

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SHENZHEN QIANFENYI INTELLIGENT TECHNOLOGY CO., LTD.,
Petitioner

v.

WACOM CO., LTD.,
Patent Owner

DECLARATION OF DR. RICARDO VALERDI
IN SUPPORT OF PETITION FOR INTER PARTES REVIEW OF
U.S. PATENT NO. 10,108,277

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I. Introduction

I, Ricardo Valerdi, Ph.D., declare as follows:

1. I have been retained on behalf of Shenzhen Qianfenyi Intelligent Technology Co., Ltd. (“Petitioner”) for the above-captioned *Inter Partes* Review proceeding to provide my expert opinions and expert knowledge. I understand that this proceeding involves U.S. Patent No. 10,108,277 (“the ’277 patent”), titled “Coordinate input device, and pen-shaped position indicator,” and that the ’277 patent is currently assigned to Wacom Co., Ltd. (“Wacom”). I understand that the present proceedings involve a challenge to the validity of claims 1-5, 7-12, 14-18, and 20-24 of the ’277 patent (the “Challenged Claims”).

2. In preparing this declaration, I have reviewed and am familiar with all the references cited herein. I have reviewed and am familiar with the ’277 patent and its file history. I confirm that to the best of my knowledge the accompanying exhibits are true and accurate copies of what they purport to be, and that an expert in the field would reasonably rely on them to formulate opinions such as those set forth in this declaration.

3. The ’277 patent describes a pen-shaped position indicator for a coordinate input device that uses capacitive sensing to detect tilt angles based on the positional differences between multiple electrodes of the pen.

4. I am familiar with the technology described in the ’277 patent and the state of the art as of the ’277 patent’s earliest claimed priority date of February 5,

2010 (Japanese Application No. 2010-024858), and its U.S. filing date of February 18, 2016 (U.S. Application No. 15/047,013).

5. I have been asked to provide my independent technical review, analysis, insights, and opinions regarding the '277 patent and the references that form the basis for the grounds set forth in the Petition for *Inter Partes* Review of the '277 patent.

II. Qualifications

6. A copy of my Curriculum Vitae is submitted as Exhibit 1003 in this proceeding. It includes details of my education, employment, and professional credentials. Further experience with styluses, touchscreen devices, capacitive sensing, and related technologies is discussed below.

7. I am currently a Full Professor, with tenure, at the University of Arizona in the Department of Systems & Industrial Engineering. Previously, I was on the faculty at the Massachusetts Institute of Technology in Cambridge, MA and was a Visiting Professor at the United States Military Academy in West Point, NY.

8. I received a Bachelor of Science degree in Electrical Engineering from the University of San Diego, a Master's degree in Systems Architecture and Engineering from the University of Southern California, and a Ph.D. in Industrial and Systems Engineering from the University of Southern California.

9. My industry experience includes a variety of engineering roles at Motorola (in the wireless communications division) and SpaceX (in the space

rocket production department). My experience at Motorola included the development of data systems connected via wireless communication networks. This involved technologies described in the '277 patent including coherent interconnect fabrics and chip-level communication systems.

10. I am a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE), the largest engineering professional society in the world. I have received numerous awards for my research, including the Frank Freiman Award for Lifetime Achievement in Cost Estimation and Parametric Modeling (the highest award given by the International Cost Estimating & Analysis Association), the Distinguished Visiting Fellowship at the Royal Academy of Engineering (United Kingdom), and the Distinguished Outreach Professor Award at the University of Arizona. I have also been elected as a Foreign Member of the Mexican Academy of Engineering. I have received best paper awards in the Defense Acquisition Research Journal, Conference on Predictive Models in Software Engineering, and Symposium of the International Council on Systems Engineering.

11. I have over 100 publications in journals, magazines, and conferences relating to a broad range of technologies including the design of military weapon systems, maintenance models for nuclear weapons arsenal, and testing of autonomous systems. My work includes evaluating component-level performance

and integration challenges—skills directly applicable to understanding interconnect architectures and system-on-chip (SoC) designs central to the '277 patent.

12. A few of my research projects of at most relevance to the technology at issue here include the following: (1) the development of a taxonomy and ontology for expeditionary cyber systems applied to cognitive radio, which was funded by the Office of Naval Research in collaboration with Army Research Laboratory, which involved complex embedded system architectures and sensor data processing; and (2) Dynamic Data Driven Applications Systems, funded by the U.S. Air Force Office of Scientific Research in collaboration with Oak Ridge National Laboratory. My background in electrical engineering and systems architecture qualifies me as an expert in embedded systems, hardware-software integration, signal processing, and performance modeling—areas that intersect with the technologies described in the patent '277, particularly capacitive sensing and electrode design.

13. I have testified in a number of cases, both at trial and by deposition. My time is billed at a rate of \$700 per hour in this proceeding. The compensation received from this case is not contingent upon my opinions or performance, the outcome, or any issues involved in or related to the proceeding.

III. My Understanding of Legal Principles

14. I understand that the Petitioner must demonstrate by a preponderance of the evidence that the Challenged Claims are unpatentable. I understand that the

preponderance of the evidence standard is one characterized as being more likely than not. As each claim is considered a separate invention, I understand that the Petitioner's burden is applicable individually to each claim.

15. I further understand that determining whether a patent claim is unpatentable requires two steps: first, construction of the meaning and scope of the claim (or individual terms of the claim), and second, comparing the properly construed claim to the prior art. A party may assert unpatentability on the basis of anticipation or obviousness.

16. I understand that my analysis requires an understanding of the scope of the '277 patent claims and that the disclosures of the '277 patent and the prior art are judged from the perspective of a person of ordinary skill in the art ("POSITA") at the time of the purported invention. For the purposes of this declaration, I have been instructed to consider the earliest claimed priority date for the '277 patent to be February 5, 2010, and my analysis is based on the perspective of a POSITA as of that date.

17. I understand that during an *inter partes* review, claims of an unexpired patent are to be construed according to their ordinary and customary meaning as would be understood by a person of ordinary skill in the relevant art within the context of the patent record. Unless otherwise noted, I have given the claim terms their plain and ordinary meaning as understood by a person of ordinary skill in the art at the time of purported invention.

18. I understand that a claim is unpatentable if it is anticipated or obvious. I understand that anticipation of a claim requires that every element of a claim is expressly or inherently disclosed in a single prior art reference. I understand that an anticipating reference need not use the exact terms of the claims, but must describe the patented subject matter with sufficient clarity and detail to establish that the claimed subject matter existed in the prior art and that such existence would be recognized by persons of ordinary skill in the field of the purported invention. I also understand that an anticipating reference must enable one of ordinary skill in the art to reduce the purported invention to practice without undue experimentation.

19. I understand that a patent claim is unpatentable if the claimed invention would have been obvious to a person of ordinary skill in the art at the time of the purported invention. This means that, even if all requirements of the claim cannot be found in a single prior art reference that would anticipate the claim, the claim can still be unpatentable.

20. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention would have been obvious to a person of ordinary skill in the art at the time of the purported invention in view of the prior art and in light of the general knowledge in the art as a whole. I also understand that obviousness is ultimately a legal conclusion based on underlying facts of four general types, all of which must be considered: (1) the

scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) any objective indicia of non-obviousness.

21. I also understand that obviousness may be established by combining or modifying the teachings of the prior art. Specific teachings, suggestions, or motivations to combine any first prior art reference with a second prior art reference can be explicit or implicit, but if relied upon must have existed before the date of purported invention. I understand that prior art references themselves may be one source of a specific teaching or suggestion to combine features of the prior art, but that such suggestions or motivations to combine art may come from the knowledge of a person of ordinary skill in the art. Specifically, a rationale to combine the teachings of references may include logic or common sense available to a person of ordinary skill in the art.

22. I understand that a reference may be relied upon for all that it teaches, including uses beyond its primary purpose. I understand that, though a reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, the mere disclosure of alternative designs does not teach away.

23. I further understand that whether there is a reasonable expectation of success from combining references in a particular way is also relevant to the

analysis. I understand there may be a number of rationales that may support a conclusion of obviousness, including:

- Combining prior art elements according to known methods to yield predictable results;
- Substitution of one known element for another to obtain predictable results;
- Use of a known technique to improve similar devices (methods, or products) in the same way;
- Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- “Obvious to try” – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; and
- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art teachings to arrive at the claimed invention.

24. I understand that it is not proper to use hindsight to combine references or elements of references to reconstruct the invention using the claims as a guide. My analysis of the prior art is made from the perspective of a person of ordinary skill in the art at the time of the purported invention and does not rely on hindsight.

25. I understand that so-called objective indicia may be relevant to the determination of whether a claim is obvious, should such evidence be alleged. Such objective indicia can include evidence of commercial success caused by an invention, evidence of a long-felt need that was solved by an invention, evidence that others copied an invention, skepticism, or disbelief by those skilled in the art, failure of others, praise of the invention, evidence that an invention achieved a surprising result, or near-simultaneous invention by multiple parties. I understand that most of such evidence must have a nexus, or causal relationship to the elements of a claim, in order to be relevant to the obviousness or non-obviousness of the claim. I am not currently aware of any such objective considerations of non-obviousness having a nexus to the claims at issue in this proceeding.

26. I understand that for a reference to be used to show that a claim is obvious, the reference must be analogous art to the claimed invention. I understand that a reference is analogous to the claimed invention if the reference is from the same field of endeavor as the claimed invention, even if it addresses a different problem, or if the reference is reasonably pertinent to the problem faced by the

inventor, even if it is not in the same field of endeavor as the claimed invention. I understand that a reference is reasonably pertinent based on the problem faced by the inventor as reflected in the specification, either explicitly or implicitly.

IV. Overview of the '277 Patent

27. The '277 patent is titled “Pointer, Position Detection Apparatus and Position Detection Method.” It relates to systems for detecting the position of a pen-shaped pointer on a coordinate input surface, as well as additional information such as pressure and tilt. The purported invention aims to improve the precision and range of input data captured from a pointer in a capacitive-based system using electrostatic coupling. *See, e.g.*, Ex. 1001, at Abstract; 2:1–27; *see also id.* at Figs. 1, 2, 5, and 19.

FIG. 1

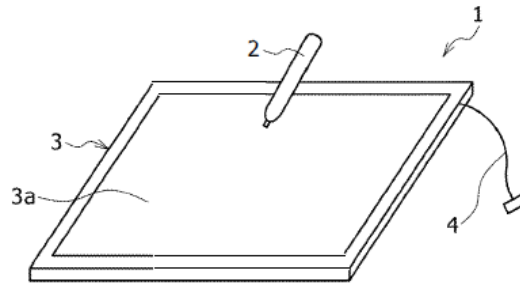


FIG. 2

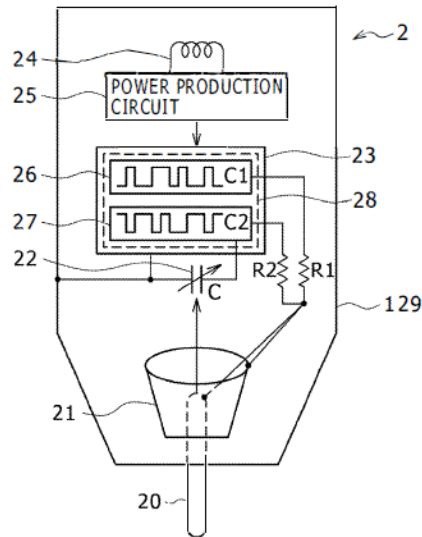


FIG. 5

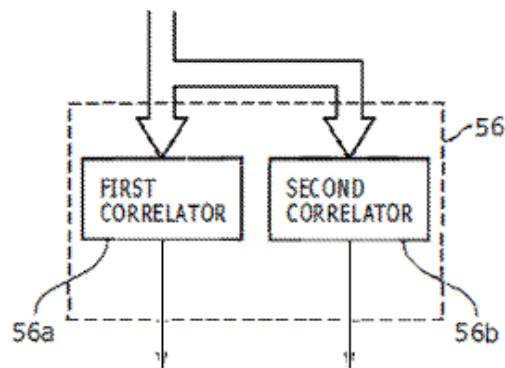
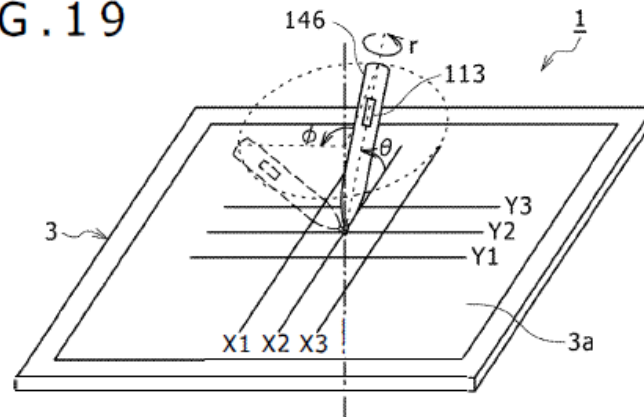
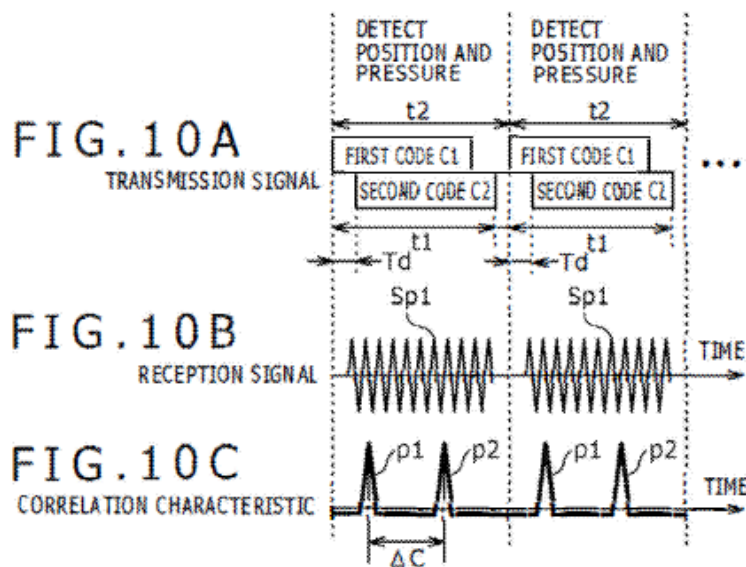


FIG. 19



28. The disclosed pointer includes multiple electrodes, including a first electrode 20 and a second electrode 21, which transmit different signals used for position and pressure detection. *Id.* at 12:47–53; *see also id.* at Fig. 2 *supra*. Each electrode is electrically connected to a signal production circuit and transmits a distinguishable code signal, such as C1 or C2, toward the coordinate input surface. *Id.*; *see also id.* at 13:1–18. The sensor surface receives these signals as electrostatic inputs. *Id.* at Abstract; 1:23–26; 13:5–18. A correlation matching circuit in the position detection apparatus identifies signal peaks to determine both the pointer's position and attributes such as pressure. *Id.* at 13:15–67; *see also id.* at Fig. 10C.

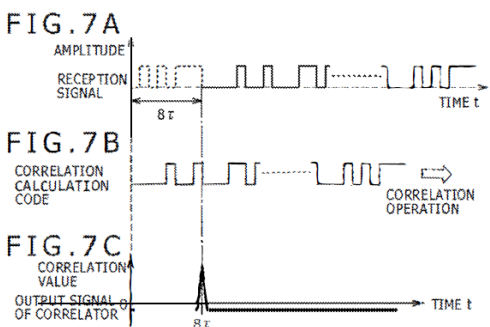
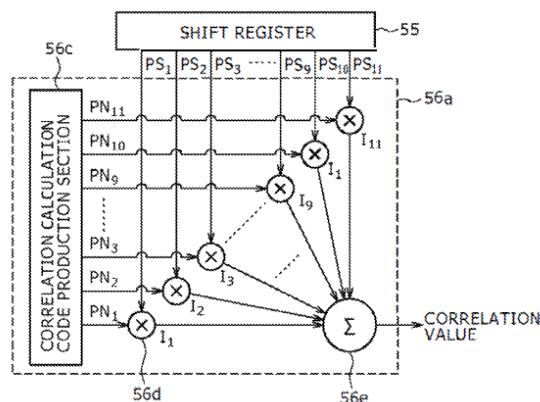


29. Signal differences between electrodes are associated with particular attributes of the pen's interaction with the sensor. For example, time differences between transmissions of codes C1 and C2 can be used to detect pressure. *Id.* at 13:60–14:51. In other embodiments, electrodes are positioned around the pen's axis to transmit distinguishable signals such that the system can detect tilt (inclination) and rotation angle based on differences in received signal intensities. *Id.* at 21:63–22:57; *see also id.* at Fig. 19 *supra*.

30. The position detection apparatus includes a correlation matching circuit comprising a first correlator and a second correlator, each configured to detect one of the transmitted codes. *Id.* at 13:15–35; *see also id.* at Figs. 5 *supra*, 6–7. The first correlator calculates a correlation value between the received signal and a code corresponding to C1, while the second correlator performs the same function for C2. *Id.* at 13:19–35. By identifying correlation peaks in each signal,

the system determines the pen's position and other attributes. *Id.* at 13:36–14:10. Pressure, for example, is derived from the time difference between the two correlation peaks. *Id.* at 14:11–27. Additional attributes such as tilt and rotation angle can also be determined based on the configuration of the detection system and signal response patterns. *Id.* at 22:4-20; see also *id.* at Fig. 19 *supra*.

FIG. 6



31. As further shown in Figure 19, when the pointer is tilted or rotated relative to the sensor surface, the spatial distance between each electrode and the surface changes. These variations alter the capacitive coupling strength between

each electrode and the sensor, leading to measurable differences in received signal levels. The system uses these differences to estimate the inclination and, in some embodiments, the rotation angle of the pen (e.g., r , θ , or φ). *Id.* at 22:4–23:4; 24:5–25:15; *see also id.* at Fig. 19 *supra*.

32. The '277 patent further describes techniques for distinguishing signals emitted from different electrodes, such as using different signal types (e.g., phase shift keying (PSK) or frequency shift keying (FSK)) or applying intentional timing offsets to allow independent processing. *Id.* at 13:59–14:51; 15:20–34.

33. The '277 patent also describes alternative signal production architectures, including use of an integrated circuit with FSK modulators and, in some embodiments, read-only memory (ROM) storing pre-modulated codes, which allows the device to transmit signals without real-time modulation overhead. These systems may include a coil and excitation signal arrangement to power the signal generation components. Such configurations enable generation of distinct signals for detecting attributes such as position and inclination. *Id.* at 21:1–12; 21:32–22:20.

V. Challenged Claims

34. I have reviewed the claims of the '277 patent. I understand that the Petition challenges claims 1-5, 7-12, 14-18, and 20-24. These claims generally relate to a coordinate input system that determines the tilt angle of a position

indicator (e.g., stylus or pen) using multiple electrodes on the pen and differential signal strength measurements.

35. For clarity, I have broken down the challenged independent and dependent claims into individual elements and labeled them with bracketed identifiers. These bracketed labels (e.g., “1[a]”) are used throughout this declaration for ease of reference.

