

## 2.3 Types of publications

The following table lists the main types of publications:

| Type of Publication             | Description   |
|---------------------------------|---|
| <i>Whatever you say</i>         | A spoken word or statement.                                 |
| <i>May fade away</i>            | A spoken word or statement that may be forgotten over time. |
| <i>Whatever you write</i>       | A written word or statement.                                |
| <i>Might come back and bite</i> | A written word or statement that can be recalled later.     |

While the spoken word, if unrecorded, may not be recalled clearly or exactly, the written word can last forever – whatever is written can and will be used to evaluate the competence of the author. In the technical areas, the works of Newton [1] and Maxwell [2] can be found and read by today's scholars. In an electronic age, where written work is recorded digitally and accessed publicly, papers can circulate the world within a second of publication and the contents will remain available and accessible forever. The written word will define a researcher's technical competence. It is therefore very important that researchers write well, in addition to understanding the importance of the written works from others. While some journals only publish electronically, the paper or electronic version is fixed at the time of publication and cannot be altered. The electronic file format used is the \*.pdf (portable document format) which is difficult to edit. Errors in published papers are corrected using a correction note in the same journal that published the original work.

All science and engineering is based on the current understanding of the laws of nature (i.e. the physical, chemical, biological and mathematical laws). Researchers must read, understand and engage with the previously published work of other researchers

### Example 2.2 Dismissal resulting from unethical practice

A number of university presidents and high ranking politicians have been forced to resign or have been dismissed from their positions because it was proved that some of their early student work was directly copied from others without proper acknowledgement (see the work of Gutenplag Wiki (Theodor zu Guttenberg, Silvana Koch-Mehrin, Veronica Sas), and others (Moon Dae-sung, Pál Schmitt, Madonna Constantine, Ward Churchill to name a few).

Preserving your academic reputation is very important for your career. If you use the work of others without referencing the source, and the works you plagiarised were wrong, the profession will judge you as either a criminal (stealing ideas from others without acknowledgement) or incompetent (incapable of arriving at correct results from investigations).

in the same discipline of engineering. Note that some of the early published works, say in the 1930s, contain some of the concepts that have since been shown to be incorrect in the light of more recent developments.

### Example 2.3 A changing paradigm

Greek philosophers thought light consisted of a stream of tiny particles (corpuscular theory). Newton supported the idea but Huygens advocated a wave theory for light. Young and Fresnel explained interference effects using this wave theory. Light was regarded as a transverse wave through 'ether' based on the view that there was no such thing as completely empty space (we call it a vacuum) through which light could pass. The ether was required to carry the wave. Quantum theory has now replaced all of these theories. [3].

**TABLE 2.1** Broad categorisation of publications and their characteristics. A tick indicates that the descriptor is valid. A cross indicates that the descriptor is not valid. The symbol ✓/✗ indicates that the descriptor is sometimes valid.

|                                  | Journal articles | Conference papers | Books | Standards | Patents | Theses | Trade magazines | Newspaper articles | Infomercials | Advertisements | Wikipedia | Web sites |
|----------------------------------|------------------|-------------------|-------|-----------|---------|--------|-----------------|--------------------|--------------|----------------|-----------|-----------|
| Archival scientific literature   | ✓                | ✓                 | ✓     | ✓         | ✓       | ✓      | ✗               | ✗                  | ✗            | ✗              | ✗         | ✗         |
| Evidence of peer review          | ✓                | ✓                 | ✗     | ✓         | ✓       | ✗      | ✗               | ✗                  | ✗            | ✗              | ✓         | ✗         |
| Author's names                   | ✓                | ✓                 | ✓     | ✓         | ✓       | ✓      | ✓/✗             | ✓/✗                | ✗            | ✗              | ✓         | ✓/✗       |
| Author's affiliation             | ✓                | ✓                 | ✓     | ✓/✗       | ✓       | ✓      | ✗               | ✓/✗                | ✗            | ✗              | ✗         | ✗         |
| Author's contact details         | ✓                | ✓                 | ✓     | ✓/✗       | ✓       | ✗      | ✗               | ✗                  | ✗            | ✗              | ✗         | ✗         |
| Title word count >10             | ✓                | ✓                 | ✗     | ✓/✗       | ✓       | ✓      | ✗               | ✗                  | ✗            | ✗              | ✗         | ✗         |
| Abstract                         | ✓                | ✓                 | ✓/✗   | ✓/✗       | ✓       | ✓      | ✗               | ✗                  | ✗            | ✗              | ✗         | ✗         |
| Keywords                         | ✓                | ✓                 | ✗     | ✓/✗       | ✓       | ✓/✗    | ✗               | ✗                  | ✗            | ✗              | ✓         | ✗         |
| Reflective assessment of results | ✓                | ✓/✗               | ✗     | ✓         | ✓       | ✓/✗    | ✗               | ✗                  | ✗            | ✗              | ✓         | ✗         |
| References                       | ✓                | ✓/✗               | ✗     | ✓/✗       | ✗       | ✓      | ✓               | ✗                  | ✗            | ✗              | ✓         | ✓/✗       |
| Publication date                 | ✓                | ✓                 | ✓     | ✓         | ✓       | ✓      | ✓               | ✓                  | ✗            | ✗              | ✓         | ✓/✗       |

The challenge for researchers is to distinguish what is credible scientific evidence from what is opinion, speculation, and sometimes factual error. This can be done, in part, by checking where the information was published. The strength in the scientific method is peer review. If papers have not been peer reviewed in a rigorous manner, then the findings are suspect.

