no
Focus Trainer	50%	no
Good Days Ahead	86%	YES
Guided Mind	50%	no
Happy Habits: Choose Happiness	43%	YES
Happyness	21%	no
HAPPYneuron	50%	no
HAPPYneuron Pro	86%	YES
Headspace	50%	YES
iCBT	50%	YES
iCouch CBT	29%	no
iMoodJournal	43%	YES
Intelligence	57%	no

SOME USEFUL FORUMS...



PsychClub

WHERE PSYCHIATRISTS CONNECT



MOBILE APPS



Psychiatry / Mental
Health Continuing
Education Mobile App:
Continuing Education,
Education Mobiles,
Education

APPS FOR PATIENTS.

Anxiety
UNITED
Mental Health Network

YOU'RE NOT ALONE

Mobile App for Mental Health Sufferers
to support and communicate with others



Key Features

- Voice & Video Calls for one-to-one
- Text chat for website chatrooms and one-on-one
- Smileys and Emoji Keyboard
- Integrates with your Anxiety United login

Supports a range of devices

- iPhones
- iPads
- Android phones
- Android tablets

1 in 4 people suffer from some form of mental health issue

Support - Share - Socialise

Everybody knows someone

www.anxietyunited.co.uk

A mobile app for sufferers of mental health to communicate and support each other.



MentalHealthU



ONLINE COUNSELLING

Big White Wall

Welcome to Big White Wall. Having a tough time? Feeling down or stressed? Start feeling better now.

Read more about the service Big White Wall offers and what it can do to help.

About Big White Wall

A safe online community of people who are anxious, down or not coping who support and help each other by sharing what's troubling them, guided by trained professionals.

Available 24/7, Big White Wall is completely anonymous so you can express yourself freely and openly. Professionally trained Wall Guides ensure the safety and anonymity of all members.

Watch this quick 2 minute video to find out how Big White Wall works.

How Big White Wall Works

XENZONE BETTER MENTAL HEALTH

Award winning online counselling services. Delivering proven mental health services for over a decade.

Commissioners, you will love how easy it is to quickly set up and deliver effective, measurable support via our services. Immediately benefit from better value, detailed reports, shorter waiting times and fewer DNAs. Read more

- Accessible
- Proven results
- Easy to use
- Available 24 hours a day (counselling up to 10pm)

*86% of our users prefer online counselling

Our clients: Local Authorities, CCGs, Schools

Xenzone Counselling Services

ieso digital health

Providing services on behalf of the NHS

Home • Our Service • Accessing Ieso • Patient Login • About Us

Available at any time of day

We put your needs first. Our therapy is private, secure, and at a time and location that is good for you.

Welcome to Ieso Digital Health "eye-ee-so"

Ieso Digital Health provides evidence-based mental health therapy online. Discreet one-to-one therapy is delivered in real time using written (typed) conversation, with patients meeting an accredited therapist in a secure virtual therapy room, at a time and location that is both convenient and comfortable for them. The use of technology and written conversation offers patient choice and more widespread access to effective, evidence-based mental health therapy, with improved outcomes.

Therapy delivered using the Ieso method of written conversation has been clinically validated within the NHS to deliver excellent clinical outcomes with high levels of patient engagement. Ieso are commissioned to deliver Online Talking Therapy on behalf of the NHS in many areas across the UK. Please check your postcode to see if Online Talking Therapy is available in your area.

We demonstrated the effectiveness of therapy through written conversation in a successful clinical trial published in *The Lancet*.

20 CCGs

Outcomes better than LAPT average

92% vs 64% Recovery	68% vs 60% Reliable Engagement
---------------------	--------------------------------

50% Fewer sessions than face-to-face therapy

Current Barriers

- ❑ Potential privacy and confidentiality issues
- ❑ Lack of current clinical data for efficacy and safety of specific mobile apps
- ❑ Liability issues
- ❑ Reimbursement for time used reviewing electronic data

Future Solutions

- ❑ High quality clinical trials and evaluation of risk vs. Benefit
- ❑ Ensuring privacy and safety
- ❑ Reviewing legal policies
- ❑ Creating professional and ethical guidelines

Legal issues

- ❑ The ownership and control of data.
- ❑ The role of third parties like Internet service providers, and the management of location-based licensing.
- ❑ Fee structures in an online environment that transcends location.
- ❑ Level of firewall.

Handbook of Technology in Psychology, Psychiatry and Neurology

Theory, Research, and Practice

Luciano L'Abate
David A. Kaiser
Editors

PSYCHOLOGY RESEARCH PROGRESS

WVA

BOOKS PUBLISHED ON TECHNOLOGY IN PSYCHIATRY AND NEUROLOGY

The Use of Technology in Mental Health

[applications, ethics and practice]

Kate Anthony
DeeAnna Merz Nagel
Stephen Goss





McLean HOSPITAL
HARVARD MEDICAL SCHOOL AFFILIATE



Thank You