Claim 1

1[pre] – “A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:”

1[a] – “a pen-shaped body having a pen-tip portion;”

1[b] – “a first electrode arranged at a first position of the pen-tip portion;”

1[c] – “a second electrode arranged at a second position of the pen-tip portion different from the first position, the second position being off an axis of the pen-shaped position indicator;”

1[d] – “a signal production circuit configured to generate first and second signals that are distinguishable from each other; and”

1[e] – “conductive lines extending between the signal production circuit and the first and second electrodes, respectively,”

1[f] – “wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines;”

1[g] – “wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable.”

Claim 2

2[pre] – “The pen-shaped position indicator according to claim 1,”

2[a] – “wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.”

Claim 3

3[pre] – “The pen-shaped position indicator according to claim 1,”

3[a] – “wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped position indicator.”

Claim 4

4[pre] – “The pen-shaped position indicator according to claim 1,”

4[a] – “wherein the first and second electrodes are arranged to surround the axis of the penshaped position indicator.”

Claim 5

5[pre] – “The pen-shaped position indicator according to claim 1,”

5[a] – “wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.”

Claim 7

7[pre] – “The pen-shaped position indicator according to claim 1,”

7[a] – “wherein the first and second signals are different in type from each other.”

Claim 8

8[pre] – “The pen-shaped position indicator according to claim 1,”

8[a] – “wherein the first and second signals are of the same type but have a time difference from each other.”

Claim 9

9[pre] – “The pen-shaped position indicator according to claim 1, further comprising:”

9[a] – “a coil configured to receive an excitation signal; and”

9[b] – “a power generation circuit configured to generate a drive voltage based on the excitation signal;”

9[c] – “wherein the drive voltage is supplied to the signal production circuit to generate the first and second signals.”

Claim 10

10[pre] – “A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:”

10[a] – “a pen-shaped body having a pen-tip portion;”

10[b] – “first and second electrodes arranged near the pen-tip portion to surround an axis of the pen-shaped position indicator; and”

10[c] – “a signal production circuit configured to generate first and second signals that are distinguishable from each other; and”

10[d] – “conductive lines extending between the signal production circuit and the first and second electrodes, respectively,”

10[e] – “wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to the first and second electrodes via the conductive lines;”

10[f] – “wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle information of the penshaped position indicator is obtainable.”

Claim 11

11[pre] – “The pen-shaped position indicator according to claim 10,”

11[a] – “wherein the pen-tip portion includes a conductive pen tip, to which the signal production circuit transmits a signal via a conductive line.”

Claim 12

12[pre] – “The pen-shaped position indicator according to claim 10,”

12[a] – “wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.”

Claim 14

14[pre] – “A method of detecting angle information of a pen-shaped position indicator, the method comprising:”

14[a] – “forming a first capacitive relationship between a sensor surface and a first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal generated by a signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator;”

14[b] – “forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen-shaped position indicator and is supplied with a second signal generated by the signal production circuit and transmitted via a second conductive line in the pen-shaped position indicator, wherein the second signal is distinguishable from the first signal; and”

14[c] – “detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.”

Claim 15

15[pre] – “The method according to claim 14,”

15[a] – “wherein the first and second electrodes are arranged at the first and

second positions that are different along the axis of the pen-shaped position indicator.”

Claim 16

16[pre] – “The method according to claim 14,”

16[a] – “wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the penshaped position indicator.”

Claim 17

17[pre] – “The method according to claim 14,”

17[a] – “wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator.”

Claim 18

18[pre] – “The method according to claim 14,”

18[a] – “wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.”

Claim 20

20[pre] – “The method according to claim 14,”

20[a] – “wherein the first and second signals are different in type from each other.”

Claim 21

21[pre] – “The method according to claim 14,”

21[a] – “wherein the first and second signals are of the same type but have a time difference from each other.”

Claim 22

22[pre] – “A method of detecting angle information of a penshaped position indicator, the method comprising:”

22[a] – “forming first and second capacitive relationships between a sensor surface and first and second electrodes, respectively,”

22[b] – “wherein the first and second electrodes are arranged near a pen-tip portion of the pen-shaped position indicator to surround an axis of the pen-shaped indicator, and”

22[c] – “wherein the first and second electrodes are supplied with first and second signals generated by a signal production circuit via first and second lines, respectively, wherein the first and second signals are distinguishable from each other; and”

22[d] – “detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.”

Claim 23

23[pre] – “The method according to claim 22, comprising:”

23[a] – “forming a capacitive relationship between the sensor surface and the pen-tip portion including a conductive pen tip, to which a signal is supplied from the signal production circuit.”

Claim 24

24[pre] – “The method according to claim 22,”

24[a] – “wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.”

VI. Level of Ordinary Skill in the Art

36. I understand that several factors are relevant to determining the level of ordinary skill in the art at the time of the claimed invention. These include: (1) the educational level of the inventor(s); (2) the types of problems encountered in the art; (3) prior art solutions to those problems; (4) the rapidity with which innovations were made; (5) the sophistication of the technology; and (6) the educational level of active workers in the field.

37. The art of the '277 patent relates to stylus-based coordinate input systems that employ capacitive sensing techniques to detect both contact position and tilt angle based on the output of multiple electrodes arranged along a pen-shaped position indicator.

38. The types of problems addressed by the '277 patent include: detecting pen tilt in a cost-effective and accurate manner; improving stylus design for capacitive sensing without significantly increasing system complexity; and avoiding reliance on auxiliary components (e.g., inertial sensors or optical elements) for tilt angle detection.

39. The prior art references analyzed in this declaration include U.S. Patent No. 5,798,756 to Yoshida (“Yoshida”), Japanese Patent Publication No. H10-11206 to Ikeda (“Ikeda”), and U.S. Patent No. 5,736,980 to Iguchi (“Iguchi”). These shorthand names are used throughout the remainder of this declaration for clarity.

40. The technology described in the ’277 patent relates to and attempts to build on prior techniques in capacitive input sensing, waveform modulation, electrode layout, and signal strength measurement. Many prior art references, including Yoshida, Ikeda, and Iguchi, reflect the state of the art in stylus design and capacitive coupling, indicating an incremental yet technically precise evolution of input detection methods.

41. In my opinion, a person of ordinary skill in the art (“POSITA”) as of February 5, 2010 (the earliest claimed priority date of the ’277 patent) would have had:

- At least a bachelor’s degree in computer engineering, electrical engineering, or similar,
- And at least two years of experience working with computing systems and their interaction/communication with other devices, or an advanced degree in electrical engineering, computer engineering, or the like.

42. Such a person would have been familiar with signal processing concepts, electrode design, circuit layout, time-domain or phase-based signal differentiation, and the use of stylus input devices for user interface control in computing systems.

VII. Summary of Prosecution History

43. The application that issued as the '277 patent, U.S. Application No. 15/047,013, was filed on February 18, 2016, and is a continuation of U.S. Application No. 14/542,438, filed on November 14, 2014, which is a continuation of U.S. Application No. 12/877,780, filed on September 8, 2010. The '277 patent issued on October 23, 2018, and is assigned to Wacom Co., Ltd. The application also claims foreign priority to Japanese Application No. 2010-024858, filed February 5, 2010. Ex. 1001 ('277 patent); Ex. 1002 (prosecution file history of '277 patent).

44. On May 4, 2016, the Examiner issued a Non-Final Office Action rejecting claims 1–23 under pre-AIA 35 U.S.C. § 103(a) over Katsurahira (US 2005/0128191) in view of Fujioka (US 4,725,978) and Fukushima (US 2003/0142073).

45. On August 4, 2016, the Applicant filed an Amendment and Remarks.

46. On November 30, 2016, the Examiner issued a Final Rejection, maintaining the § 103(a) rejections.

47. On February 9, 2017, the Applicant filed a Request for Continued Examination (RCE) with further remarks and amendments.

48. On July 26, 2017, the Examiner issued a second Non-Final Office Action, maintaining the § 103(a) rejections over Katsurahira, Fujioka, and Fukushima, and introducing Zhang (US 2004/0246877).

49. On August 25, 2017, the Applicant submitted an Amendment and Request for Reconsideration.

50. On December 12, 2017, the Examiner issued a Final Rejection, continuing to reject the claims under § 103(a).

51. On January 5, 2018, the Applicant filed a Response After Final Action.

52. On May 30, 2018, the Applicant and Examiner conducted an Applicant-Initiated interview.

53. On June 21, 2018, the Examiner issued a Notice of Allowability.

54. The '277 patent issued on October 23, 2018. None of the art cited in the current IPR petition, including Yoshida, Ikeda, or Iguchi, was cited by the Examiner or discussed during prosecution (*see* Section VIII, *infra*).

VIII. Teachings of the Prior Art and Applied References

55. My prior art analysis relies primarily on three references as shown in the table below, in addition to my knowledge and the background discussed herein. Each of these references describes stylus-based systems using capacitive

techniques, multiple electrodes, and differential signal analysis to obtain position and/or angle data. These references, individually and in combination, address the technical challenge of accurately detecting the angular orientation of a pen-shaped position indicator using capacitive techniques, without the need for mechanical sensors.

Reference	Inventor(s)	Filing Date	Issue/Publication Date
U.S. Patent No. 5,798,756 (“Yoshida”)	Yasuhiro Yoshida, Kengo Takahama, and Takao Tagawa	May 14, 1996	August 25, 1998
U.S. Patent No. 5,736,980 (“Iguchi”)	Yoshinori Iguchi, Katsumi Hirano, Tomohiko Nishimura, Kunio Hiromoto, and Kazuyoshi Nomiya	April 11, 1996	April 7, 1998
Japanese Patent Application Publication No. H10-11206 (“Ikeda”)	Kensei Ikeda	June 26, 1996	January 16, 1998

56. In my opinion, a POSITA would have recognized the relevance of these references to the field of capacitive stylus input systems and understood them as part of the common design landscape at the time.

57. None of the above prior art references were before the examiner during the prosecution of the ’277 patent.

A. Yoshida (U.S. Patent No. 5,798,756) (Ex. 1005)

Fig.2

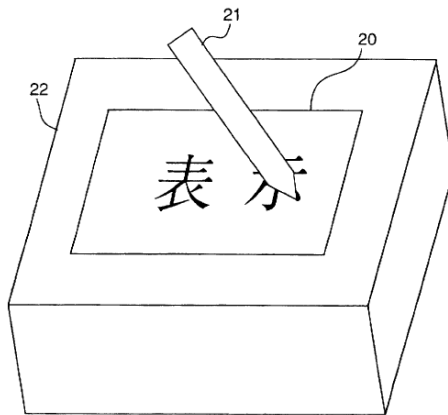
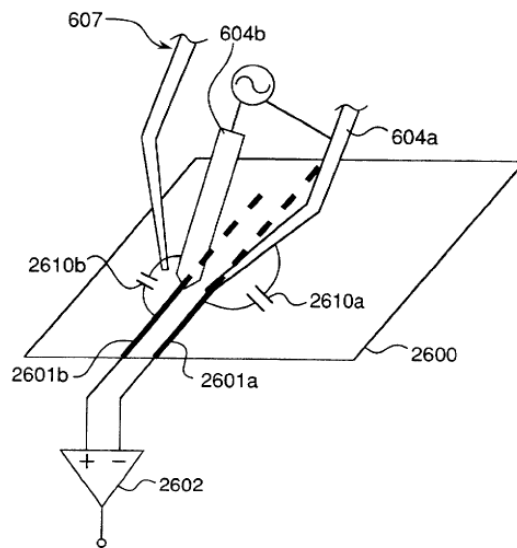
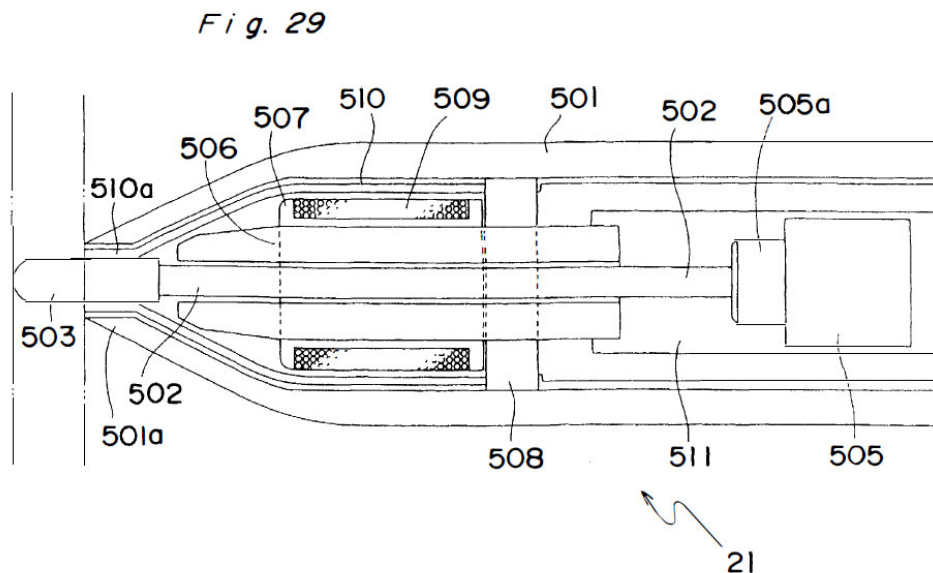


Fig.26



60. The capacitive interaction between the stylus electrodes and the tablet is processed by differential amplification circuits to determine the position of the stylus relative to the sensor surface. For example, Yoshida describes how electrode placement at different axial positions (e.g., inner electrode 502 and outer electrode

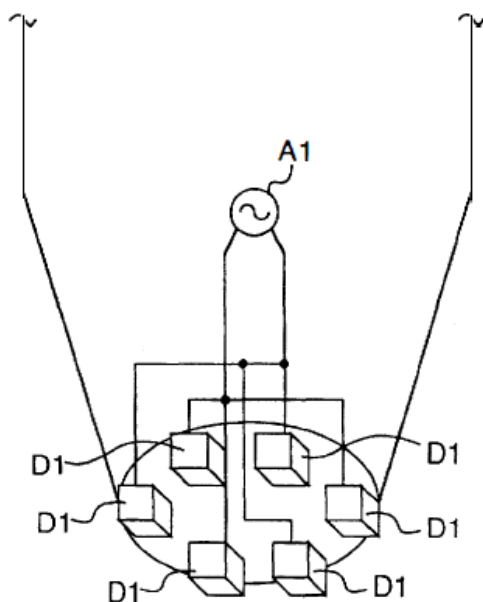
510 in Fig. 29) can result in signal variations that correlate with stylus tilt relative to the tablet surface. *Id.*, Fig. 29, 28:3–25. A POSITA would have understood that such axial separation and corresponding signal variations align with the '277 patent's recitation of first and second electrodes forming separate capacitive relationships with the sensor surface to generate detection signals from which angular information is obtainable.



61. Yoshida further explains that these detection signals are distinguishable from each other by virtue of their phase relationship, enabling the tablet to differentiate signals from different electrodes. Ex. 1005, 26:25–37. In addition, Yoshida describes embodiments where a rotational electric field is generated using plural electrodes (e.g., detection electrode D1), such that the reported coordinate is substantially invariant to pen roll. *Id.*, 8:66–9:11; 26:36–48; 57:1–20; *see also id.* Fig. 28. A POSITA would have recognized that this

architecture necessarily considers the effects of pen posture, including inclination and roll, because posture alters the distribution of electric field lines and the effective gaps to the sensor surface.

Fig.28



62. Yoshida demonstrates how electrode design choices, such as the use of a ring-shaped coordinate detection electrode, directly relate to tilt detection and compensation. When a stylus is held vertically above a ring electrode, the electric field lines from the pen tip to the ring are distributed symmetrically around the axis, producing a uniform maximum capacitance. As the pen tilts, this symmetry is broken: one side of the ring is closer to the pen tip, increasing field density and effective coupling area, while the opposite side decreases. The overall capacitance to the ring varies in a predictable way with tilt angle. A ring electrode provides an

integrated 360° response that is more informative than a single point electrode, which would only measure local proximity and confound tilt with lateral displacement. By comparing the ring’s signal with other electrodes (such as orthogonal X and Y strips), the system can distinguish tilt magnitude from x–y position. In this way, Yoshida’s architecture shows that capacitive-coupling schemes are inherently sensitive to pen posture, and that the design must either compensate for or exploit angle information to maintain stable positional accuracy.

B. Ikeda (Japanese Patent Application Publication No. H10-11206) (Ex. 1006)

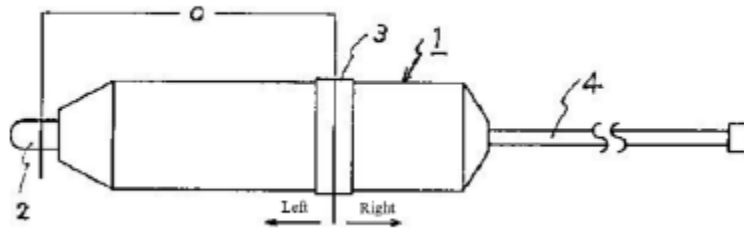
63. Ikeda is titled “Coordinate Input Apparatus and Position Indicator” and was filed on September 5, 1996. Ikeda published on January 16, 1998. I understand that Ikeda is prior art to the ’277 patent.

64. Ikeda addresses the challenge of detecting both position and angular orientation in a pen-shaped position indicator without using mechanical sensors, which can increase cost, complexity, and wear.

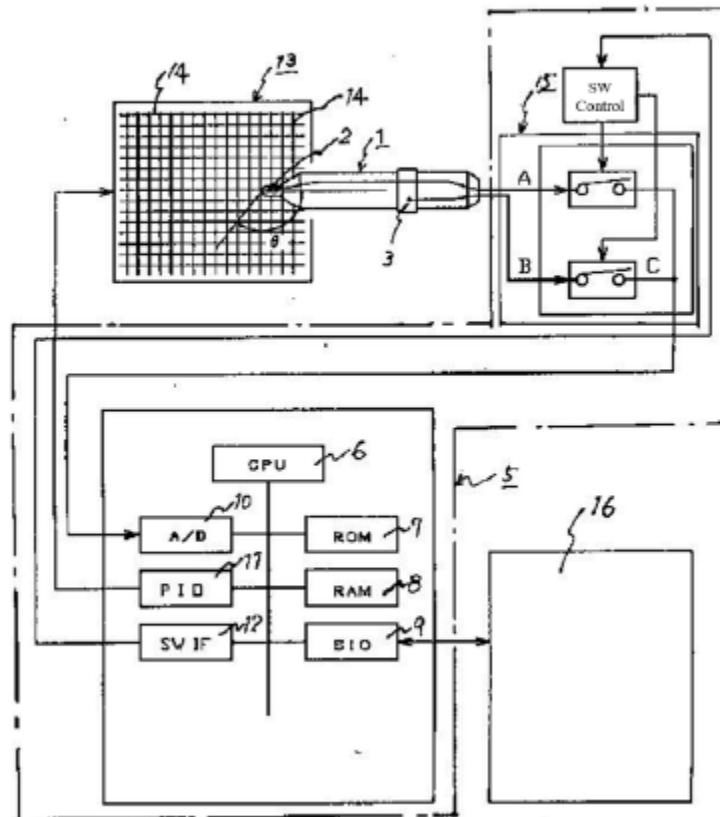
65. Ikeda discloses a capacitive coordinate input system in which the position indicator is configured with multiple electrodes for detecting tilt angles. In one embodiment, Ikeda describes a first electrode arranged at the tip of the pen and a second ring-shaped electrode on the pen body, enabling detection of angular information based on differences in capacitance between the electrodes and a tablet sensor surface. Ex. 1006, ¶¶ [0005]–[0007]; *see also id.*, Figs. 1 and 3. A POSITA

would have recognized that this arrangement discloses first and second electrodes forming distinct capacitive relationships with the sensor surface to generate detection signals from which angular information can be derived.