Novice researchers should distinguish between the various types of publications listed in Table 2.1 and use only those published works that are clearly steeped in the scientific method. The most rigorous publication type is the journal paper. Figure 2.1 exhibits many of the most important characteristics that can be used in defining the validity of the information contained in a publication. While the system of peer review is not foolproof and errors can be found and even propagated in later publications, this is the best and most widely accepted method available and is used to maintain the integrity of science and engineering principles. Researchers must understand this so that they know how and where to publish their work.

Researchers, however, may find many new ideas in most of the publication types listed in Table 2.1. The authors and publication must be cited in any reports if the material has been used as part of the research project. Each publication category given in Table 2.1 is discussed in more detail in the following sub-sections. These sub-sections describe some of the commonly accepted practices but individual publication mechanisms have variations on these processes. The information given in these sections serves as a guide only, and prospective authors must review all information provided by the targeted publication.

### 2.3.1 Journal articles

Refereed journal articles are the most important and most valued contributions to the archival literature. While the time between the date of submission and the date of publication can be quite long – two years is not uncommon – most journal editors express

the wish that the time between submission and publication be as short as possible. A period of six weeks for the return of the first review to the authors is a common target. The delay between submission and publication is caused mainly by the reviewing process. Reviewers perform their reviews on a voluntary basis. For this reason the selection of reviewers can take time as each potential reviewer must be approached (the title and abstract are sent) and then agree to undertake the review process within a set time frame (commonly four weeks). Once the final version of the paper has been approved, then an editorial committee will prepare the paper for publication. This causes additional delays.

Journal articles are subjected to anonymous peer review. This means that two or more experts in the field are required to review the work, suggest corrections and approve the work as scientifically rigorous. While this review process is not always perfect - it depends on the dedication, ethics and competence of the reviewers - it is the best available source of expertise world-wide. Paper reviewers are selected by the journal's technical editorial staff. These reviewers are expected to have the required experience and competence in the field of research.

Once the review has been completed the associate editor will make a decision on the suitability of the manuscript for publication. Commonly the reviewers must decide on one of the following recommendations:

- (a) Accept without change;
- (b) Resubmit with minor corrections (e.g. correct typographical errors, improve the quality of the graphs, add additional information, add additional references, etc);
- (c) Resubmit with major changes (additional research work required);
- (d) Reject (insufficient new material, scientific errors, flawed methodology, etc);
- (e) Reject (material is not relevant to this journal).

All comments are sent to the authors together with the decision. In the case of categories (b) and (c), the authors must address every

point raised by the reviewers, revise the manuscript (showing the changes) and resubmit to the journal for further consideration. The review process will then be repeated, usually with the same reviewers.

In addition to commenting on the research methods, results and conclusions, the reviewers are asked to review the reference list and to provide the authors with a list of typographical errors. Reviewers will also comment on the quality of the graphs and other figures and the relevance of the paper to the journal for which it has been submitted. In the light of these comments the authors revise and resubmit the paper. Further comments will then be made by the reviewers. The paper will only be accepted for publication if all the reviewers are happy with the final draft of the paper. The paper is then passed to the editorial staff of the journal for a further review and additional questions might be asked of the authors. These are questions of clarity and language use rather than technical issues.

Research journals in science and engineering, like most magazines, are published regularly in a yearly cycle. The volume number is usually the same for articles published during the same calendar year. Each issue published in the year contains a number of articles. The issue number is simply a count from the first issue release in the year (issue number 1). The page numbers run sequentially through the year. Thus the first article in issue number 1 starts on page 1. The first article in issue number 2 will continue from the last page number of first issue.

Journal publications commonly report the latest scientific and engineering developments, although some review articles are published in order to consolidate the current knowledge in the field. Review articles might not contain new knowledge created by the authors, but will contain a very large reference list which covers the latest developments. Some journals specialize in this type of article (e.g. *Proceedings of the IEEE*). In both cases the papers are reviewed independently before publication is approved. All scholarly journals use an ISSN number (International Standard Serial number) and this can be found in the

front pages of each issue. While most journal names are unique (world-wide), it is important for authors to use the correct journal title as many journals have similar names.

Figure 2.1 shows a typical first page of a journal article. The major features revealed on the front page include:

- The title of the journal;
- The title of the paper (usually containing more than ten words);
- A list of the authors, their affiliations and contact details;
- An abstract which outlines the work and major conclusions;
- A list of keywords relating to the paper;
- The submission date, revision date and the publication details (e.g. the journal volume number, issue number, page numbers and date of publication).