[Fig 1.]



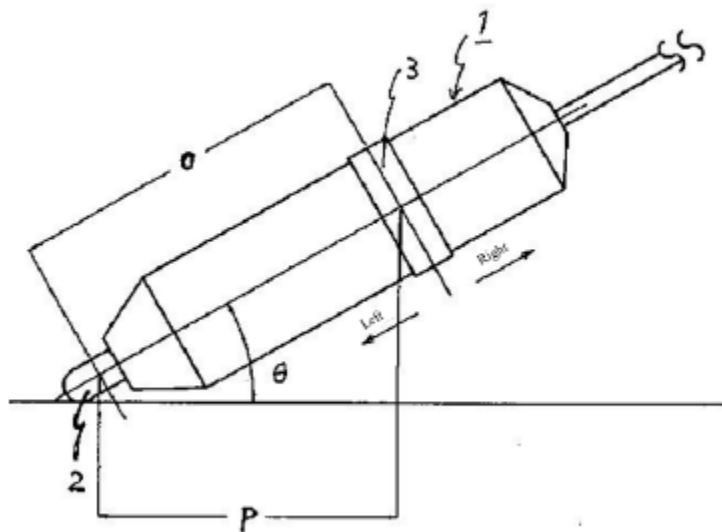
[Fig. 3]



66. Ikeda explains that the detection system digitizes and stores signals from the tip and body electrodes, enabling them to be separated and independently processed. *Id.*, ¶¶ [0009]–[0012]; see also *id.*, Fig. 3. By comparing these digitized signals, the system determines the tilt angle of the pen relative to the tablet. A POSITA would have understood that such separation and comparison of electrode outputs is supplying distinguishable signals to multiple electrodes for angle detection.

67. Ikeda further teaches calculating tilt angle using the relation $\cos \theta = O/P$, where O is a reference dimension and P is the measured dimension. *Id.*, ¶ [0013]. The device uses this relation to determine whether the tilt exceeds a threshold angle and to control whether coordinate input is accepted. *Id.*, ¶ [0014]; see also *id.*, Fig. 5.

[Fig.5]



68. Ikeda also notes that variations are possible, such as fixing the tip electrode while moving the body electrode to achieve joystick-like functionality. *Id.*, ¶¶ [0015]–[0016]. A POSITA would have appreciated that these variations confirm the broader applicability of Ikeda’s multi-electrode approach to systems providing both coordinate and orientation input.

C. Iguchi (U.S. Patent No. 5,736,980) (Ex. 1007)

69. Iguchi is titled “Position Detecting System and Position Indicator” and was filed on April 11, 1996. Iguchi issued on April 7, 1998. I understand that Iguchi is prior art to the ’277 patent.

70. Iguchi addresses the problem of accurately detecting pen tilt and rotation using capacitive techniques without relying on mechanical sensors, enabling more precise input for applications such as handwriting and drawing.

71. Iguchi discloses a position detecting system in which a pen-shaped position indicator is capacitively coupled to a sensor surface and includes multiple electrodes for positional and angular detection. In certain embodiments, Iguchi describes the use of electrode arrangements and signal processing to determine the inclination or tilt of the pen relative to the sensor plane. *See, e.g.*, Ex. 1007, Figs. 26a, 26b, 27c, 29a, 29b; 15:38-52, 17:24-45.

FIG. 26a

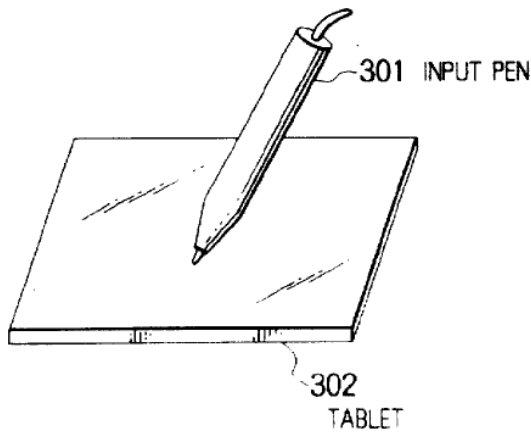


FIG. 26b

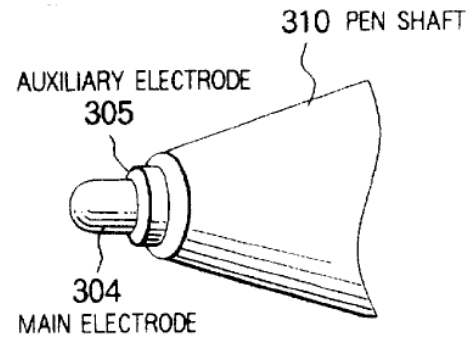
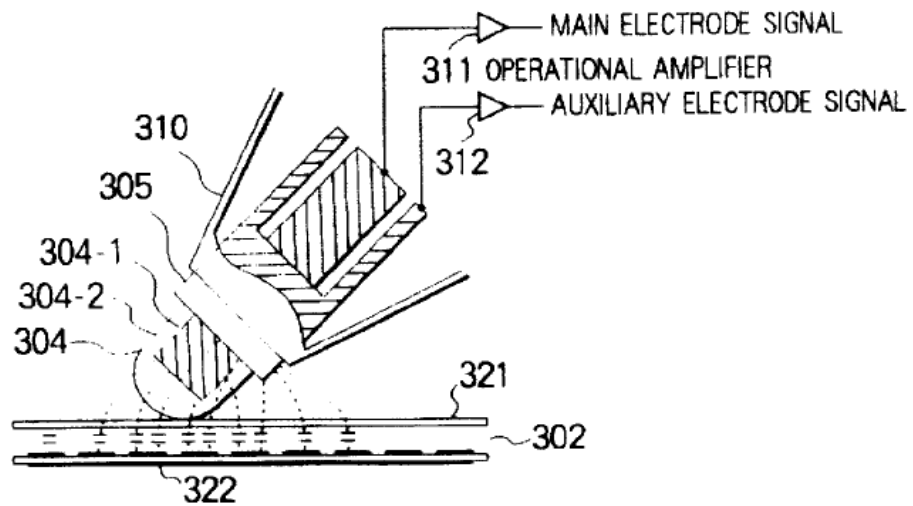
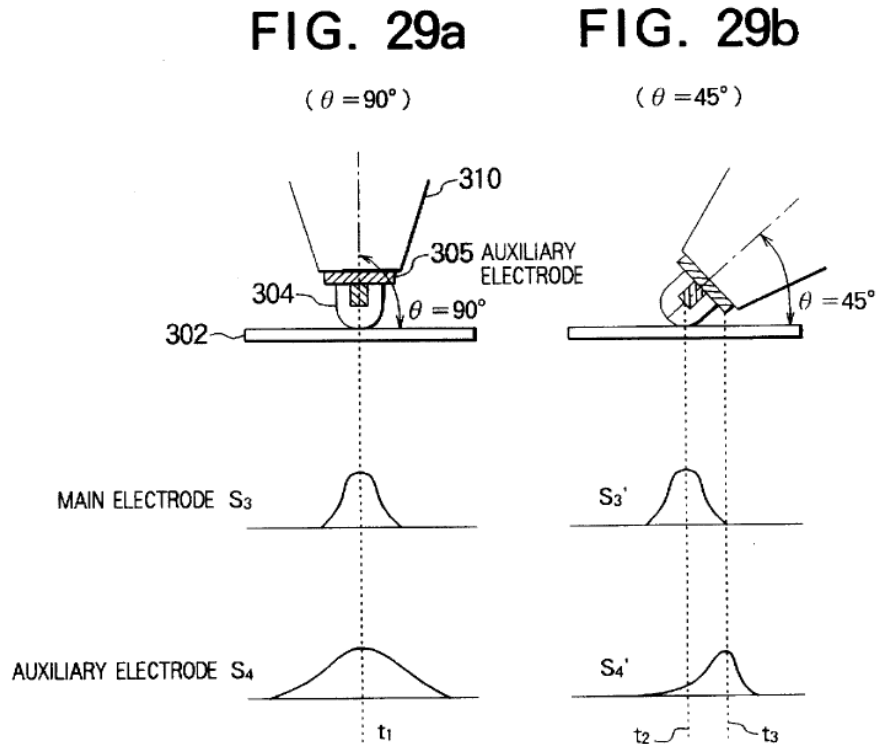


FIG. 27c





72. In one embodiment, Iguchi shows inner and outer electrodes arranged coaxially near the pen tip, where changes in the capacitive coupling pattern with the tablet can be analyzed to determine tilt direction and magnitude. *Id.*, Figs. 26a and 26b; 15:38-52. The capacitive signal strength received at different sensor electrodes varies with tilt angle, allowing angle detection without mechanical gimbals or additional sensors.

73. Iguchi also teaches using separate electrode pairs arranged circumferentially around the axis of the pen to enable rotation angle detection. The relative amplitudes and phases of signals from these electrodes, when compared, provide an indication of rotational orientation about the pen axis. *Id.*, Fig. 27c;

17:24-45. This technique would have offered a known and predictable way to capture rotation data in multi-electrode stylus designs.

74. In addition, Iguchi describes modulating the signals applied to different electrodes, such as by varying timing, phase, or waveform, so that their respective capacitive couplings can be independently resolved at the tablet side. *Id.*, Figs. 29a and 29b; 18:14-36. This separation of signals enables accurate calculation of both positional and angular information from the same set of electrodes.

75. Iguchi further explains that these angular detection techniques can operate in real time in conjunction with conventional coordinate detection, providing both position and orientation data from a single pen-shaped position indicator. *Id.* at 15:38-52, 17:24-45, 18:14-36. This integration allows for more precise input in applications such as handwriting recognition, drawing, and CAD, where pen tilt and rotation affect the rendered output.

76. A POSITA would have recognized that combining Iguchi's real-time angular detection techniques with Yoshida's electrode configuration would have been straightforward and yielded predictable improvements in stylus performance without altering the underlying capacitive detection principles.

D. Known Techniques in Stylus Technology

77. As of the earliest claimed priority date of the '277 patent, a person of ordinary skill in the art would have been familiar with a wide variety of techniques and components used to design stylus-based input systems.

78. Both passive and active styluses were well known. Passive styluses typically relied on conductive contact to simulate a finger on a capacitive touchscreen, while active styluses included internal electronics, signal generation components, and communication circuits for transmitting more detailed stylus state information such as pen ID, button status, pressure, or angle.

79. A POSITA would have been aware of capacitive stylus systems that used multiple electrodes to provide more detailed position information or angle estimation based on spatially varied signal interactions with a tablet sensor array.

1. Early Patent Disclosures Addressing Stylus Tilt Detection and Correction

80. U.S. Patent No. 3,873,770 to Ioannou ("Ioannou," Ex. 1011) was filed March 21, 1974 and issued March 25, 1975, decades before Yoshida, Ikeda, and Iguchi.

81. Ioannou discloses a system for digitizing graphic data using a stylus and a tablet grid and specifically teaches "means are provided for detecting stylus tilt and variations in h and to compensate for position errors." Ex. 1011, [57] Abstract. Ioannou explains that tilt produces changes in the positive and negative

peaks of the coil's impulse envelope and sets out mathematical relations describing how tilt angle affects positional error. *Id.*, 7:65-8: 40.

82. Ioannou further describes compensating for tilt-induced errors by calculating a correction quantity based on envelope peaks and stylus geometry, including an error correction $\Delta X = Z \cdot \tan(\theta)$. *Id.*, 8:15–67. The patent also provides circuit implementations with peak detectors, ramp generators, and correction counters for automatically adjusting the position measurement. *Id.*, 9:55–10:65.

83. In my opinion, Ioannou (Ex. 1011) demonstrates that as early as the 1970s the art had recognized stylus tilt as a source of positional error and disclosed mathematical models and electronic circuitry for tilt detection and compensation. This illustrates that tilt detection was a long-standing engineering problem that had been studied for decades before the '277 patent. Such disclosures provide important context for why a POSITA would have viewed later refinements, including the tilt-detection techniques of Yoshida, Ikeda, and Iguchi, as natural developments that could be combined to improve stylus accuracy.

84. U.S. Patent No. 4,939,318 to Watson ("Watson," Ex. 1012) was filed November 6, 1989 and issued July 3, 1990, several years before Yoshida, Ikeda, and Iguchi.

85. Watson expressly addresses the problem of pen tilt in digitizer tablets. Watson discloses a method of detecting pen tilt in an electromagnetic induction system "which does not require changing the physical construction of the pen or

tablet.” Ex. 1012, 3:29–33. Specifically, Watson calculates tilt by interpolating the zero-crossing point of the stylus signal and then using voltage values from grid wires immediately adjacent on either side of that point to compute a tilt correction factor. *Id.*, [57] Abstract; 3:45–4:24.

86. Watson discloses that tilt is determined by comparing voltage values AP and AN derived from interpolation of wires adjacent the zero crossing, and computing a parameter T, defined as:

$$T = (\Delta P - \Delta N) / (\Delta P + \Delta N)$$

where T is “a number roughly proportional to the pen tilt.” Ex. 1012, 5:4–6:15.

This correction is then applied to the interpolated pen position to compensate for tilt error. *Id.*

87. Watson also explains that earlier methods, such as Ioannou (U.S. 3,873,770), relied on waveform peaks several wires away from the data point and failed to operate near tablet edges. Ex. 1012, 2:35–55. Watson improves upon such methods by using only adjacent wire voltages, which enables tilt correction up to the edges of the active area. *Id.*, 5:1–14.

88. In my opinion, Watson (Ex. 1012) illustrates that by 1990 the art had already developed practical algorithms for detecting and correcting stylus tilt. This reference shows that tilt detection was a long-recognized problem, that engineers had devised multiple solutions, and that refinements continued through the 1990s. These teachings confirm that tilt detection was well understood long before the

'277 patent, and they provide important context for why a POSITA would have been motivated to combine later approaches, such as Yoshida with Ikeda or Iguchi, to refine stylus tilt measurement.

89. U.S. Patent No. 5,239,489 to Russell ("Russell," Ex. 1013) was filed May 6, 1991 and issued August 24, 1993, several years before Yoshida, Ikeda, and Iguchi.

90. Russell discloses a digitizer tablet that estimates both the position and the angular orientation (tilt) of a stylus relative to the sensing plane. Ex. 1013, [57] Abstract. The tablet includes coil arrays and a processor that measures induced signals, derives zero-crossing estimates for position, and applies weighting functions to refine those estimates. *Id.*, 3:30–46; 6:15–35.

91. Russell teaches a tilt estimator that centers a second weighting curve on the refined position estimate, calculates a weighted average of signal derivatives, and normalizes this value against the RMS signal strength to obtain an estimate of pen tilt. Ex. 1013, 9:10–45. Figures 6a–6c illustrate the tilt angles (α and β) relative to the x-z and y-z planes of the tablet. *Id.*, 4:17-20; 9:55–65.

92. Russell further explains that the estimated tilt values can be used both to correct the pen position estimate and to output tilt information (α , β) to external systems, such as handwriting recognition software. *Id.*, 10:1–25.

93. In my opinion, Russell (Ex. 1013) demonstrates that by the early 1990s the art had advanced to sophisticated digital estimation techniques that

simultaneously measured stylus position and angular orientation using signal processing methods. Russell illustrates that tilt detection was not only well recognized but also considered valuable for correcting positional errors and enabling new applications. This disclosure provides important context for understanding why a POSITA would have been motivated to refine and combine the tilt-detection approaches of Yoshida, Ikeda, and Iguchi in the mid-1990s.

94. U.S. Patent No. 5,748,110 to Sekizawa (“Sekizawa,” Ex. 1014) was filed July 10, 1995 and issued May 5, 1998. Sekizawa discloses a coordinate detecting device and angle information detecting method capable of detecting tilt angles of a stylus pen with high accuracy. Ex. 1014, [57] Abstract. The device employs a plurality of sensor coils and detects stylus tilt by analyzing differences between main peak and sub-peak induced voltage distributions within a sensor coil’s detection width, correcting these distributions through interpolation and translation operations to cancel error and improve tilt measurement accuracy. *Id.*, 3:35–4:16; 6:18–7:10; 9:27–11:11.

95. Sekizawa confirms that by the mid-1990s, techniques for accurately detecting stylus tilt using electromagnetic coupling and induced voltage corrections were well established. These methods built on earlier work such as Ioannou (Ex. 1011), Watson (Ex. 1012), and Russell (Ex. 1013), and predate Yoshida, Ikeda, and Iguchi.

2. Commercial Deployments and Academic Studies

96. Beyond the patent literature, stylus-based interaction and tilt detection were also reflected in commercial products and academic studies well before the '277 patent. These sources confirm that tilt was not only the subject of patent disclosures but had become a practical, implemented, and widely studied feature in the marketplace and research community.

97. In 1993, Ars Technica reported that IBM and BellSouth launched the Simon Personal Communicator, one of the earliest smartphones with touchscreen technology. Ex. 1009 at 7–10. The Simon featured a resistive touchscreen that required a stylus for navigation and input. While not involving tilt detection, the IBM Simon demonstrates that stylus-based interaction was already well-established in commercial devices more than a decade before the earliest priority date of the '277 patent, providing background context for the subsequent refinements in stylus tilt detection.

98. By the late 1990s and early 2000s, stylus products and publications routinely explored the use of multiple electrodes, spatial signal variation, and timing-based signal analysis to enhance input precision. Commercial systems also advertised tilt through signal strength variation, reflecting that tilt was viewed as an important and marketable stylus feature.

99. For instance, the Wacom Intuos pen tablet, a commercial product widely available in the 1990s and 2000s, expressly advertised and implemented a tilt feature. The Wacom Intuos manual states: “The tablet recognizes when you tilt

the pen or airbrush from vertical to inclined positions.” Ex. 1015 at 39. It further explains that the Intuos pen is “tilt sensitive” and “senses the amount of tilt between the tool and tablet. This is used to create natural-looking pen, brush, and eraser strokes in applications that are tilt-sensitive.” *Id.* This reflects commercial deployment of tilt-detection functionality in active stylus systems.

100. The Intuos manual also emphasizes that tilt data was integrated into software applications for realistic rendering. By mapping tilt to brush shape, spray patterns, or stroke dynamics, users could achieve natural results comparable to traditional drawing tools. *Id.* at 39–40. This demonstrates that tilt detection was not only technically implemented but also practically useful and commercially valuable years before the ’277 patent.

101. In my opinion, the Intuos manual (Ex. 1015) confirms that by the late 1990s and early 2000s, tilt detection was a mainstream, expected feature of stylus input systems. The manual illustrates that tilt data could be sensed, transmitted, and used in real-world software applications. A POSITA would have understood such systems as evidence that tilt detection was an established capability, reinforcing why it would have been natural to combine the tilt-measurement techniques disclosed in Yoshida, Ikeda, and Iguchi to improve stylus accuracy.

102. A 2001 Macworld article announcing the Wacom Intuos2 pen tablet explained that the pressure-sensitive pen “can transmit tilt angle and direction information as well.” Ex. 1016 at 1. This shows that tilt angle detection and

directional orientation were publicly known, commercially implemented, and marketed features of stylus products in the early 2000s, several years before the earliest priority date of the '277 patent.

103. The Intuos2 User Manual includes a dedicated “TILT” tab in its control panel for adjusting tilt sensitivity of the pen and airbrush tools. Ex. 1017 at 51. This demonstrates that tilt sensing was not only technically supported but also customizable by end-users, confirming that tilt was a standard and expected parameter in commercial stylus systems.

104. In my opinion, Exs. 1016 and 1017 confirm that by the early 2000s, tilt sensitivity had progressed beyond basic recognition to become an integrated, user-adjustable feature in mainstream pen tablets. These materials illustrate that tilt angle and directional data were widely available in commercial stylus systems and valued by software developers and users.

105. A 2005 CreativePro review of the Wacom Cintiq 21UX interactive pen display emphasized that the Wacom Grip Pen supported “pen pressure and tilt sensitivity,” with tilt directly impacting brush dynamics in applications such as Adobe Photoshop. Ex. 1018 at 1. The review explained that tilt allowed natural variations in brush stroke behavior, enabling effects that mimicked real-world drawing and painting. This demonstrates that by 2005 tilt sensitivity was a widely marketed and implemented feature of professional stylus products.

106. A December 2005 Post Magazine review of the same product highlighted that the Cintiq 21UX control panel included dedicated settings where “pen pressure and tilt are adjustable in the control panel.” Ex. 1019 at 1. The review further noted that such controls allowed users to configure tilt sensitivity to match specific workflows, confirming that by the mid-2000s tilt was not only supported but also adjustable at a user-interface level. This shows that tilt was a mainstream expectation in professional pen-based systems.

107. In April 2008, researchers from the Chinese Academy of Sciences, Penn State, and Nokia presented “Tilt Menu: Using the 3D Orientation Information of Pen Devices to Extend the Selection Capability of Pen-based User Interfaces,” a pen based user interface technique that used the 3D orientation of a stylus for command selection. Ex. 1020. The authors explained that the Tilt Menu “supports selection without any pen tip movements” by using tilt as a secondary input channel, allowing a user to choose commands while simultaneously drawing. *Id.* at 1. Experiments showed the Tilt Menu reduced task time and integrated smoothly with freeform drawing. *Id.* at 4-9. This research confirms that stylus tilt was considered a robust, independent input modality suitable for enhancing pen interfaces.

108. In October 2009, a research paper titled “SpikeNav: Using Stylus Tilt in Three Dimensional Navigation” was presented at the ACM UIST symposium. Ex. 1021 at 1. The paper, authored by a researcher at the University of British

Columbia, described a pen-based navigation technique where the stylus functions as a “spike” inserted into a 3D model. Tilt was used to control scene rotation while pressure toggled between navigation modes. *Id.* at 1–2. The study emphasized that tilt offered an intuitive and powerful input channel for three-dimensional interaction, using commodity stylus hardware. *Id.* at 2–3. This work confirms that tilt was recognized as a robust modality for advanced user interfaces prior to the earliest priority date of the ’277 patent.

109. In December 2009, an empirical study titled “A study of inherent pen input modalities for precision parameter manipulations during trajectory tasks” compared four inherent pen input modalities—pressure, tilt, azimuth, and rolling—for precision manipulation during trajectory tasks. Ex. 1022 at 2454. The study apparatus used a Wacom Cintiq 21UX, which detected tilt angles between approximately 30°–90°, azimuth from 0–359°, and rolling from 0–359°. *Id.* at 2456. Results showed that pressure was the fastest input modality, but tilt achieved among the lowest error rates in narrow-target conditions. *Id.* at 2457–2458. The authors concluded that tilt and related angular inputs provided meaningful control parameters, suitable for fine-grained manipulations in pen-based user interfaces. *Id.* at 2459–2461. Notably, the study was published before the earliest claimed priority date of the ’277 patent (Feb. 5, 2010) and reflects contemporaneous recognition of tilt as a core stylus modality.

110. Taken together, these patents, commercial devices, and academic studies show that tilt detection was recognized as a longstanding engineering challenge and by the 1990s had multiple known solutions. By the 2000s, tilt was a mainstream, user-adjustable feature of commercial products and a validated modality in academic research. In my opinion, this history confirms that a POSITA at the time of Yoshida, Ikeda, and Iguchi would have understood tilt detection techniques as well-established, interchangeable design choices. A POSITA would therefore have been motivated to combine Yoshida with Ikeda or Iguchi to improve tilt accuracy and reliability, with a reasonable expectation of success.

E. Motivations to Combine and Expectation of Success

111. In this section, I explain the reasons why a POSITA at the time of the purported invention of the '277 patent would have been motivated to combine the prior art references relied upon in the Petition. Each reference addresses the same general field of capacitive stylus-based input systems and seeks to improve the accuracy or functionality of detecting position and/or angular orientation. I address explicit suggestions in the prior art, industry needs, and recognized engineering practices that would have led a POSITA to combine these teachings with a reasonable expectation of success.

112. Yoshida discloses a pen-shaped position indicator with multiple electrodes arranged along the pen body for capacitive coupling with a sensor array, enabling detection of spatial relationships between the pen and tablet. *See Ex.*

1005, Figs. 2, 6A, 26; 19:66–20:3; 26:19–37; 27:13–25. Ikeda describes a coordinate input apparatus with electrodes positioned at different locations to detect angular information based on differential capacitance. *See* Ex. 1006, ¶¶ [0022]–[0024], [0027], Figs. 1, 3. Iguchi teaches complementary timing- and phase-based differentiation of signals from spatially separated electrodes to determine angular orientation. *See* Ex. 1007, Figs. 26a, 26b, 27c, 29a, 29b; 15:38–52; 17:24–45; 18:14–36. These teachings are compatible and address the same underlying challenge: obtaining reliable angular data from capacitive stylus systems without mechanical sensors and/or more complicated technology.

113. A POSITA would have recognized that integrating Yoshida’s structural electrode arrangement (Ex. 1005, Figs. 2, 6A, 26; 19:66–20:3) with Ikeda’s tilt detection through differential capacitive signal comparison (Ex. 1006, ¶¶ [0022]–[0024], Fig. 3) would yield a predictable system capable of accurately detecting tilt while preserving the low-cost, solid-state advantages of capacitive systems.

114. Similarly, a POSITA would have recognized that integrating Yoshida’s electrode arrangement (Ex. 1005, 26:19–37) with Iguchi’s timing or phase-based signal differentiation (Ex. 1007, 18:14–36; Figs. 29a, 29b) would provide a known and predictable way to capture both tilt and rotation without adding mechanical sensors.

115. There were clear design incentives to combine these techniques. Improving angular precision was important in graphic design tablets, pen computing, and note-taking applications. At the same time, industry pressures favored low-cost stylus solutions that could estimate tilt without using additional hardware such as gyroscopes or accelerometers. *See, e.g.*, Ex. 1006, ¶ [0004]; Ex. 1007, 1:12–21.

116. A POSITA also would have understood that the specific techniques involved were well known in the field. The placement of multiple electrodes at offset positions, as in Yoshida (Ex. 1005, Figs. 26, 29), was already a recognized approach for enhancing capacitive signal detection. Similarly, timing differentiation, as taught in Iguchi (Ex. 1007, 18:14–36), was a known method to avoid interference and to distinguish between signals in capacitive systems. Combining these features would therefore have been a routine engineering exercise producing predictable results.

117. Given the commonality of the underlying operating principles, a POSITA would have reasonably expected success in combining these references using routine skill. None of the references teaches away from such a combination, and each operates on principles already understood and accepted in the art.

118. The prior art itself provides clear rationales for the combination. Yoshida provides a structural electrode arrangement. *See* Ex. 1005, Figs. 2, 6A, 26; 19:66–20:3; 26:19–37. Ikeda explains the functional benefit of capturing angular

information using separated electrodes. *See* Ex. 1006, ¶¶ [0022]–[0024], [0027], Figs. 1, 3. Iguchi shows how to differentiate signals from multiple electrodes based on time. *See* Ex. 1007, 18:14–36; Figs. 29a, 29b.

119. These rationales, together with established industry knowledge and recognized design goals, would have led a POSITA to arrive at the subject matter of the Challenged Claims of the '277 patent with a reasonable expectation of success.

120. In my opinion, the combination of Yoshida with Ikeda or Iguchi is consistent with the well-established practice in the field of capacitive stylus design of integrating structural electrode configurations with complementary signal processing techniques. A POSITA, faced with the design goal of improving angular detection without increasing hardware complexity or cost, would have viewed these teachings as compatible and mutually reinforcing. By combining Yoshida's electrode arrangements with either Ikeda's differential capacitive comparison or Iguchi's timing-based signal separation, a POSITA would have arrived at a system capable of reliably detecting tilt and rotation using only capacitive elements, thereby satisfying industry requirements for accuracy, simplicity, and cost-effectiveness.

IX. Grounds for Invalidity

A. Ground 1: Claims 1-5, 7-12, 14-18, and 20-24 are obvious over Yoshida in view of Ikeda and the knowledge of a POSITA.

121. It is my opinion that claims 1-5, 7-12, 14-18, and 20-24 of the '277 patent are obvious over Yoshida in view of Ikeda and the knowledge of a POSITA. Appendix A is a claim chart detailing my invalidity analysis, which compares the prior art to the claim elements and further describes the teachings, suggestions, and motivations to combine the references.

B. Ground 2: Claims 1-5, 8-12, 14-18, and 21-24 are obvious over Yoshida in view of Iguchi and the knowledge of a POSITA.

122. It is my opinion that claims 1-5, 8-12, 14-18, and 21-24 of the '277 patent are obvious over Yoshida in view of Iguchi and the knowledge of a POSITA. Appendix A is a claim chart detailing my invalidity analysis, which compares the prior art to the claim elements and further describes the teachings, suggestions, and motivations to combine the references.

X. Conclusion

123. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross examination in the case and that cross examination will take place within the United States. If called for cross-examination, I will appear for cross examination within the United States during the allotted period.

124. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are

believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed this 30th day of September, 2025.

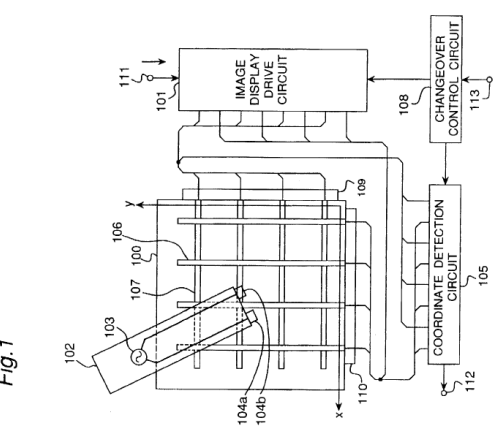
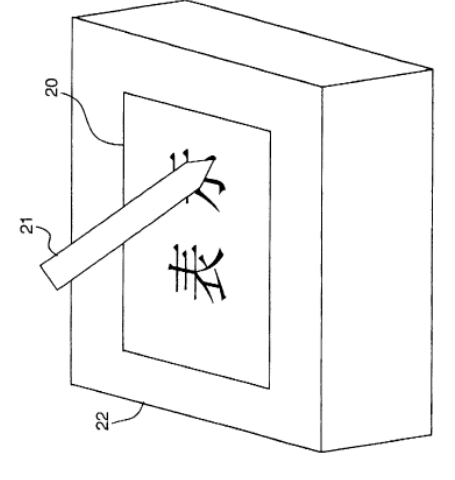
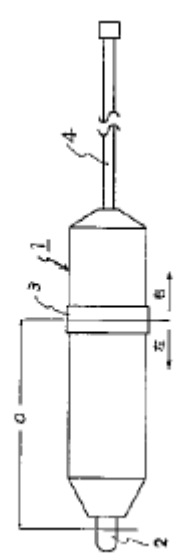
Respectfully submitted,

A handwritten signature in black ink that reads "Ricardo Valerdi". The signature is written in a cursive style with a large, stylized 'R' and 'V'.

Ricardo Valerdi, Ph.D.

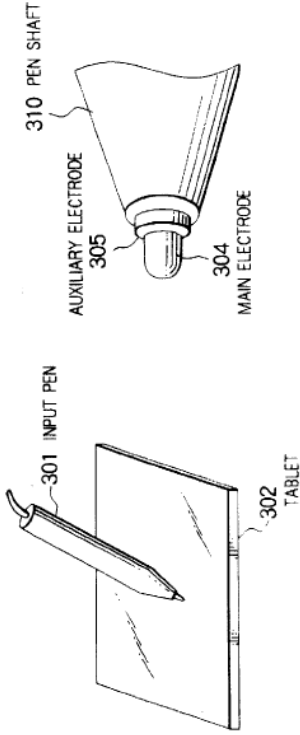
APPENDIX A
Yoshida in view of Ikeda or Iguchi
U.S. Patent No. 10,108,277

Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
Claim 1 (Ind. Claim)		
1[pre] A pen-shaped position indicator configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:	YOSHIDA discloses a pen-shaped electronic pen 21, which capacitively couples with a sensor surface. YOSHIDA, Figs. 1 and 2, 19:66-20:1 (“the electric field generator 102 shown in FIG. 1 is incorporated in a pen-shaped electronic pen 21”). YOSHIDA also discloses that “a signal which is generated by an electric field generated from the electrodes of the coordinate pointing device at the electrodes of the panel coupled through an electrostatic capacitive coupling with the coordinate pointing device is detected.” YOSHIDA, 14:62-67; <i>see also id.</i>, 22:28-39; 25:28-35; Fig. 2.	<u>IKEDA</u> IKEDA discloses a coordinate detection pen that capacitively couples with a sensor surface. IKEDA, [0005], Figs. 1, 5. Specifically, IKEDA discloses a coordinate input device comprising a coordinate detection pen by capacitance coupling, with a detection unit for detecting a coordinate in a coordinate indicating unit of the pen and a detection unit for detecting an angle in a pen body unit of the pen: “[A] coordinate input device comprising a tablet with multiple electrode lines in the X and Y axis directions and a coordinate detection pen utilizing capacitive coupling with the tablet's electrode lines. The device includes a detection unit for detecting coordinates at the coordinate indicating part of the coordinate detection pen and two detection electrode units: one for detecting coordinates and another for detecting angles at the pen body of the aforementioned coordinate detection pen, enabling the detection of the tilt angle of the aforementioned coordinate detection pen itself and the direction of the pen on the coordinate input

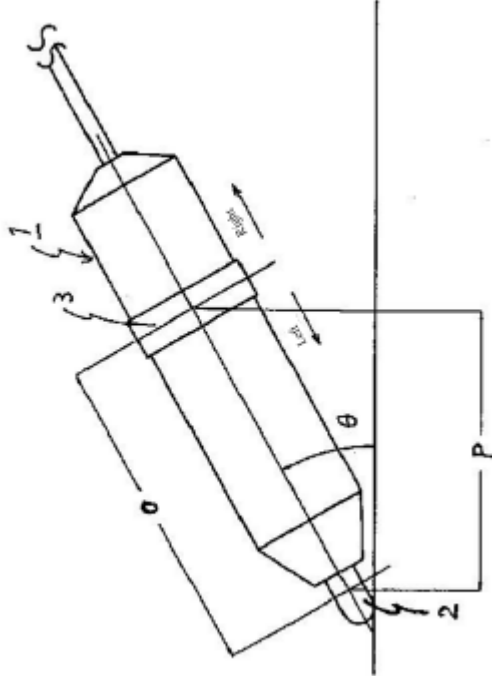
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	  <i>Fig. 1</i> <i>Fig. 2</i>	device.” IKEDA, [0005]; see also <i>id.</i>, [0001] (“This invention relates to an apparatus for detecting electrode line signals on the board surface of a coordinate input device using capacitive coupling.”), Figs. 1, 5. 【図 1】  IKEDA Fig. 1

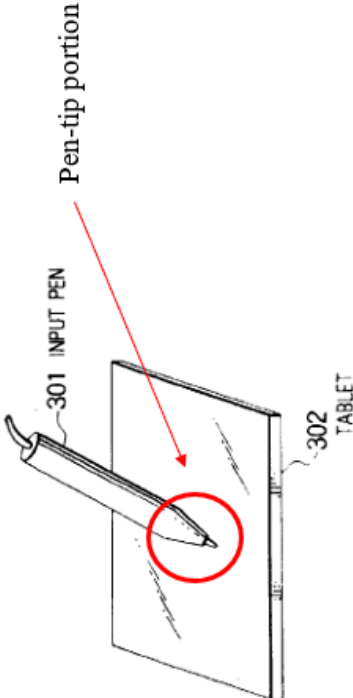
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		IKEDA Fig. 5 discloses capacitive coupling through multiple detection electrodes. IKEDA, Fig. 5. A POSITA would have recognized that capacitive coupling is a fundamental mechanism in coordinate input devices and that integrating multiple detection electrodes enhances precision in determining both position and angle. YOSHIDA discloses a capacitive stylus system utilizing multiple electrodes, while IKEDA explicitly teaches a coordinate detection pen that capacitively couples with a sensor surface and includes dedicated detection units for positional and angular measurements. Given the widespread

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		adoption of capacitive input technology, a POSITA would have understood that modifying YOSHIDA's stylus system in view of IKEDA would be a predictable and advantageous improvement, reinforcing tilt detection capabilities and enhancing overall input accuracy through the use of multiple capacitive detection electrodes. <u>IGUCHI</u> IGUCHI discloses a capacitive pen system in which multiple electrodes interact with a sensor surface, forming capacitive relationships. Specifically, IGUCHI discloses that an electric field is generated from the stylus electrodes and capacitively coupled with the sensor surface to provide positional data. IGUCHI, Figs. 26a, 26b, 30:25-29 ("[t]he main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310" and "[t]he auxiliary electrode 305 is arranged around this main electrode 304").