The title is sufficiently long to ensure that the contents of the article are uniquely identified. The author's names, affiliations, contact details are provided to allow other researchers to make contact with the research team to ask further questions about the work. The use of a prescriptive title (commonly more than ten words) ensures that the reader can establish the relevance of this work to their own research endeavours. Commonly an abstract is available publicly on the internet at no cost to the reader. There may be a cost to access the full paper unless the reader subscribes to this particular journal. The inclusion of keywords in the paper allows targeted, high speed computer searching. The references cited in the paper demonstrate that the work was based on the work of others in developing the field and allows the reader to undertake further background searches into the field. The publication date establishes the priority of the research work reported and is used by the research community to follow the path of the research development.

Often two or more dates are published with the article. The first date is the earliest date and establishes when the researchers completed their work and the submitted paper was received by the journal. The review of the article is then undertaken and the paper

## Base-Station Tracking in Mobile Communications Using a Switched Parasitic Antenna Array

Stephanie L. Preston, Student Member, IEEE, David V. Thiel, Senior Member, IEEE,  
 Trevor A. Smith, Student Member, IEEE, Steven G. O'Keefe, Member, IEEE,  
 and Jun Wei Lu, Member, IEEE

**Abstract**—Base-station tracking in mobile communications benefits from a directional antenna and so requires direction finding technology. A novel technique for electronically directing the radiation pattern of an antenna is presented. A directional array with only one active element and three parasitic elements operating near resonance. Three different methods of direction finding are assessed: a coarse angular location method, a precise angular location method assuming one incident beam, and a precise angular location method with multiple incident beams. An array with  $n$  elements, if used in conjunction with a relatively simple controller, can be used to resolve  $n - 1$  signals. This technology can be implemented using both wire and patch antenna-array elements and either linear or circular polarization can be used, lending the technology to applications in both terrestrial and satellite communications systems.

**Index Terms**—Antenna arrays, mobile communication.

### I. INTRODUCTION

In digital communications systems, it is possible to have a periodic break in the transmission of information without degrading the signal transmitted. This break in transmission can be used to optimize the communications channel. One factor that can greatly improve the channel is the use of a directional antenna system. In this paper, we propose that in between data segments, the mobile transceiver maintains the optimal channel by reorienting the antenna system. This is only possible if the time required to perform the operation is sufficiently small and the directivity of the antenna is adequate. We suggest that an electronically steerable switched parasitic antenna array supported by a small digital controller can achieve these objectives, even in severe multipath environments. The solutions we suggest are evaluated in the context of time-domain multiple access (TDMA) in group special mobile (GSM) mobile telephone communications for use in base-station tracking but are far more generally applicable.

When using directional antennas, intelligent high-speed direction-finding techniques are required and, in the case of a mobile transceiver, the system must have low-power requirements. With conventional directional antenna systems

for initial signal acquisition and subsequent direction updates, a full  $360^\circ$  scan may be required. We propose a technique that will enable the updates to be minimized and allow the direction to be determined without a full  $360^\circ$  scan periodically. Current direction-finding techniques include conical scan, sequential lobing monopulse, and track-while-scan [1], [2]. These techniques require the use of either mechanically rotating antennas, crossed loops or phased arrays.

In direction finding, multiple incoming signals can result in an incorrect angular position being determined. A common method used to resolve multipath and/or multiple signals is the use of high-gain narrow-beam mechanically rotating antennas [1], [2]. This method can resolve two or more signals provided they are separated by an angle greater than the beamwidth of the antenna. Thus, the number of signals that can be detected depends on the beamwidth of the antenna. Other techniques for minimizing the impact of multipath interference involve the implementation of frequency hopping, polarization agility, and space diversity. A previous paper discusses the use of four directional arrays to reduce the fading caused by multipath signals [3]. This technique uses four separate arrays, each with a directional pattern, and requires switching between these arrays.

The methods used to reduce the effects of multipath mentioned above have been successful, however, these systems are generally quite complex. Where possible, it is desirable to avoid mechanically rotating parts so that power consumption is kept to a minimum. The alternate methods have involved the use of phased arrays, allowing  $360^\circ$  rotation with no moving parts. This would seem an ideal solution, however, in order to track multipath signals, a full  $360^\circ$  sweep is required regularly so that the desired signal is distinguished from other spurious signals. This process is time consuming with both the phased array and the mechanically steerable arrays and with phased arrays it is also computationally intensive. Certain applications cannot afford the time spent in these cases, for example, with the TDMA modulation scheme used in GSM for mobile telephones, the minimum interval between frames is 4.038 ms.