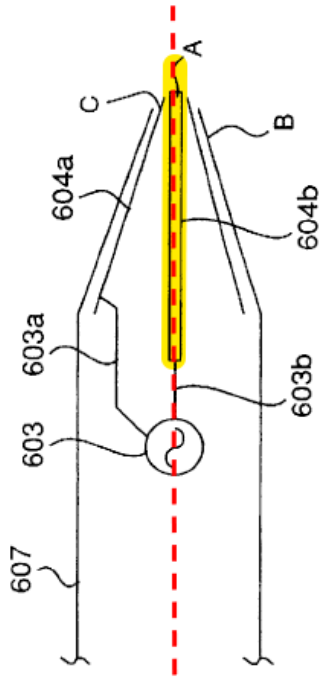
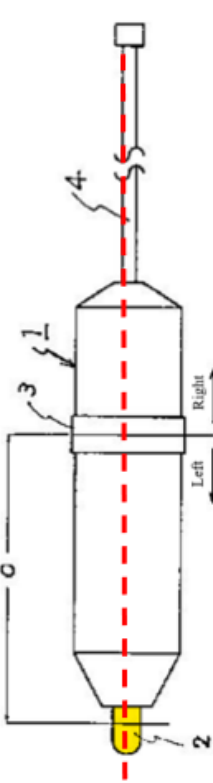
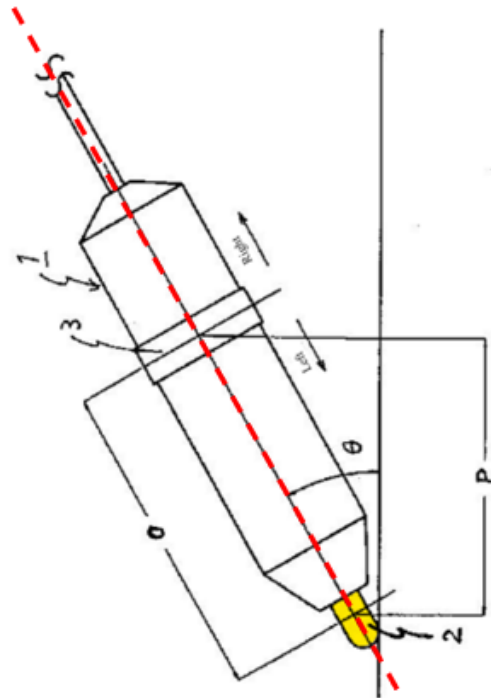
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		FIG. 26a  FIG. 26b A POSITA would have recognized that capacitive stylus systems rely on multiple electrodes to facilitate accurate position detection and signal differentiation. YOSHIDA discloses a capacitive stylus with multiple electrodes that interacts with a sensor surface, while IGUCHI further reinforces this concept by demonstrating a system where multiple electrodes generate capacitive relationships to improve positional tracking. A POSITA would have found it obvious to incorporate IGUCHI's structured electrode arrangement into YOSHIDA's capacitive stylus system to enhance detection precision, as using multiple capacitive elements to refine position

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		data was a well-known and predictable design choice in the field of coordinate input devices.
1[a] a pen-shaped body having a pen-tip portion;	YOSHIDA discloses a pen-shaped body with a pen-tip portion. YOSHIDA, Fig.2. YOSHIDA's Fig. 2 illustrates a pen-shaped electronic pen 21 featuring a distinct pen-tip portion, which serves as the primary contact point for capacitive coupling. This figure provides a side view of the pen, highlighting its elongated cylindrical body and the tapered tip designed for interaction with a sensor surface.	<u>IKEDA</u> IKEDA discloses a coordinate detection pen with a pen tip portion (“detection unit 2”): “Fig. 1 is a configuration diagram of the coordinate detection pen of this invention, where an axis-shaped detection unit 2 is positioned at the tip of the coordinate indicated point, and a ring-shaped detection unit 3 for indicating the angle is positioned on the body of the coordinate detection pen.” IKEDA, [0008], Figs. 1 (block diagram of the coordinate detection pen showing key components), 5 (shows coordinate detection pen with tilt detection). IKEDA Fig. 1

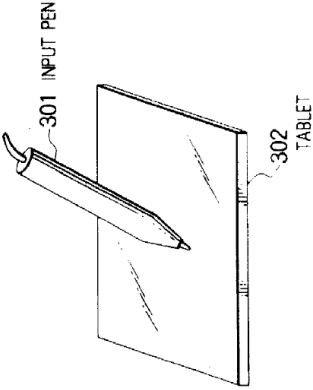
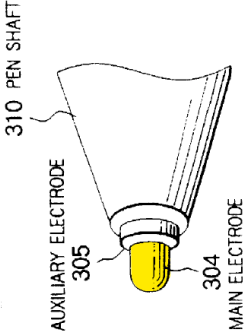
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		[Fig.5]  IKEDA Fig. 5 A POSITA would have recognized that capacitive input devices commonly utilize a pen-shaped body with a distinct pen-tip portion to facilitate precise interaction with a sensor surface. Given that YOSHIDA discloses a pen-shaped stylus with capacitive coupling and IKEDA explicitly discloses a coordinate detection pen with a defined pen-tip portion for input detection, a POSITA would have understood that incorporating IKEDA's pen structure into YOSHIDA's system represents a

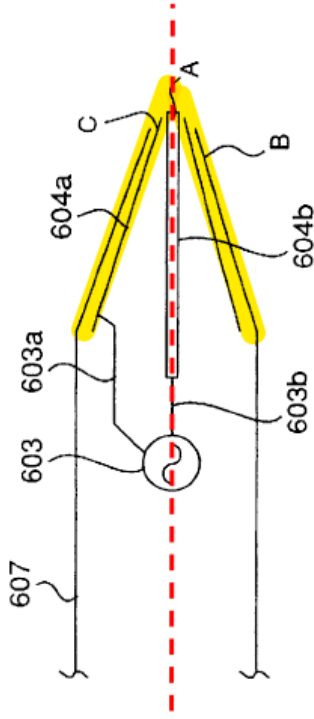
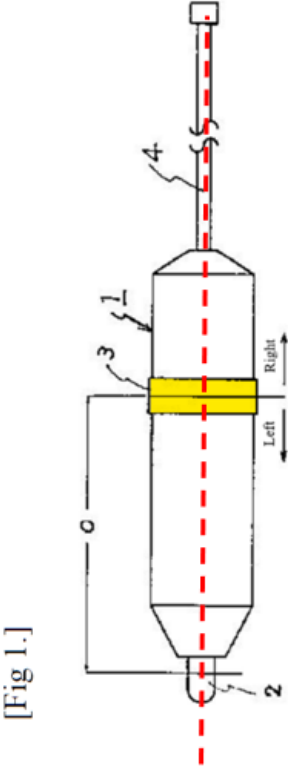
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		predictable and routine application of known design principles. The combination of YOSHIDA's capacitive stylus system with IKEDA's detailed pen structure would have been an obvious refinement to optimize capacitive signal detection and stylus positioning. <u>IGUCHI</u> IGUCHI discloses a capacitive pen system that includes a pen-shaped structure with a main electrode at the tip. IGUCHI, Fig. 26a, 30:25-29. FIG. 26a  A POSITA would have recognized that capacitive input devices commonly incorporate a pen-shaped

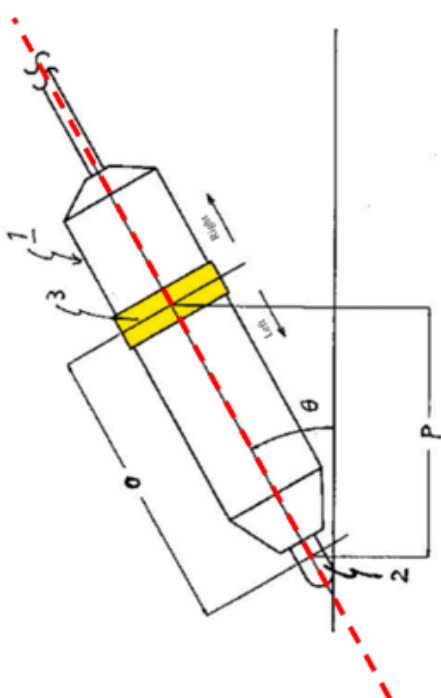
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		structure to facilitate stable and accurate interaction with a sensor surface. IGUCHI discloses a capacitive pen system with a pen-shaped body and a main electrode positioned at the tip, reinforcing the conventional design principles for capacitive styluses. Given YOSHIDA's disclosure of a capacitive stylus and IGUCHI's explicit depiction of a pen-shaped input device with a tip electrode, a POSITA would have understood that modifying YOSHIDA's stylus system in view of IGUCHI would be a predictable optimization to improve capacitive signal transmission and precision in input detection.
1[b] a first electrode arranged at a first position of the pen-tip portion;	YOSHIDA discloses a rod-shaped inner electrode 604b at the pen-tip portion of the pen-shaped electric field generator 607. YOSHIDA, Fig. 6A.	<u>IKEDA</u> IKEDA discloses a first electrode on a coordinate detection pen tip: "[A] coordinate detection electrode (first detection unit) is positioned at the tip of the coordinate detection pen, and a ring-shaped coordinate detection electrode (second detection unit) for angle reading is placed on the body of the coordinate detection pen." IKEDA, [0006], Figs. 1, 5.

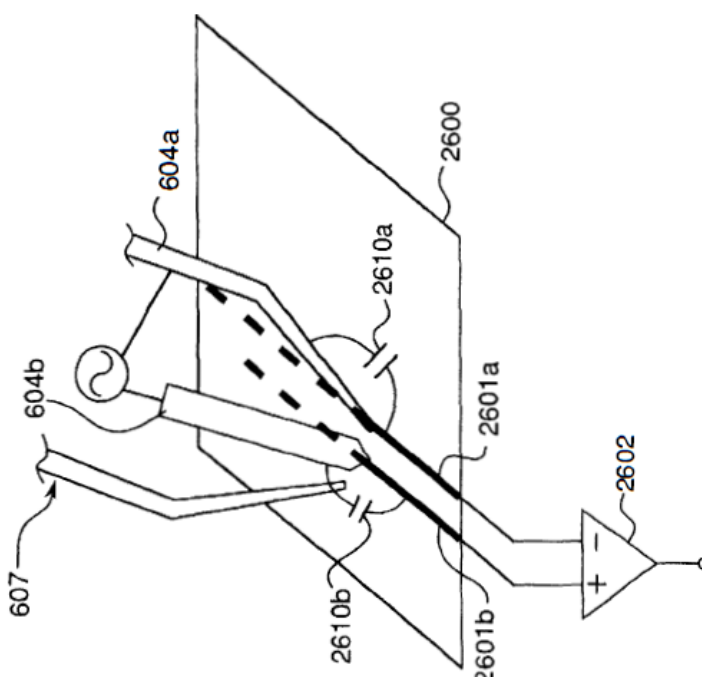
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	Fig. 6A  In Figure 6A of YOSHIDA, a rod-shaped inner electrode 604b is depicted at the pen-tip portion. This cross-sectional view shows the internal configuration of the pen tip, where the inner electrode is located along the central axis of the pen, facilitating capacitive coupling with the sensor surface.	[Fig 1.]  IKEDA Fig. 1 [Fig.5]  IKEDA Fig. 5

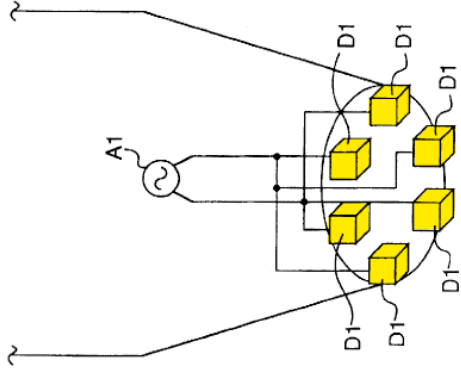
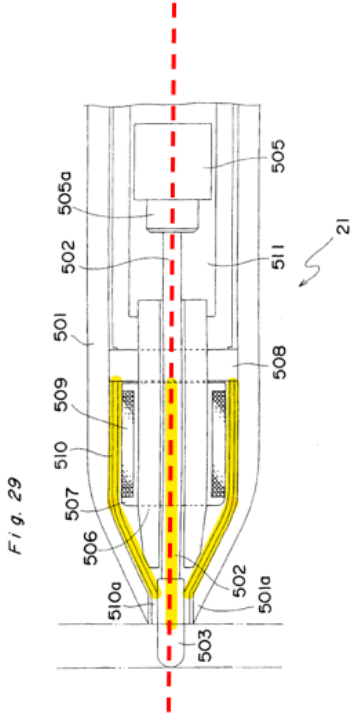
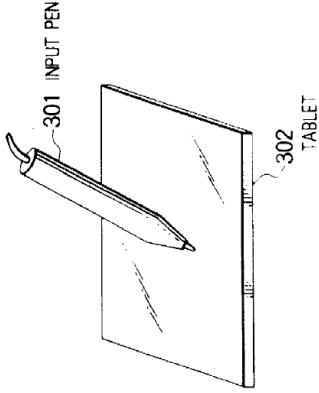
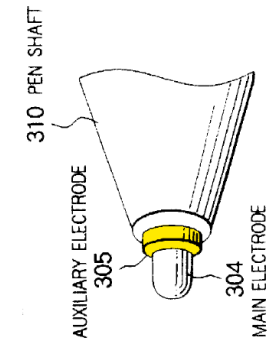
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		A POSITA would have understood that capacitive styluses commonly employ a first electrode at the tip to facilitate signal detection and coordinate tracking. A POSITA would have found it obvious to integrate IKEDA's electrode configuration into YOSHIDA's stylus to optimize capacitive coupling and improve signal differentiation, as arranging detection electrodes at the tip was a known and predictable design choice in capacitive input devices. <u>IGUCHI</u> IGUCHI discloses a main electrode 304 at the end tip of the pen shaft, which is positioned to interact capacitively with the sensor surface. IGUCHI, Fig. 26a, Fig. 26b, 30:25-29 ("[t]he main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310" and "[t]he auxiliary electrode 305 is arranged around this main electrode 304.").

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		FIG. 26a  FIG. 26b  A POSITA would have recognized that positioning a main electrode at the tip of a capacitive stylus enhances signal transmission and interaction with the sensor surface, ensuring accurate coordinate detection. IGUCHI explicitly discloses a main electrode 304 arranged at the end tip of the pen shaft, reinforcing that this configuration was a well-known design principle in capacitive input technology. Integrating IGUCHI's electrode placement into YOSHIDA's stylus would have been an obvious design choice to improve capacitive coupling efficiency and facilitate precise input detection, as capacitive stylus systems commonly employ such electrode positioning to optimize performance.

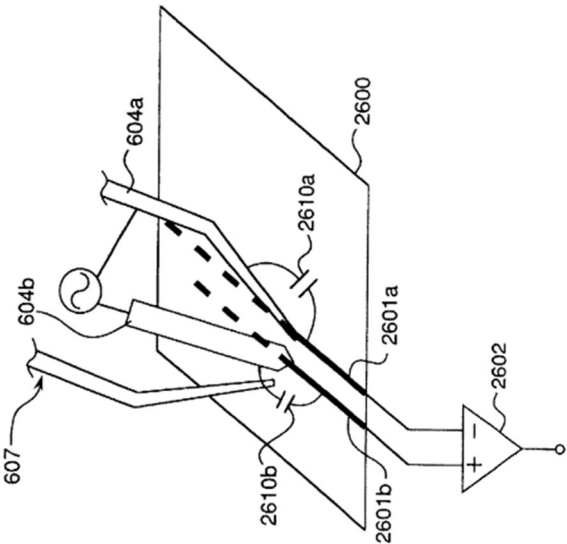
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1[c] a second electrode arranged at a second position of the pen-tip portion different from the first position, the second position being off an axis of the pen-shaped position indicator;	YOSHIDA discloses a megaphone-shaped outer electrode 604a positioned differently from the first electrode and off-axis of the pen-shaped position indicator. YOSHIDA, Fig.6A; 25:8-57. Fig.6A  Referring to Fig.6A of YOSHIDA, a megaphone-shaped outer electrode 604a is also arranged at the pen-tip portion of the pen-shaped electric field generator 607, and the second position of the outer electrode 604a is different from the first position of the inner electrode 604b. Fig. 6A also shows that the position of the outer electrode 604a is off an axis of the pen-shaped position indicator. The outer electrode 604a	<u>IKEDA</u> IKEDA discloses a ring-shaped coordinate detection electrode for angle reading positioned differently from the first electrode: “[A] ring-shaped coordinate detection electrode (second detection unit) for angle reading is placed on the body of the coordinate detection pen.” IKEDA, [0006], Figs. 1, 5.  [Fig 1.] IKEDA Fig. 1

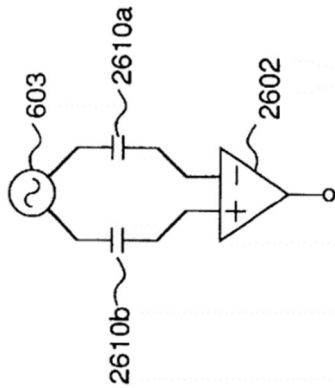
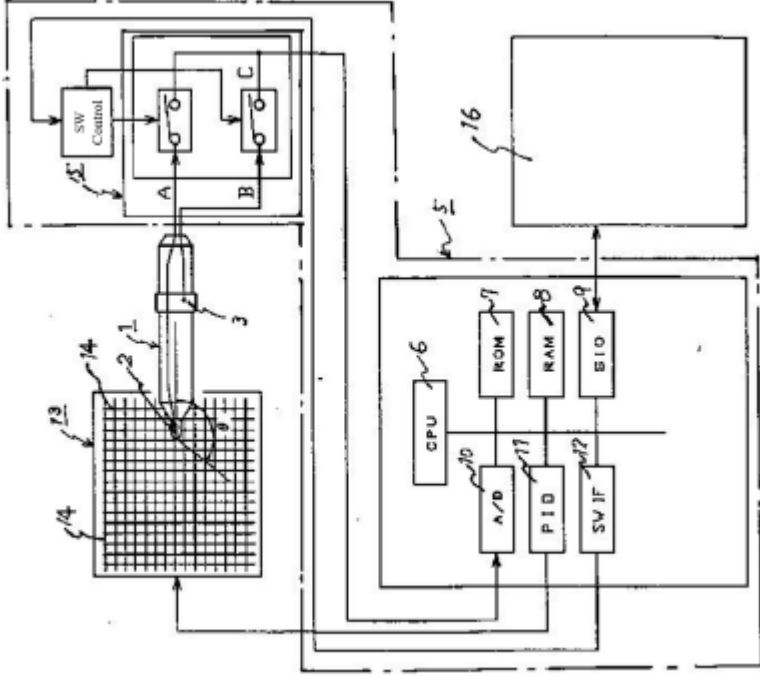
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103) surrounds the inner electrode 604b asymmetrically, creating an off-axis arrangement that contributes to detection of angle or tilt information when the pen-shaped indicator interacts with the sensor surface. This arrangement is evident in this cross-sectional depiction, where the outer electrode surrounds the inner electrode asymmetrically, contributing to the detection of tilt or angle when interacting with the sensor surface. <i>See also</i> Figs. 26, 28 (disclosing non-coaxial structure), and 29.	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		[Fig.5]  IKEDA Fig. 5 IKEDA discloses a ring-shaped detection electrode positioned away from the tip electrode, which forms a capacitive relationship at a different position along the stylus body. IKEDA, Fig. 5, [0006]. This configuration inherently creates an off-axis capacitive field, which a POSITA would recognize as enabling tilt detection. A POSITA would have understood that positioning a second electrode at a different location along the stylus body, as disclosed in IKEDA, enhances capacitive sensing by enabling angle detection