### II. ELECTRONICALLY STEERABLE ANTENNA ARRAY

The basic concept of an electrically steerable switched-parasitic antenna array has been presented previously [4], [5]. Near-resonance parasitic elements are used to create a directional electronically steerable antenna array. This technique can be applied to both wire antenna structures (e.g.,

Manuscript received March 5, 1997; revised December 29, 1997. S. L. Preston was supported by a scholarship from the CSIRO Division of Telecommunications and Industrial Physics, Sydney Australia. This work was supported in part by research grants from the Australian Telecommunications and Electronics Research Board and the Australian Research Council.

The authors are with the Radio Science Laboratory, School of Microelectronic Engineering, Griffith University, Nathan Qld 4111 Australia.  
 Publisher Item Identifier S 0018-926X/98/040841-5.

0018-926X/98\$10.00 © 1998 IEEE

**FIGURE 2.1** An example of the first page of a refereed journal article. Note the following characteristics: the length of the title, the name and page details of the paper, the dates when the manuscript was received and revised, the index terms, the names and affiliations of the authors and the abstract. References are included in square brackets.

might be resubmitted in light of the corrections made in response to the initial review. The last date is the date of publication; recently this date might be the date when the article was published on the web and/or the date when the article appeared in print.

When submitting a paper for review, the authors are required to state that their article (in full or in part) has not been previously published and has not been submitted for publication elsewhere including another journal or conference.

In addition to publishing 'full papers', many journals will publish shorter works such as comments on papers, corrections to papers, short notes, technical notes and letters. These publications are all listed in the archival scientific and engineering literature. Readers of the full papers might sometimes find that their search reveals these additional short papers. In particular, factual and mathematical errors can be misleading and so searching the authors' names or the paper title can be very useful in finding more recent information pertaining to the field and any corrections to the original paper. These additional comments, after peer review, will be published, and will cite the original paper.

Some professional engineering associations also publish a magazine. These magazines can contain full journal-type articles and usually they are referenced in the same manner as journal papers. The articles are reviewed in a manner similar to journal papers, however, many items in the magazines will not be rigorously reviewed. Care must be taken when reading and citing magazine articles.

2.3.3

### 2.3.2 Short journal articles

Most journals allow the publication of short articles. These can be in the form of 'letters', 'short communications', 'comments', 'errata' and 'notes'. The reviewing procedure for most short articles is a quicker process. For some publications, only the editor or associate editor will review the submission.

Comments on a published full paper are submissions from other researchers who have read the article and have suggested errors, misinformation and/or a failure of the article to review the literature fully. The comment will be sent to the original authors for a reply. Usually both the comment and the reply will be published in the same issue of the journal.

Short communications are usually confined to the publication of new but minor discoveries, however, some short communications are used as a mechanism to gain speedy publication of new ideas. Both comments and short communications might have been assessed by an editor or associate editor of the journal only and a full review of the literature will not be included.

Some journals only publish letters. These journals require authors to submit short articles in which the number of words and figures is limited. The review process is still rigorous, but reviewers are asked only to provide the journal editor with a yes/no decision to publish. The authors receive no feedback on the article. If accepted it will be published as it was submitted. Because of the page limits, letters have limited explanations, descriptions and a smaller number of references. Letters are usually published much more rapidly than full papers.

### 2.3.3 Conference papers

Scientific and engineering conferences are meetings of engineering researchers with the aim of updating and reporting research developments not yet published. At these meetings researchers present research papers and discuss their latest findings, either through a formal presentation in a lecture room, or a poster presentation. Authors are usually required to submit a written paper to the conference technical committee. The paper is reviewed for relevance and correctness and the authors of the accepted papers are invited to make a presentation at the meeting. The papers are released to attendees at the conference as 'conference proceedings'. This is the printed record of the conference. After the conference is over, the papers may be made available to the wider scientific community via the web and accessible through the scientific web-based search engines. These papers usually contribute to the archival literature.

Conferences can be a preferred method for researchers to announce recent results as commonly the time scale between conference paper submission and publication is much shorter when

compared to the journal review and publication process. Commonly conference papers are submitted six months before the conference and published on the first day of the conference. The rapid timescale of conferences means that the review process of papers is short or non-existent. If the conference includes a peer review process, the technical committee of the conference will assign the papers to one or two people on a panel of experts and the papers are usually reviewed on a pass/fail basis with only editorial changes allowed. Thus conference publications are usually not rigorously assessed and so should be regarded by novice researchers as important but subject to some uncertainty when compared to journal papers.

Figure 2.2 shows a typical first page of full paper presented at a conference. The major features revealed on the front page include:

- The title of the paper (usually containing more than ten words);
- A list of the authors, their institutions and contact details;
- An abstract which outlines the work and major conclusions;
- A list of keywords relating to the paper.

Most conferences will publish their papers as 'proceedings' of the conference and will use an ISBN number (International Standard Book number) rather than an ISSN number. The volume number will be confined to the number of volumes published for the particular conference. In some cases, conference presenters are invited to expand their paper and submit it as a journal publication in a 'special issue' of the journal. In this case the normal reviewing process for journal papers is followed, but with strict time lines for submission and publication.

### 2.3.4 Books

There are three types of books commonly used by academics in their research:

## Flexible, Light-Weight Antenna at 2.4GHz for Athlete Clothing

Amir Galehdar and David V. Thiel\*

Centre for Wireless Monitoring & Applications  
Griffith School of Engineering, Griffith University – Nathan  
Queensland, 4111, Australia  
E-mail: d.thiel@griffith.edu.au

### Abstract

Linearly polarized rectangular patch antennas printed on light-weight cotton clothing are subject to both convex and concave bending. Changes in resonant frequency resulting from H plane bending are explained in terms of changes in effective length. Agreement between theory, practical and simulation results was observed. The resonant frequency changed by up to 8% for extreme bending although the bandwidth remains essentially unchanged at 4.5%. A 16.8% bandwidth was achieved using a double U-Slotted patch which minimized the problem.

**Key words:** wearable antennas, patch antenna, dual slots, curved patch.

### I. Introduction

Athlete monitoring during sporting events and training is of significant interest to coaches and television broadcasters. Coaches seek biomechanical and physiological information to make tactical changes during the event. Television broadcasters seek to inform viewers as the status of the athlete. Wearable antennas for these applications must include sufficient antenna gain to minimize battery size and sufficient range to cover the field of play (usually not less than 100 m line-of-sight).

In this paper the effects of concave and convex bending in E and H plane on wearable antennas are reported. An increase in the bend angle for a concave H plane increased the resonant frequency. This is thought to result from a decrease in effective length. Convex H plane bending has the opposite effect. These results were verified by simulation, experiment results and an approximate theory. Concave E plane bending was measured and explained by previous researchers [1, 2]. An increase in bend angle decreased the resonant frequency.

This paper outlines the design of a 2.45GHz flexible patch antenna mounted on fabric having thickness 1.6 mm and relative permittivity  $\epsilon_r = 1.63$  (determined experimentally). The fabric adhesive used to fix the copper patch and ground plane increased the effective relative permittivity to 2.6. The basic design was built using flexible copper mesh as both the ground plane and the patch with fabric as the dielectric. Adhesive backed copper-coated non-woven nylon fabric is available from commercial suppliers for EMI suppression applications.

**FIGURE 2.2** An example of a conference paper. Note that the paper title is shorter, the author's names and affiliations are given, the paper has an abstract and the page numbers are given. Commonly the name of the conference does not appear with each article. References are included in square brackets.

- Textbooks;
- Research books (monographs); and
- Reference books.

Textbooks are used in undergraduate and postgraduate courses and in training people to enter the engineering profession. These books usually have a very large circulation and often have repeated editions as the material is upgraded and errors are corrected. Commonly the titles of textbooks contain 2–4 words and are designed to be used for one or two courses/subjects in tertiary educational institutions such as universities. Often several textbooks will have the same name and so the author, publisher and date of publication must be included in references to the book. High quality textbooks are commonly re-released with corrections and additions as appropriate and so the edition number of the book is an important inclusion when citing the book in a research publication.

Textbooks usual cover standard experimental, theoretical and computational techniques used in the field. Most textbooks have detailed references and bibliographies. When writing a research paper, the author need not rewrite the well-accepted theory, but rather an appropriate textbook can be used as a reference and a source of equations, definitions and standard experimental methods.

Research books are written by experts in the research field. The target audience is the small, more specialised academic community and the books contain higher level information on a specific topic.

A third type of book is the reference book. These books commonly contain an alphabetically ordered index of terms. These books might include 'dictionary', 'encyclopaedia' 'reference' in the title.

Paper and electronic copies of books are subjected to professional examination between the time of writing and before publication. Commonly the material in a textbook is well established

in the field and presents only that knowledge and understanding which reflects the current position.

The front matter in every book includes the book title, author and affiliation, publisher and place of publication, an ISBN number, the date of publication and the edition number. Most of this information must be used when referencing the book in a scientific paper.

### 2.3.5 Standards

The engineering profession usually provides practising engineers with standards. A standard is a document that defines a particular experimental technique or a requirement specification. Standards can also be used to define engineering terms so that the profession uses terms in a well-accepted and defined way. Novice researchers should be familiar with these terms and their precise definitions, and use them correctly when writing research papers.

Engineering standards are reviewed as technology develops, and new standards are written and approved by experienced members of the profession in the relevant discipline. Following a review, some changes will be made and it may be that some previously accepted terms are no longer acceptable. Such terms are referred to as being 'deprecated'. Such changes are made to resolve confusions and to add new terms as the technology develops.

Most standards are published using an ISBN number (i.e. a book reference number). While the names of the committee members who developed the standard are listed inside the standard, the reference will be to the professional society rather than any one individual or group of individuals.

The International Organization for Standards (ISO) and the International Electrotechnical Commission (IEC) maintain standards internationally; however, most countries have national standards authorities which are charged with the maintenance and implementation of national standards.

### Example 2.4 Examples of standards

In the IEEE-SA Standards Definition Database [4] are definitions of electrical, electronic and software engineering terms.