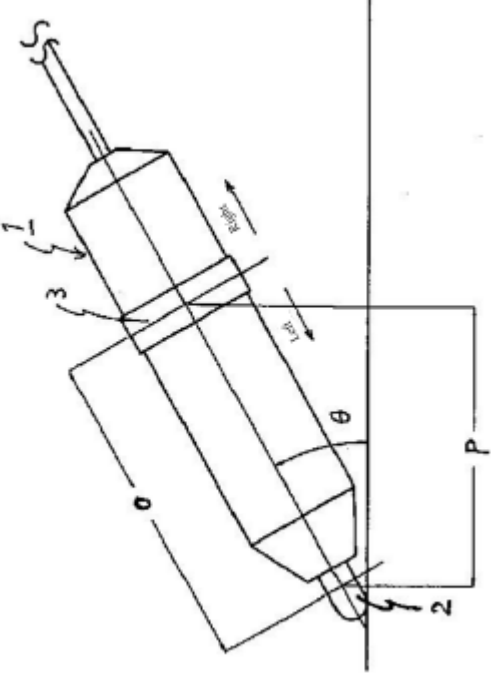
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	Fig.26 	through variations in capacitive coupling. The ring-shaped detection electrode in IKEDA, positioned away from the tip electrode, inherently forms an off-axis capacitive field that allows for improved tilt measurement. Modifying YOSHIDA’s stylus to incorporate a second electrode as shown in IKEDA, would have been an obvious and predictable design choice to refine stylus-based capacitive input systems, as capacitive electrode placement was a well-known method for improving spatial and angular tracking accuracy. A POSITA would have been motivated to combine IKEDA’s disclosure of a ring-shaped detection electrode with YOSHIDA’s stylus design to achieve more precise angle detection without resorting to complex or expensive mechanical sensors. Both references operate in the field of capacitive stylus technology and address similar problems, making their combination a logical and straightforward step for a POSITA. The desire to improve performance by enabling detection of not only position but also tilt and angular information was driven by commercial demand for more advanced input devices, as evidenced by widespread touchscreen and stylus development in the prior art. This combination represents a predictable application of

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	<i>Fig.28</i>  <i>Fig. 29</i> 	known techniques to achieve enhanced functionality and improved angular detection accuracy without adding mechanical sensors. <u>IGUCHI</u> IGUCHI discloses an auxiliary electrode 305 arranged around the main electrode 304, forming an off-axis capacitive interaction with the sensor surface. IGUCHI, Figs. 26a, 26b, 30:25-29. FIG. 26a  FIG. 26b  A POSITA would have recognized that positioning an auxiliary electrode around the main electrode, as disclosed in IGUCHI, creates an off-axis capacitive interaction that enhances signal differentiation and enables more precise tilt detection. The arrangement

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		of the auxiliary electrode 305 in IGUCHI demonstrates a well-known approach to improving capacitive input accuracy by detecting changes in electrostatic coupling caused by stylus inclination. Modifying YOSHIDA’s stylus to incorporate a second electrode positioned as shown in IGUCHI, would have been an obvious design choice for optimizing capacitive sensing capabilities, particularly in applications requiring enhanced angular detection.
1[d] a signal production circuit configured to generate first and second signals that are distinguishable from each other; and	YOSHIDA discloses a signal production circuit that generates first and second signals that are distinguishable from each other. Specifically, YOSHIDA discloses “in a manner as shown in FIG.26, when electrodes 2601a and 2601b provided in an LCD panel 2600 are connected to a differential amplifier 2602 . . .” (YOSHIDA, 26:12-16) and “as shown in FIG, 26. the outer electrode 604a and the inner electrode 604b are coupled most intensely with the electrodes 2601a and 2601b via capacitors 2610a and 2610b. In the above place, electric fields applied to the outer electrodes 604a and 604b are opposite in phase to each other.” YOSHIDA, 26:19-26, Fig. 26. Thus, the first and	<u>IKEDA</u> IKEDA describes two detection units for coordinate and angle determination, indicating that its system produces separate signals for positional tracking and angular displacement. IKDEA, Fig. 3, [0008] (“[C]oordinate detection is performed using the two detection units 2 and 3, and the coordinate data detected via electrostatic capacitance coupling with the tablet’s electrodes . . . is applied to the main body 5 of the coordinate input device . . .”). Additionally, the electrical block diagram (Fig. 3) illustrates how signals are processed: “The main body 5 of the coordinate input device includes a CPU 6 for performing coordinate control, a ROM 7

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	second signals generated using electrodes 604a and 604b are distinguishable from each other. <i>Fig.26</i>  YOSHIDA further discloses in Figure 27 that the AC power source 603 of the electric field generator connects to the differential amplifier 2602 via capacitors 2610a and 2610b, demonstrating how distinguishable signals are applied to the electrodes in a stylus system. YOSHIDA, Fig. 27, 26:31-35. Specifically, YOSHIDA also discloses “[a]n	storing the program for coordinate control, a RAM 8 for storing the detected coordinate data and the reference dimensions O corresponding to the two detection units 2 and 3 of the coordinate detection pen 1” IKEDA, [0009], Fig. 3 (electrical block diagram).

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	electric equivalent circuit corresponding to the arrangement of FIG. 26 is shown in FIG. 27” and “[a]s shown in FIG.27, the AC power source 603 included in the electric field generator 607 is connected to the differential amplifier 2602 via the capacitors 2610a and 2610b”. YOSHIDA, Fig. 27, 26:31-35. These signals interact with the sensor surface in operation, ensuring they are transmitted through conductive pathways and maintaining distinct phase relationships. <i>Fig.27</i>  YOSHIDA’s Figure 27 presents a schematic diagram of the electronic pen’s circuitry, including an AC power source 603 (a signal production circuit) connected to electrodes 604a and 604b as	[Fig. 3]  IKEDA Fig. 3 IKEDA further discloses that signals from the detection units are used for angle determination: “Using the coordinate data from the two detection units 2 and 3 stored in the regions of RAM 8, the

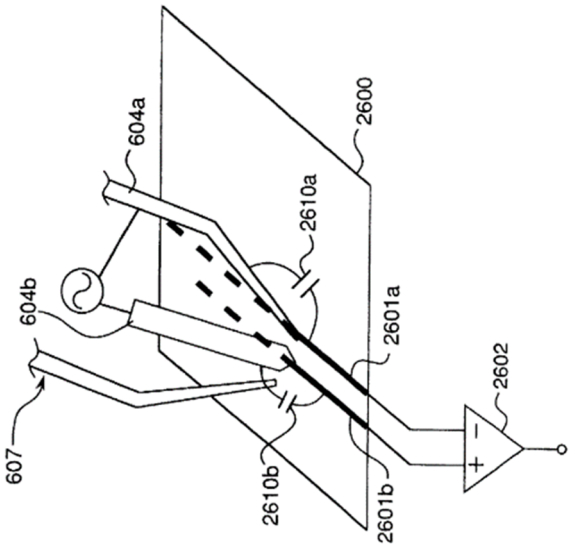
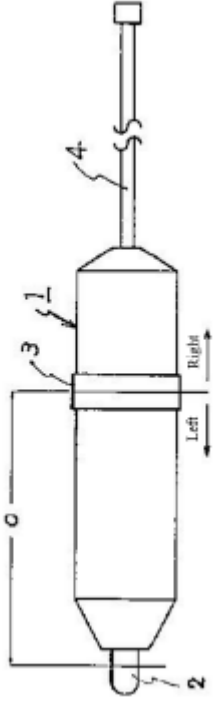
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	depicted in Fig. 26. The output of the AC power source 603 applied to the outer electrodes 604a and the inner electrode 604b are opposite in phase to each other. The phase of the first signal to the inner electrode 604b is inverted with respect to the phase of the second signal to the outer electrode 604a. The diagram indicates that the power source generates distinguishable signals applied to the electrodes, with annotations suggesting opposite phases or differing frequencies to facilitate signal differentiation. Additionally, YOSHIDA Figure 27 expands on the signal transmission process, illustrating how the signals interact with the sensor surface during operation.	dimensional control program converts the dimensions between the detection unit for coordinate detection and the detection unit for angle detection, storing the angle dimension P where the coordinate detection pen 1 is located in RAM 8 of the coordinate input device.” IKEDA, [0013], Fig. 5. [Fig.5]  YOSHIDA discloses an AC power source that generates distinguishable signals through differential capacitive coupling, providing opposite-phase outputs from a signal production circuit. IKEDA further describes multiple detection units that generate separate signals for coordinate and angle

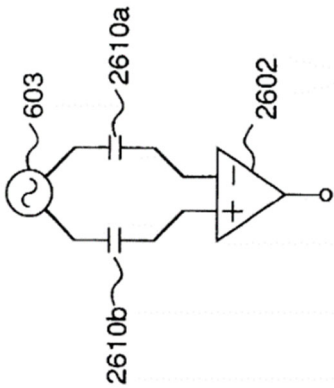
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		determination. A POSITA would recognize that incorporating IKEDA's detection system into YOSHIDA's stylus configuration would enhance signal processing for both coordinate and angular tracking, further confirming distinguishable signals. A POSITA would understand that generating distinguishable signals for multiple electrodes is essential to capacitive stylus operation. YOSHIDA discloses such signals via opposite-phase outputs from a signal production circuit, and IKEDA reinforces the same principle by showing distinguishable signals for coordinate and angle detection. A POSITA would have been motivated to combine IKEDA's disclosure of a signal-separation approach with YOSHIDA's stylus circuitry because both references operate in the common field of capacitive stylus technology and address similar problems of improving signal processing. A POSITA would have recognized that combining these teachings would predictably enable a more robust system for distinguishing positional and angular information, thereby enhancing detection accuracy. The combination would also improve performance by meeting the commercial demand for

Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		more sophisticated input devices with enhanced accuracy for both position and angle detection. <u>IGUCHI</u> IGUCHI discloses capacitive signal differentiation, where time-differentiated signals from capacitive electrodes encode positional information. IGUCHI, Fig. 29b. FIG. 29a FIG. 29b ($\theta = 90^\circ$) ($\theta = 45^\circ$)

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		IGUCHI further discloses: "The main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310. The auxiliary electrode 305 is arranged around this main electrode 304." IGUCHI, 30:25-29. IGUCHI also discloses: "Since the auxiliary electrode is located in a position separated from the main electrode, coordinates of the main and auxiliary electrodes with respect to a tablet plate are separately detected when the pen shaft is inclined" and that "[i]nclination data of the pen shaft can be taken out by a difference between timing signals caused by a difference between these coordinates." IGUCHI, 15:6-12. This confirms that IGUCHI describes a system in which signals from different electrodes are separately detected, supporting the generation of distinguishable signals. A POSITA would have recognized that capacitive input systems inherently generate and differentiate signals based on electrode positioning and coupling dynamics. IGUCHI explicitly discloses time-differentiated capacitive signals that encode positional information, demonstrating a method for distinguishing signals based on temporal variations. IGUCHI, Fig. 29b. By modifying YOSHIDA's signal production circuit to incorporate IGUCHI's

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		time-differentiation techniques, a POSITA would have found it obvious to enhance signal distinguishability for improved stylus input detection. Given that both references address capacitive input devices and signal processing, integrating IGUCHI’s time-dependent capacitive variations into YOSHIDA’s stylus system would have been a predictable design choice to refine signal resolution and tracking accuracy.
1[e] conductive lines extending between the signal production circuit and the first and second electrodes, respectively,	YOSHIDA discloses conductive lines transmitting signals between AC power source 603 and electrodes 604a, 604b. YOSHIDA, Figs. 26, 27. The signal of the AC power source 603 (the “signal production circuit”) is applied to the outer electrodes 604a and the inner electrode 604b (the “first and second electrodes”) through conductive lines. <i>Id.</i> at 26:31–35 (“the AC power source 603 included in the electric field generator 607 is connected to the differential amplifier 2602 via the capacitors 2610a and 2610b,” showing each electrode coupled through separate conductive pathways.)	<u><i>IKEDA</i></u> Ikeda discloses that the tip detection unit 2 and body detection unit 3 are connected by conductive lines to processing circuitry. Ex. 1006, ¶[0008] (“an axis-shaped detection unit 2 is positioned at the tip. . .and a ring-shaped detection unit 3 for indicating the angle is positioned on the body of the coordinate detection pen”), with Figure 1 depicting the physical connection, and Figure 3 showing the signal flow from both electrodes to the CPU 6, ROM 7, and RAM 8. <i>Id.</i> , ¶[0009], Fig. 3.

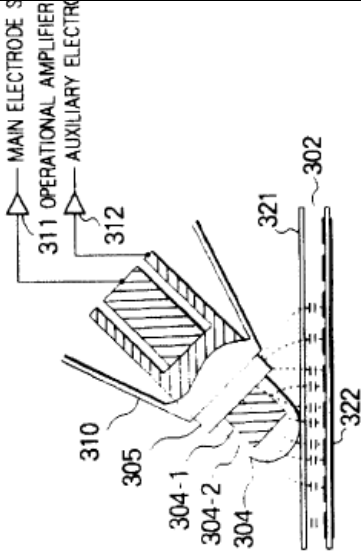
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
	Fig. 26  YOSHIDA's Figure 26 illustrates the internal circuit of the pen, where conductive lines extend between the AC power source 603 and the first and second electrodes (604a, 604b). These conductive lines serve as the transmission medium for signals from the power source to the electrodes, ensuring proper operation of the capacitive coupling mechanism. <i>See also</i> Figs. 27 and 6A (cross-sectional view illustrating the electrode structure and connections inside the pen); 24:66-25:14 (“As shown in FIG. 6A, the electric field generator 607	[Fig 1.]  IKEDA further discloses: “[C]oordinate detection is performed using the two detection units 2 and 3, and the coordinate data detected via electrostatic capacitance coupling with the tablet's electrodes . . . is applied to the main body 5 of the coordinate input device through a cable 4 connected to the coordinate detection pen 1.” IKEDA, [0008], Fig. 3. In addition, IKEDA discloses, “The main body 5 of the coordinate input device includes a CPU 6 for performing coordinate control, a ROM 8 for storing the program for coordinate control, a RAM 8 for storing the detected coordinate data and the reference dimensions 0 corresponding to the two detection units 2 and 3 of the coordinate detection pen 1” IKEDA, [0009], Fig. 3. This confirms that IKEDA discloses a signal transmission structure using

Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103) has a structure in which both the output terminals of the AC power source 603 are connected to the outer electrode 604a and the inner electrode 604b of the coaxial electrode.”) <i>Fig.27</i> 	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”) conductive connections from a detection unit to an external system. Additionally, IKEDA Figure 3 discloses an electrical block diagram showing the signal paths and interconnections of the stylus system, reinforcing that conductive pathways are used to transfer signals from the detection pen to processing electronics. IKEDA, Fig. 3.
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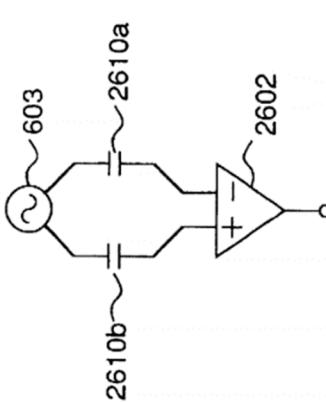
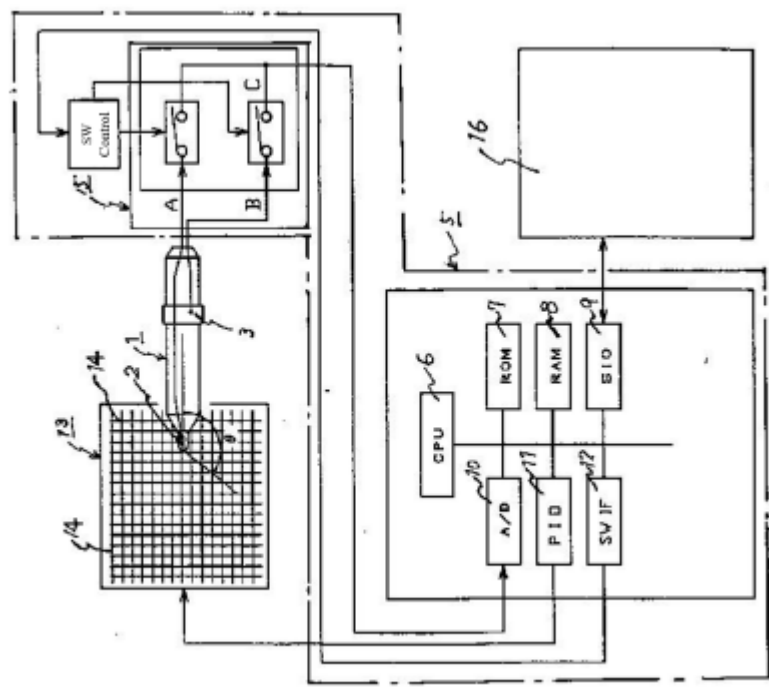
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	Fig. 6A	[Fig. 3] YOSHIDA discloses conductive lines that extend between a signal production circuit and electrodes arranged in the pen-tip portion. IKEDA explicitly describes a structure where capacitive signals detected at the stylus tip are transmitted via conductive lines to a processing unit.

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		A POSITA would have understood that conductive lines are necessary to route signals from electrodes within the pen to the signal production circuit, and that capacitive stylus systems commonly include such conductive pathways. Both YOSHIDA and IKEDA explicitly show conductive connections, confirming that these configurations were well known in the field. Incorporating IKEDA's explicit disclosure of conductive connections into YOSHIDA's stylus design would have been a routine application of known stylus design principles. A POSITA would have been motivated to combine YOSHIDA and IKEDA's disclosures because both references address the same fundamental challenge: routing signals between electrodes and signal-generation circuitry. Combining their teachings would predictably result in a practical and reliable electrical connection scheme, improving manufacturing efficiency and ensuring accurate transmission of distinct signals. Given the strong commercial push for styluses with increased capabilities, a POSITA would have recognized the benefit of leveraging IKEDA's clearly illustrated

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		wiring techniques alongside YOSHIDA’s electrode layout to build a higher-performance, market-ready device. <u>IGUCHI</u> IGUCHI discloses conductive connections between the main and auxiliary electrodes and associated circuits. Specifically, IGUCHI discloses: “Since the auxiliary electrode is located in a position separated from the main electrode, coordinates of the main and auxiliary electrodes with respect to a tablet plate are separately detected when the pen shaft is inclined.” IGUCHI, 15:6-12. Further, IGUCHI’s Figure 27c shows the arrangement of electrodes and connections, supporting that the capacitive signals are transmitted through conductive pathways. IGUCHI, 31:5-11, Fig. 27c.