In mechanical engineering, the mechanical properties of materials are measured using standard test procedures [5].

In geotechnical engineering there are standard methods for testing the shear strength of soils [6].

It is wise for a research team to use measurement techniques and numerical computational techniques which are defined by the most recent standard. Lesser known measurement techniques might lead to incorrect results which may compromise the research outputs.

Commonly the standards terms and techniques are reproduced in part in textbooks and so seeking the original standards documents (often at quite high cost) may not be necessary.

### 2.3.6 Patents

A patent is a document written to protect an idea for commercial advantage and exploitation.

Patents are written and granted on the basis of their originality (referred to as an 'inventive step'). The object of a patent is to protect an invention or innovation against commercial theft whereby one company makes a profit from an invention by another person or company. While each country maintains a patent assessment process and an inventory of patents granted, most patents are readily available using a web based search using keywords. Most patents will cite previous patents and other published literature.

Patents are country specific – that is, most nations manage their own patents through a patent examination procedure before the patent is granted. Figure 2.3 shows an example of the front page of a registered patent from the United States of America; however, the patent format is different for different countries. The



US006034638A

**United States Patent**

[19] Thiel et al.

[11] Patent Number: 6,034,638  
[45] Date of Patent: Mar. 7, 2000

[54] ANTENNAS FOR USE IN PORTABLE COMMUNICATIONS DEVICES

3,725,928 4/1973 Block et al. 343/833  
4,123,759 10/1978 Hines et al. 343/854

[75] Inventors: David V. Thiel, Cumbria; Steven G. O'Keefe, Chamber Flat; Jun W. Lu, Wishart, all of Australia

4,170,759 10/1979 Stimpel et al. 343/876

4,356,492 10/1982 Kaloi 343/700 MS

[73] Assignee: Griffith University, Queensland, Australia

4,367,474 1/1983 Schaubert et al. 343/700 MS

4,379,296 4/1983 Farrar et al. 343/700 MS

4,414,550 11/1983 Tressell 343/700 MS

4,631,546 12/1986 Dumas et al. 343/833

4,700,197 10/1987 Milne 343/837

4,800,392 1/1989 Garay et al. 343/700 MS

5,075,691 12/1991 Garay et al. 343/830

5,243,358 9/1993 Sanford et al. 343/700 MS

5,338,896 8/1994 Danforth 343/702

5,373,303 12/1994 Nolan et al. 343/841

5,507,012 4/1996 Luxon et al. 343/841

## FOREIGN PATENT DOCUMENTS

21,4806 8/1986 European Pat. Off. .

588,271 9/1993 European Pat. Off. .

221,6726 3/1989 United Kingdom .

222,3730 11/1989 United Kingdom .

§ 371 Date: Mar. 14, 1996

§ 102(e) Date: Mar. 14, 1996

[87] PCT Pub. No.: WO94/28595

PCT Pub. Date: Dec. 8, 1994

[30] Foreign Application Priority Data

May 27, 1993 [AU] Australia PL 9043

[51] Int. Cl. 7 H01Q 1/24

[52] U.S. Cl. 343/702; 343/815; 343/841;

Primary Examiner—Don Wong

Assistant Examiner—Tan Ho

Attorney, Agent, or Firm—Jenkins &amp; Wilson, P.A.

[58] Field of Search 343/702, 785,

343/700 MS, 790, 815, 818, 841, 851,

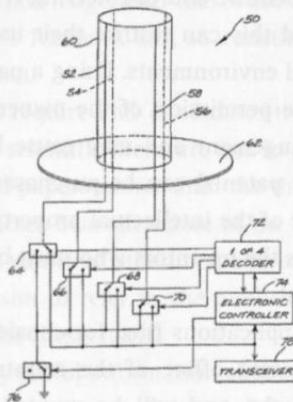
833, 834, 876, 872, 873

[56] References Cited

## [57] ABSTRACT

In one embodiment, an antenna has four equally spaced monopole elements mounted in a symmetric array on the outer surface of a solid cylinder structure. The cylinder has a high dielectric constant, and extends from a conductive ground plane. The monopole elements can be switched by switching elements so that one or more is active, with the others acting as parasitic directors/reflectors being connected commonly to ground or left in an open circuit condition to be effectively transparent.

22 Claims, 9 Drawing Sheets



**FIGURE 2.3** An example of a US patent. Note the inventors are listed together with their affiliations, the date of filing and the previous work (references cited) are listed. There are a number of codes for the sub-discipline of the invention (both national and international). The abstract summarises the invention.

International Patents Treaty between nations ensures that there is some uniformity between the national patent offices.

A patent is characterized by a patent number, the date when the patent was submitted, the authors of the patent and their affiliations, the sponsoring company, a brief summary and a series of six number codes which define the field in which the invention will find application. For example the first page of a USA patent (Figure 2.3) includes the 'Field of search' codes as 343/815 where 343 refers to a general subject area (antenna) and 815 is a more specific (subclass) of the area (with radio cabinet) [7]. The previous patents and papers in the area (called 'prior art') are also listed under 'References cited'. The Abstract briefly outlines the subject material of the patent. The novelty claims of the invention are listed numerically at the end of the patent together with a series of figures.