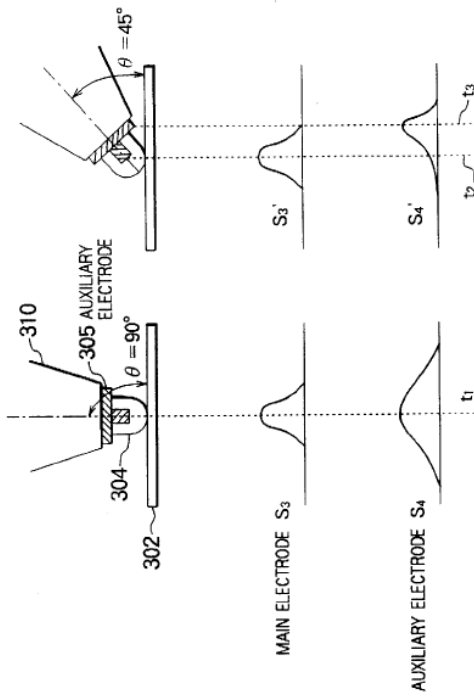
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		FIG. 27c  Additionally, IGUCHI discloses: "[T]he main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310" and "[t]he auxiliary electrode 305 is arranged around this main electrode 304." IGUCHI, 30:25-29. This demonstrates the structured connectivity within IGUCHI's capacitive stylus system. A POSITA would have recognized that capacitive stylus systems inherently require conductive pathways to transmit signals between multiple electrodes and a processing circuit. IGUCHI explicitly discloses a structured configuration where the main and auxiliary electrodes are positioned separately and interact with the sensor surface through capacitive coupling, confirming the

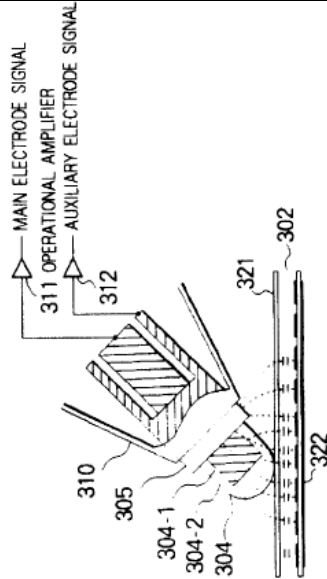
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		presence of distinct signal transmission paths. IGUCHI further describes how capacitive signals are detected independently at different electrode locations, demonstrating that conductive connections are necessary for accurate position and inclination tracking. Incorporating IGUCHI's disclosure of structured conductive pathways into YOSHIDA's stylus system would have been a predictable and straightforward modification, as capacitive input devices commonly employ multiple electrodes connected through conductive lines to facilitate signal transmission. A POSITA would have understood that integrating IGUCHI's signal transmission structure into YOSHIDA's system would enhance the accuracy of capacitive detection by ensuring reliable signal propagation between the electrodes and the processing circuitry.
1[f] wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to	YOSHIDA discloses capacitive coupling between electrodes 604a, 604b and the LCD panel electrodes 2601a, 2601b. YOSHIDA, Fig.26, 27:5-7 (“the outer electrode 604a and the inner electrode 604b are coupled most intensely with the electrodes 2601a and 2601b via capacitors 2610a and 2610b”).	<u>IKEDA</u> IKEDA describes a coordinate detection pen where signals are transmitted to multiple detection electrodes via circuit pathways. Specifically, IKEDA discloses: “[C]oordinate detection is performed using the two detection units 2 and 3, and the coordinate data detected via electrostatic capacitance coupling with the tablet's electrodes . . . is applied to the main body 5 of the coordinate input device

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	Fig.27  YOSHIDA also discloses “[i]n the experiment shown in FIG. 7, a potential difference across a pair of adjoining segment electrodes 202 was detected . . . a y-coordinate value of the electrodes 604a and 604b of the electric field generator 607 can be obtained . . .” YOSHIDA, 27:5-16. YOSHIDA also discloses “by performing two times similar detection operations from the segment electrode side and from the common electrode side so as to detect and decide the coordinates of the bottom portion of each double-humped output obtained, the coordinates of the bottom portion correspond to the coordinates of the position in which the electrodes 604a and 604b are located.	[Fig. 3]  YOSHIDA discloses that the first and second signals from the signal production circuit are transmitted via conductive lines to the first and second electrodes, which then capacitively couple with the sensor surface to transmit distinct detection signals. IKEDA

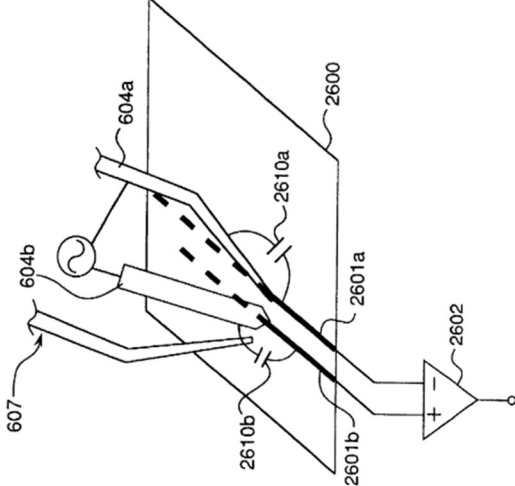
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	Therefore the coordinates (x, y) of the position in which the electrodes 604a and 604b of the electric field generator 607 are located can be specified". YOSHIDA, 27:17-25. YOSHIDA further discloses that the electrodes 202 of LCD panel 200 can detect the coordinates (x, y) of the position in which the electrodes 604a and 604b are located.	reinforces this principle by showing capacitive data paths from multiple electrodes to the processing circuitry, confirming that such coupling mechanisms were standard in the field. Both references, therefore, disclose that the first and second signals are configured to capacitively couple with the sensor surface. A POSITA would have understood that capacitive coupling between stylus electrodes and tablet electrodes was a well-known mechanism for transmitting distinct detection signals, and that capacitive input devices commonly employed such structured signal pathways to ensure accurate processing of positional and angular data. Integrating IKEDA's capacitive data paths into YOSHIDA's stylus system would have been a predictable and routine modification to improve signal accuracy and enable simultaneous detection of coordinate and angular information. A POSITA would have been motivated to combine YOSHIDA's and IKEDA's teachings regarding capacitive coupling because both disclose highly compatible techniques within the same field of

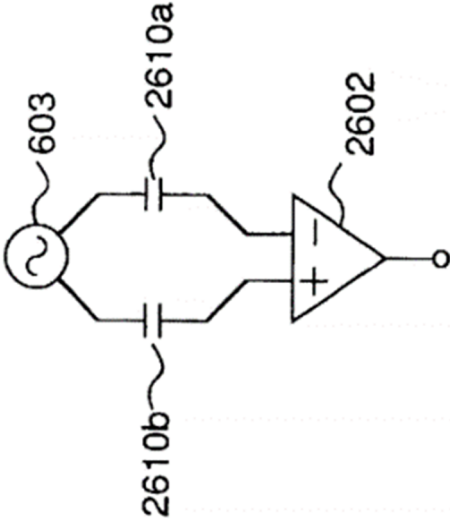
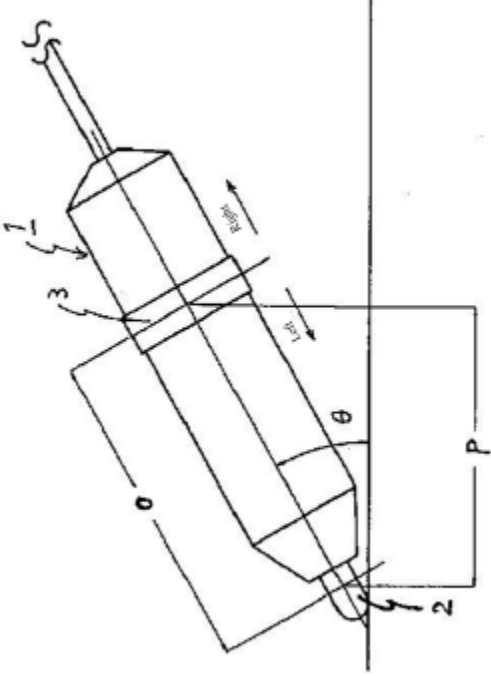
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		capacitive stylus technology. Capacitive coupling was a well-established method for transmitting stylus position and angle data, and combining these designs would predictably enhance performance by allowing the system to simultaneously process coordinate and angular information. There was a recognized market demand for advanced pen inputs in professional applications like CAD and digital illustration, making this combination an expected and commercially sensible step. <u>IGUCHI</u> IGUCHI discloses time-differentiated signals traveling through capacitive pathways, demonstrating that signal transmission via conductive lines is an inherent feature. Specifically, IGUCHI states: “[A] time difference is caused between timing t2 of a peak of an output signal S3’ provided by the main electrode and timing t3 of a peak of an output signal S4’ provided by the auxiliary electrode.” IGUCHI, 31:37-41, Fig. 29b.

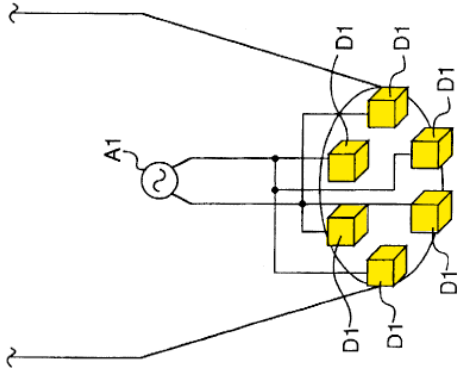
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		FIG. 29a FIG. 29b ($\theta = 90^\circ$) ($\theta = 45^\circ$)  Further, IGUCHI discloses that capacitive signals are detected by electrodes positioned at different locations, confirming the presence of transmission paths: “Since the auxiliary electrode is located in a position separated from the main electrode, coordinates of the main and auxiliary electrodes with respect to a tablet plate are separately detected when the pen shaft is inclined.” IGUCHI, 15:6-9. Additionally, IGUCHI Figure 27c provides a schematic representation of capacitive signal transmission paths, demonstrating how signals

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		generated at different electrode locations travel through conductive pathways before interacting with the sensor surface. IGUCHI, Fig. 27c, 31:5-11. FIG. 27c  A POSITA would recognize that capacitive stylus systems inherently require structured signal transmission to ensure accurate detection of positional and angular displacement. IGUCHI discloses that capacitive signals are detected by electrodes positioned at different locations and transmitted through conductive pathways, demonstrating that signal differentiation and transmission via conductive lines are essential components of capacitive stylus operation. Given YOSHIDA’s disclosure of capacitive signal generation and transmission, a POSITA would have found it obvious to incorporate IGUCHI’s structured

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1[g] wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle	YOSHIDA discloses a capacitive stylus system where multiple electrodes 604a and 604b interact with a sensor surface to generate detection signals. YOSHIDA explains that an electric field is generated from the stylus electrodes and capacitively coupled with the sensor surface to provide positional data. YOSHIDA, Figs. 26, 27, 27:13–25 (“by performing two times similar detection operations from the segment electrode side and from the common electrode side so as to detect and decide the coordinates . . . the coordinates (x, y) of the position in which the electrodes 604a and 604b of the electric field generator 607 are located can be specified”). These disclosures demonstrate that each stylus electrode independently forms a capacitive relationship with the panel’s electrode matrix, and that the positional	signal transmission methods to enhance the detection of time-differentiated capacitive signals. By integrating IGUCHI’s time-differentiated capacitive signal transmission into YOSHIDA’s capacitive stylus framework, a POSITA would recognize the predictable advantage of improved tilt detection and signal resolution, making this combination an expected and beneficial modification.
the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle	YOSHIDA discloses a capacitive stylus system where multiple electrodes 604a and 604b interact with a sensor surface to generate detection signals. YOSHIDA explains that an electric field is generated from the stylus electrodes and capacitively coupled with the sensor surface to provide positional data. YOSHIDA, Figs. 26, 27, 27:13–25 (“by performing two times similar detection operations from the segment electrode side and from the common electrode side so as to detect and decide the coordinates . . . the coordinates (x, y) of the position in which the electrodes 604a and 604b of the electric field generator 607 are located can be specified”). These disclosures demonstrate that each stylus electrode independently forms a capacitive relationship with the panel’s electrode matrix, and that the positional	<u>IKEDA</u> IKEDA discloses a capacitive stylus that detects tilt angle using multiple electrodes positioned along the stylus body. Specifically, IKEDA states: “A coordinate detection electrode (first detection unit) is positioned at the tip of the coordinate detection pen, and a ring-shaped coordinate detection electrode (second detection unit) for angle reading is placed on the body of the coordinate detection pen.” IKEDA, [0006], Fig. 5 (illustrating angle detection using capacitive coupling). Additionally, IKEDA discloses how these electrodes form capacitive relationships that allow tilt detection: “Using the coordinate data from the two detection units 2 and 3 stored in the regions of RAM 8, the dimensional control program converts the

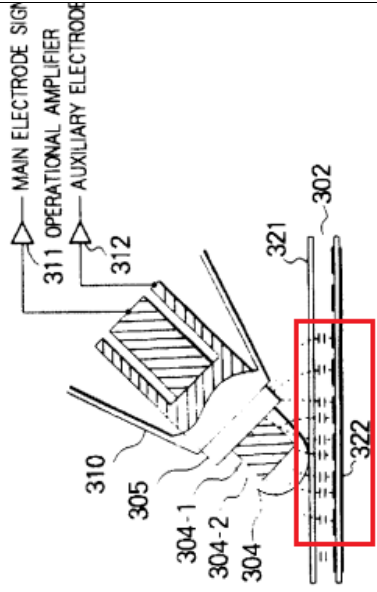
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information of the pen-shaped position indicator is obtainable.	information is extracted by comparing signals from the different capacitive couplings. <i>Fig.26</i> 	dimensions between the detection unit for coordinate detection and the detection unit for angle detection, storing the angle dimension P where the coordinate detection pen 1 is located in RAM 8 of the coordinate input device.” IKEDA, [0013], Fig. 5. Further, IKEDA confirms that capacitive stylus systems inherently generate multiple capacitive relationships for tilt detection: “By detecting each coordinate using the detection unit 2 for coordinate detection and the detection unit 3 for angle detection of the coordinate detection pen 1, control over the angle of the coordinate detection pen 1 can be achieved.” IKEDA, [0015], Fig. 5; <i>see also id.</i>, Abstract (“[Problem to be Solved]: In a coordinate input device using capacitive coupling, the presence of only one electrode for coordinate detection prevents input control based on the angle of use of the coordinate detection pen against the board surface...[Means for Solving the Problem]: An electrode for coordinate detection is arranged at the tip of the coordinate detection pen and the body of the pen. The pen body is equipped with an electrode designed to detect a ring-shaped angle.”); Claim 1 (“two detection electrode units: one for detecting coordinates and another for detecting

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	Fig.27  YOSHIDA further explains that the stylus can employ a plurality of electrodes (D1) to generate a “rotational electric field,” which provides stability against changes in roll orientation. In particular, YOSHIDA notes that “even though the pen which serves as the electric field generator rolls, the electrostatic capacity between the electrodes of the pen and the electrodes of the panel do not change.” YOSHIDA, 26:36–48; see also 8:66–9:11; 57:1–20. This teaching shows that the system can be configured so that some angular variations (such as roll) do not affect the detected signal, thereby	angles...enabling the detection of the tilt angle of the aforementioned coordinate detection pen itself”). [Fig.5]  IKEDA Fig. 5 Figure 5 of IKEDA discloses how the first detection unit is positioned at the pen tip, and the second detection unit is ring-shaped and positioned along the pen body, allowing the system to measure tilt by analyzing changes in capacitive coupling at different locations along the pen axis.

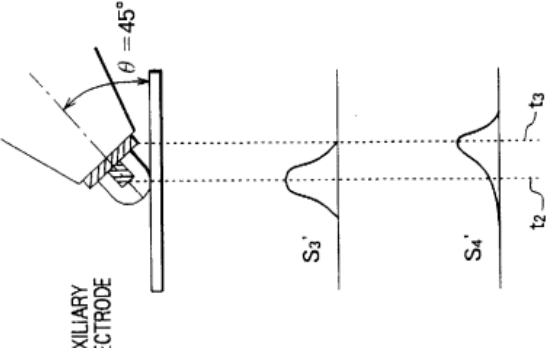
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	allowing consistent positional data even as the pen rotates. <i>Fig.28</i>  A POSITA would have understood that YOSHIDA describes a capacitive architecture in which an AC field is driven from the pen tip and sensed by the LCD panel's existing X/Y electrode matrix. Those electrodes are time-multiplexed into detection circuitry (e.g., a differential amplifier) so that the same panel hardware performs both display and input functions. In such arrangements, the mutual capacitances between the stylus electrodes and the	A POSITA would have understood that when a stylus includes multiple conductive electrodes, each electrode establishes its own capacitive coupling with the sensor surface, producing distinct relationships that can be analyzed for input data. YOSHIDA illustrates this with electrodes 604a and 604b, which form separate capacitive links with the panel's X/Y grid. IKEDA reinforces this principle by teaching that a tip electrode and an additional electrode along the pen body create distinct capacitive couplings that can be used not only for coordinate determination but also for inclination detection. A POSITA would have been motivated to integrate IKEDA's tilt-specific configuration into YOSHIDA's capacitive stylus architecture to extend its capabilities from coordinate tracking to precise angle measurement. Both references address similar design challenges in capacitive stylus technology and are directed to improving how stylus posture is sensed. Because the techniques are technically compatible, their combination would have been straightforward and would predictably yield a stylus capable of reporting both position and angular information with greater accuracy. Moreover, market demand at the time strongly favored styluses that

Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103) panel grid are the key signal carriers. Variations in those capacitances reflect not only the x–y position and distance of the pen tip, but also its angular posture relative to the surface. For example, as the pen tilts, the electric field distribution shifts asymmetrically across the panel electrodes, producing detectable differences in the capacitive coupling strengths. At the same time, YOSHIDA illustrates that by arranging electrodes to generate a rotationally symmetric field, certain angular components (such as roll) can be designed out of the measurement, thereby improving stability. A POSITA would recognize that these disclosures collectively confirm that YOSHIDA teaches the use of electrode-to-panel capacitive relationships for extracting not just coordinate data but also angular information.	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”) could capture tilt and rotation, as evidenced by contemporaneous commercial products such as Wacom’s tilt-sensitive pens. A POSITA would have recognized that merging IKEDA’s angle-sensing disclosure with YOSHIDA’s electrode configuration was a natural response to these commercial pressures and would achieve improved performance without introducing technical incompatibilities. <u>IGUCHI</u> IGUCHI discloses generating detection signals in the sensor surface from which angle information is obtainable. As shown in FIG. 26a and FIG. 26b, “[t]he main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310” and “[t]he auxiliary electrode 305 is arranged around this main electrode 304”. IGUCHI, 30:25-29, Figs. 26a–26b.
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		FIG. 26a FIG. 26b IGUCHI also discloses how capacitive signals interact to determine pen inclination: “No shape of the electrostatic capacity is formed with right and left symmetry with respect to the main electrode. This is because no peak of the electrostatic capacity provided by the main electrode 304 is in conformity with a peak of the electrostatic capacity provided by the auxiliary electrode 305 by inclining the pen shaft.” IGUCHI, 31:5-11, Fig. 27c.