Figure 2.3 also includes the International Classification Code H01Q 1/24. Using the index [8] one can determine that H refers to electricity, H01 refers to basic electric elements and H01Q defines aerials.

Many scientific and engineering technologies are protected by patents and this can restrict their use in both the research and commercial environments. Using a patent for commercial benefit without the permission of the owners of the patent is regarded as an infringement and may cause legal action. Inventions (as defined by patents) can be purchased and sold and so the current owner of the intellectual property might not be listed on the patent. It is the inventors who must be listed if reference is made to a patent.

Patent applications filed for consideration are assessed by the national patent office of the country in which patent protection is sought, and will be granted only if the technology or methodology is an inventive step. The time delay between the original submission of a patent application and the registration of the patent can be up to 3 years.

The award of a patent does not imply that the technology functions in the manner described or that the method has advantages

over existing technologies, despite any claims made in the patent document. Thus, when conducting a literature review, researchers must understand that while patents contain new ideas and novel applications of these ideas, they are not a reliable source of scientifically verified advances in the field.

### 2.3.7 Theses

Many tertiary education institutions require their undergraduates, master's degree and PhD candidates to submit a thesis as part of their final assessment. If the student is awarded the degree, then the thesis may be available on the internet and will be identified during electronic searching.

The status of these documents varies with institutions. Commonly most bachelor's and master's theses are marked on the basis of a pass/fail system and there is no revision of content in line with examiner's feedback. For this reason, theses can provide useful information but might not be a reliable source of competent, verified new knowledge. PhD theses are usually corrected in line with examiner's feedback and so constitute a more reliable source of information.

Most institutions require PhD candidates to publish their work in the international scientific literature and so preferred references are to the published papers rather than the thesis itself. It should be noted that all theses bear the name of the candidate only and will not include the names of other members of the research team. This is another reason to refer to the published papers from the thesis rather than the thesis itself.

Theses often carry useful information about experimental methods which are not always described in their entirety in journal or conference papers. In electrical engineering it is common to include circuit diagrams, in mechanical and structural engineering it is common to include mechanical drawings and in chemical engineering, comprehensive details of chemical processes. If used in further research, then these details should be referenced to the

relevant thesis. Researchers need to remain cautious about the accuracy of the material in theses.

### 2.3.8 Trade magazine articles

Trade magazines contain large numbers of advertisements as well as some articles written by the editorial staff of the magazine covering the latest developments in a particular sub-discipline or field of research. The writer is likely to be a scientific reporter rather than an expert in the field and will be reporting information previously released by research institutes and companies as press statements and other forms of publicity. These articles are generally review articles covering recent journal papers and/or company releases about new products.

While such articles are generally informative, the articles are brief and lack scientific and engineering detail. These are not a particularly reliable source of new knowledge. They are secondary sources and so researchers should cite the original articles.

Figure 2.4 is an example of a trade magazine article. Readers will note that the title is relatively short, there is no abstract/summary, there are no keywords, and the author's affiliation and contact details are not given. These articles commonly have very few references.

### 2.3.9 Newspaper articles

Most general newspapers provide their readers with commentary on recent scientific and engineering innovations. As with trade magazines, the articles are quite short, lack detail and have a tendency to be sensationalist (to sell more papers). These articles do not contain a reflective summary on the research outcomes and so are of limited use as a research resource.

Figure 2.5 is an example of an article published in a national newspaper. Note that the title is short, the author is a journalist and not a researcher, and there are no references.

## MEDICAL

## New electrode designs improve cochlear implants

AUSTRALIAN academic and commercial researchers have developed designs for higher-performance electrodes which could substantially improve sound perception in the next generation of cochlear implants.

The work was carried out by University of Melbourne Research Fellow Dr Carrie Newbold, the HEARING Cooperative Research Centre (HEARing CRC) and Cochlear Limited.

The research, which has been ongoing since 2001, looks at less intrusive, slim electrode designs, the use of new biomaterials and manufacturing techniques to produce electrodes with higher capacity for information transmission.

The new designs are based on Dr Newbold's research into the



**The next generation of cochlear implants could benefit from slimmer electrode designs.**

**Image credit:** Cochlear.

electrodes. Because they are so small, their connecting wires are even thinner. This necessitates hand assembly, limiting production.

The delicate membranes and internal structures in the cochlea present an additional challenge during the implant process.

The new designs address these challenges by changing the physical characteristics of the electrode array and making it easier to surgically insert the device with minimum risk of damage.

The researchers are also looking at the potential application of new conductive polymers for improving hearing stimulation in the cochlear. These replacement plastics are more efficient with electricity, and are also less brittle. ■

[www.hearingcrc.org](http://www.hearingcrc.org)

**FIGURE 2.4** An example of a complete article in a trade magazine. The title is relatively short and the name of the author is not included; only the name and brief contact details of the sponsoring organization are given. There are no references in the article (reproduced with permission, *Electronics News*, p. 4, 14 June 2013).

## THE POWER WITHIN

A bioenergy harvest from the heart or inner ear could help power devices such as pacemakers in future

**SCIENTISTS** are studying how to tap the energy naturally created by people's bodies — such as heat, sound and movement — to power medical devices without the need to change batteries.

The development, still years away, will have benefits. Doctors

from becoming a reality, could prove one of the solutions of interest and need to be explored. One way to do this is by using new technology to regulate the body's temperature. Other products, including bio-management devices, could be made to function without changing batteries, or at least sharply and save power. Time, money and research could have a real impact on how this technology can be used. This is an important month, as the technology has the potential to make a significant difference to the body's temperature. The author, Dr. Michael J. S. Johnson, is a Research Fellow at the Institute of Technology and Industrial Medicine, University College Dublin. He has been involved in the development of a number of projects related to the use of sensors and actuators in medical applications. His current research interests include the development of novel sensors and actuators for use in medical applications, particularly in the field of bio-medical engineering. He is also interested in the application of sensors and actuators in other fields, such as robotics and automation.

from benefits to power generated by the laser arc. In order to reduce the need for power, they make M. Arie Karmi, an aerospace engineer, a research scientist at the Aerospace Research Center of the Israel Aircraft Industries. He has developed a system that can save energy in aircrafts. The system uses a laser beam to heat the air around the aircraft, which then expands and creates a cushion of air underneath the aircraft. This cushion of air reduces the drag on the aircraft, resulting in fuel savings. The system has been tested on a Boeing 747 and has shown significant fuel savings.

group measured the vibrations emitted in the chime of pigs while being challenged, inspiring, and activating them. The results showed that the pigs' heartbeats increased when they were exposed to the challenges, and the heartbeats decreased when they were exposed to the activation. These findings were published in the journal *Frontiers in Veterinary Medicine*.<sup>1</sup> "One neat thing is that we found a significant and pronounced association between heart rate variability and the pigs' heartbeats," says Dr. Bannister. "At Virginia Polytechnic Institute and State University, students can learn how to employ heart rate variability as a tool to help them to better understand the differences in temperament between animals."



Researchers compare the futuristic devices to solar-powered calculators.

卷之三

**FIGURE 2.5** An example of a newspaper article related to an engineering discovery. The name of the author is given and the names of various researchers and their institutions are mentioned in the article. The article is an overview of a number of new developments, and has been taken from another publication (*The Wall Street Journal*). This is clearly a secondary source of information. Readers of this article can find more information about the developments by searching the archival literature using the names and keywords (reproduced with permission, *The Australian*, p. 16, 3 December 2012).

### 2.3.10 Infomercials

This word describes video clips and written articles which are produced by a company with the aim of selling their expertise and products. The articles contain some factual information and specifications but little of the research approach used to develop the product (this would be of great benefit to competing companies). As the articles are not subjected to rigorous review by independent experts, the claims are unsubstantiated. These should not be used as reference material for researchers.

Infomercials can be found in newspapers, trade journals, web sites and might resemble a newspaper article or scientific article, but these are usually clearly labelled as not part of the normal technical content.

### 2.3.11 Advertisements

Advertisements on social media, television, magazines and newspapers contain little factual information and the claims are not supported by reliable evidence. They have not been subjected to independent review. For this reason researchers should not use advertisements as reference material.

### 2.3.12 Wikipedia

This is a web based resource ([www.wikipedia.org](http://www.wikipedia.org)) commonly found by web search engines. Wikipedia articles contain definitions of terms, history and scientific and engineering facts. The articles are written by the general public which includes experts. The articles are well referenced in the scientific and engineering literature and so the articles constitute a secondary source of information rather than a primary source. The articles can be changed at any time by any individual from around the world, and can be changed back in the same manner. There are adjudicators who monitor the activity on the Wikipedia pages and will restrict changes if they appear frivolous or biased.

Engineering and scientific papers should not include references to Wikipedia directly because it is subject to change. However, the original sources cited at the end of the article can be a valuable resource. While a researcher might cite a Wikipedia article to demonstrate changes or misunderstandings of some people, no other citation appears justifiable in the scientific press.

### 2.3.13 Web sites

Web search engines which are specifically set up to search the refereed scientific literature will yield web sites with scientific and engineering information. Novice researchers should take care not to use the material from web sites unless the following guidelines are applied:

- The authors and their affiliations are clearly found and can be considered reputable;
- The date of 'publication' on the web can be found.

Some universities and individual professors publish their lecture notes and laboratory notes on their web sites. These can prove to be a valuable resource for those not familiar with the field. In most cases, however, there is little new knowledge published on the web as researchers seek to gain credit for their work through refereed journal and book publications.