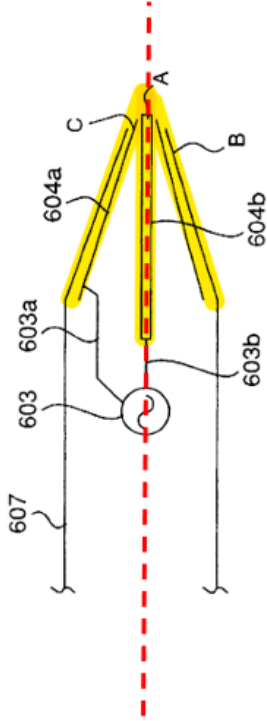
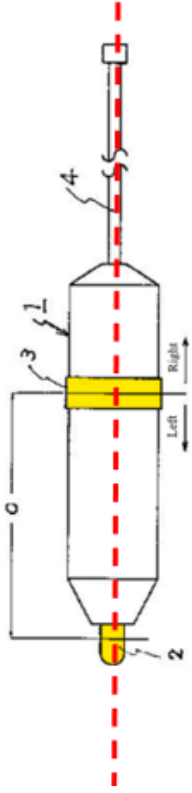
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		FIG. 27c  IGUCHI's Figure 27c presents an analysis of how capacitive relationships between multiple electrodes on a pen allow for angle detection. The capacitive signals generated by the electrodes interact with the sensor surface, producing detection signals that reveal tilt and angular movements of the pen. As shown in Figure 27c, variations in detected capacitance between electrodes allow for the calculation of angular displacement, supporting the claim that the generated detection signals provide angle information. IGUCHI also discloses “[s]ince the auxiliary electrode is located in a position separated from the main electrode, coordinates of the main and auxiliary electrodes with respect to a tablet plate are

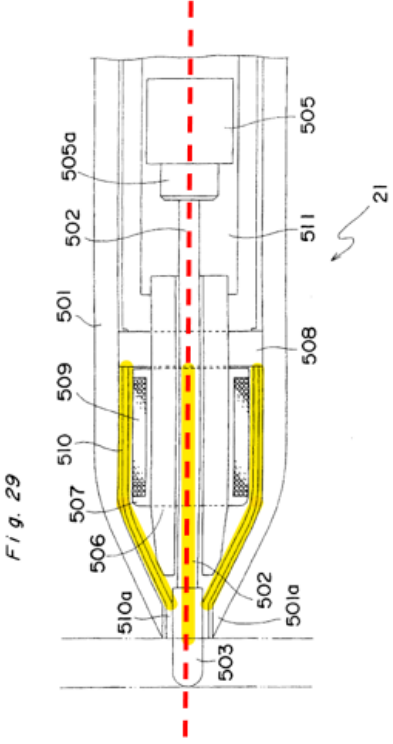
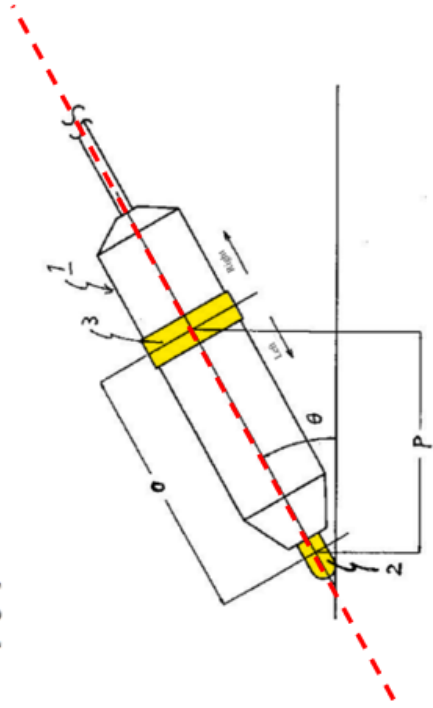
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
		separately detected when the pen shaft is inclined" and that "[i]nclination data of the pen shaft can be taken out by a difference between timing signals caused by a difference between these coordinates". IGUCHI, 15: 6-12. A POSITA would have understood or found obvious that the "inclination data of the pen shaft" is corresponding to the "angle information of the pen-shaped position indicator" in 1[g], and the "the difference between timing signals" caused by a difference between these coordinates" is corresponding to the "detection signals in the sensor surface" in 1[g]. <i>See also</i> IGUCHI 31:26-44. The limitation "to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable" in 1[g] has been disclosed by IGUCHI. IGUCHI further supports the detectability of angular displacement by describing how time-differentiated signals from capacitive electrodes encode tilt information. IGUCHI, Fig. 29b, 31:47-50. Specifically, IGUCHI discloses "a time difference is caused between timing t2 of a peak of an output signal S3' provided by the main electrode and timing

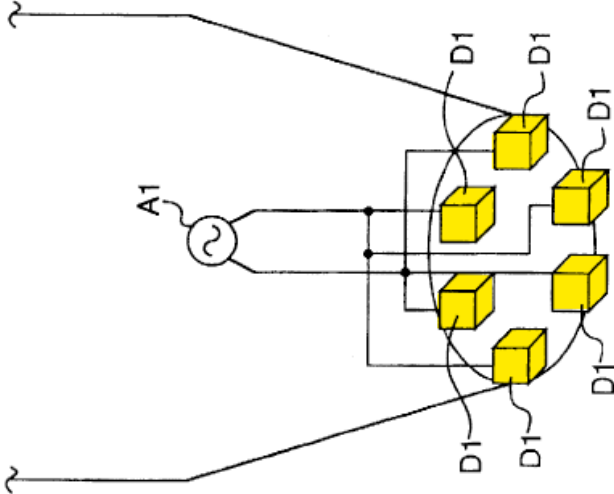
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		t3 of a peak of an output signal S4' provided by the auxiliary electrode.” IGUCHI, 31:37-41, Fig. 29b. FIG. 29b $(\theta = 45^\circ)$  In Figure 29b of IGUCHI, the output signals S3' and S4' from the main and auxiliary electrodes are plotted over time. The graph demonstrates that while both signals are of the same type (e.g., voltage signals), there is a measurable time difference between them, which is utilized to determine the

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		pen's tilt or angle. The figure presents a waveform diagram illustrating the time difference between output signals S3' and S4'. The figure visually demonstrates how these signals shift over time, supporting the argument that signals from different electrodes have a detectable phase difference. This timing offset allows for accurate angular detection of the pen's tilt relative to the sensor surface. A POSITA would have understood that capacitive stylus systems inherently generate multiple capacitive relationships between electrodes in the pen and electrodes on the sensor surface, and that variations among those couplings can be exploited for angular detection. YOSHIDA discloses capacitive signals from electrodes 604a and 604b that interact with the LCD panel grid, while IGUCHI teaches that main and auxiliary electrodes form distinct capacitive couplings whose relative signal strengths can be used to determine inclination of the pen. A POSITA would have been motivated to combine these teachings because YOSHIDA and IGUCHI both operate in the same technical field of capacitive stylus input and address the common problem of detecting not only stylus position but also angular

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		posture. Incorporating IGUCHI’s offset electrode arrangement and time-differentiated signal processing into YOSHIDA’s capacitive stylus framework would have been a predictable enhancement, as each reference discloses complementary features designed to improve angular detection accuracy. Such a combination would have improved performance by providing more reliable tilt measurements without relying on mechanical sensors, thereby reducing device complexity, manufacturing cost, and size. In addition, there was significant commercial demand at the time for advanced digital pens that could support professional graphics applications and consumer electronics markets such as tablets and smartphones. Market trends toward thinner, more accurate styluses would have further incentivized a POSITA to integrate IGUCHI’s angular detection methods with YOSHIDA’s established capacitive system to meet user expectations for precision and expanded functionality.
Claim 2 2[pre] The pen-shaped position indicator	<i>See supra</i> 1[pre] – 1[g].	<i>See supra</i> 1[pre] – 1[g].

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according to claim 1,		
2[a] wherein the first and second electrodes are arranged at the first and second positions that are different along the axis of the pen-shaped position indicator.	YOSHIDA discloses a megaphone-shaped outer electrode 604a positioned differently from the first electrode and off-axis. YOSHIDA, Fig.6A. Fig.6A  Referring to Fig.6A of YOSHIDA, a megaphone-shaped outer electrode 604a is also arranged at the pen-tip portion of the pen-shaped electric field generator 607, and the second position of the outer electrode 604a is different from the first position of the inner electrode 604b. Fig. 6A also shows that the position of the outer electrode 604a is off an axis of the pen-shaped position indicator. This arrangement is evident in this cross-sectional depiction, where the outer electrode surrounds the inner electrode	<i>IKEDA</i> IKEDA discloses that the first electrode (on the pen tip) and the second electrode (on the pen body) are at different positions along the axis of the coordinate detection pen: “In this invention, the operator can control coordinate detection without considering the angle of the coordinate detection pen. To achieve this, a coordinate detection electrode (first detection unit) is positioned at the tip of the coordinate detection pen, and a ring-shaped coordinate detection electrode (second detection unit) for angle reading is placed on the body of the coordinate detection pen.” IKEDA, [0006], Figs. 1, 5. [Fig 1.] 

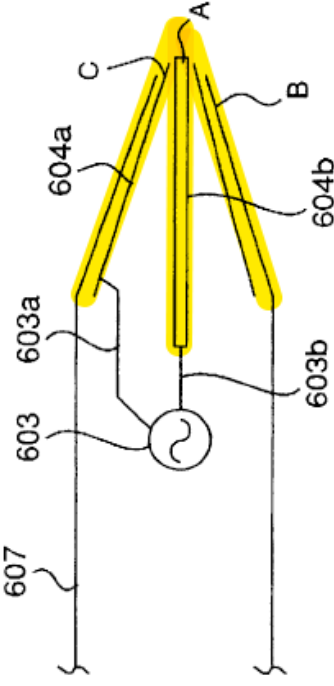
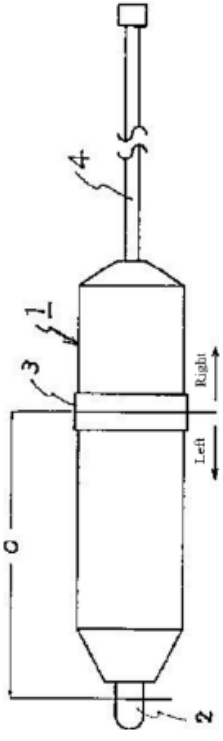
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103) asymmetrically, contributing to the detection of tilt or angle when interacting with the sensor surface. YOSHIDA also discloses rod-shaped inner electrode 502 and outer electrode 510 are arranged at the first and second positions that are different along the axis of the pen 21. YOSHIDA, Fig.29.	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
	<i>Fig. 29</i>  YOSHIDA's Figure 29 provides a detailed view of the pen's internal structure, showing inner electrode 502 and outer electrode 510 positioned at different locations along the pen's longitudinal axis. This longitudinal section highlights the spatial separation between the electrodes, which is crucial for detecting different capacitive interactions along the pen's length. <i>See also</i> Fig. 28 (disclosing “plurality	[Fig.5]  Figures 1 and 5 of IKEDA disclose a coordinate detection pen with multiple detection electrodes positioned at different locations along the stylus axis, confirming a design where electrodes are spaced along the longitudinal direction of the pen body. YOSHIDA discloses a pen-shaped stylus with multiple electrodes positioned near the pen tip, while IKEDA explicitly describes a configuration in which a tip electrode is longitudinally separated from another electrode along the pen body. A POSITA would have understood that employing electrodes at different axial positions, including off-axis relative

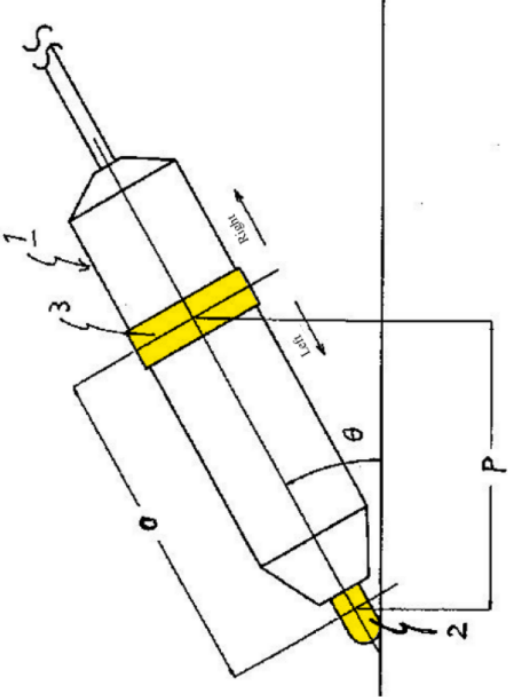
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	of electrodes D1 are mounted on a circumference of the tip end portion of the pen”). <i>Fig.28</i> 	to one another, was a well-known and predictable configuration in capacitive stylus design because it creates multiple capacitive relationships that vary measurably with tilt. These variations in capacitance enable more accurate angular detection in addition to positional tracking. A POSITA would have been motivated to combine YOSHIDA’s detailed stylus body design with IKEDA’s explicit disclosure of longitudinally separated electrodes because both references operate in the same field and address the challenge of improving tilt sensitivity. This arrangement was a routine and predictable design choice, enhancing performance without requiring complex or costly mechanical sensors. Moreover, the commercial demand at the time for precise, feature-rich digital pens in applications such as professional graphics, CAD, and consumer touchscreen devices would have incentivized a POSITA to adopt this configuration to meet market expectations for accuracy and functionality. <u>IGUCHI</u> IGUCHI discloses a pen-shaped input device in which the main electrode 304 is positioned at the

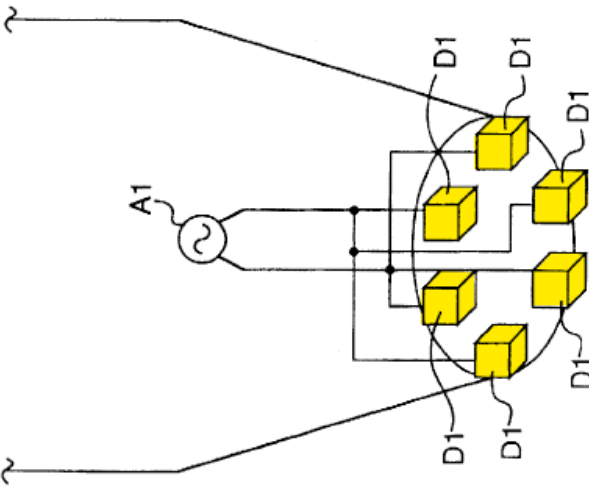
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		center of the pen tip and the auxiliary electrode 305 is arranged around the main electrode but located along the shaft of the pen. IGUCHI, Figs. 26a, 26b, 30:25–29 ("The main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310. The auxiliary electrode 305 is arranged around this main electrode 304."). FIG. 26a FIG. 26b In addition, as shown in Figs. 29a and 29b, IGUCHI's longitudinal cross-sectional illustrations show that the auxiliary electrode is spaced axially from the main electrode along the pen body.

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		FIG. 29a FIG. 29b YOSHIDA discloses a stylus with electrodes 604a and 604b arranged at the pen tip that form separate capacitive couplings with the LCD panel. IGUCHI teaches a configuration with a main electrode and auxiliary electrodes separated along the pen's longitudinal axis, producing distinct capacitive interactions that can be used to detect inclination. A POSITA would have understood that positioning electrodes at different locations along the pen's axis enables detection of multiple capacitive relationships with the sensor surface. Differences in signal

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		strength or timing among those couplings can be used to determine angular displacement or to refine positional accuracy. This arrangement was a known and predictable technique in multi-electrode stylus design to increase sensitivity and differentiation of signals. A POSITA would have been motivated to combine YOSHIDA's capacitive detection framework with IGUCHI's refined electrode configuration because the teachings are complementary and address the same problem of enhancing angular detection. The combination would predictably improve tilt measurement accuracy by producing distinct, measurable capacitance variations as the pen tilts. Both references were developed in the same field and even assigned to the same company, reflecting shared engineering objectives. In addition, consumer demand for precise stylus tracking in applications like CAD and digital illustration provided a strong commercial incentive to integrate IGUCHI's advanced electrode arrangement into YOSHIDA's proven capacitive system.
Claim 3[pre] The pen-shaped position	<i>See supra</i> 1[pre] – 1[g].	<i>See supra</i> 1[pre] – 1[g].

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indicator according to claim 1,		
3[a] wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the pen-shaped indicator.	YOSHIDA discloses an outer electrode 604a surrounding a rod-shaped inner electrode 604b at the pen tip, where both are part of a pen-shaped electric field generator. YOSHIDA, Fig. 6A; 24:58–25:5; 8:66-9:11. Fig. 6A  Yoshida further discloses a second electrode comprising plural electrode pieces arranged to surround the axis of the pen-shaped indicator. <i>Id.</i> 26:36-48 (“<i>plurality of electrodes D1</i> are mounted on a circumference of the tip end portion of the pen”). See <i>also id.</i> 57:1-20 (“the first [‘cylinder	<u>IKEDA</u> IKEDA discloses a coordinate detection pen comprising multiple detection electrode units, including a ring-shaped detection electrode 3 for angle detection that surrounds the pen axis. IKEDA, Figs. 1 and 5, ¶[0006]. [Fig 1.] 

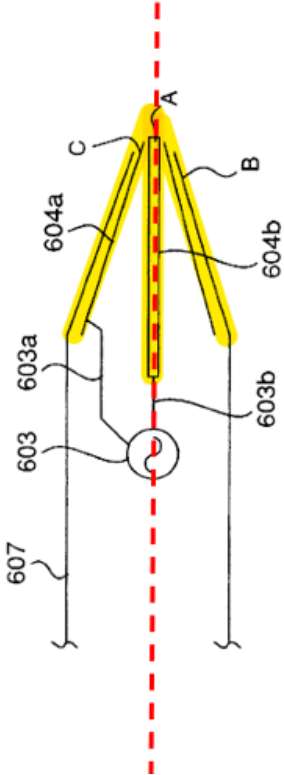
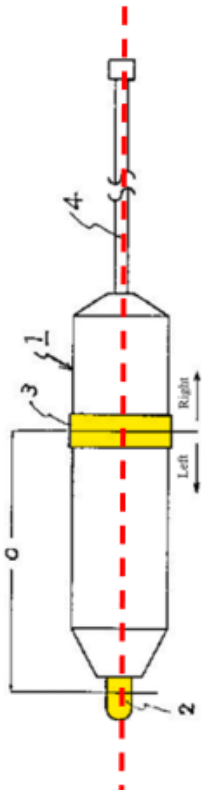
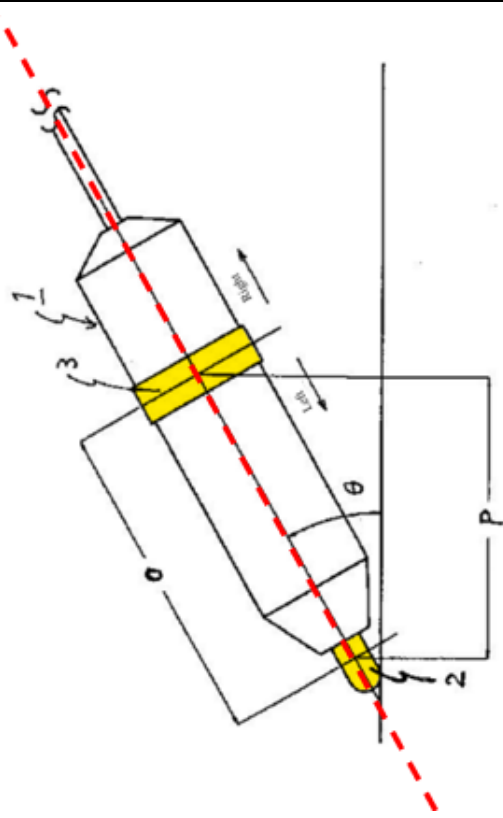
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	shaped’] electrode of the coordinate pointing device is <i>arranged as separated apart at approximately regular intervals around the circumference</i> of the second electrode.”) This cylinder-shaped electrode must comprise plural electrode pieces if the electrode “is arranged as separated apart at [] regular intervals around the circumference of the” pen axis. <i>Id.</i> 57:14-16.	[Fig.5]  The structure and placement of detection electrode 3 is further shown to surround the pen shaft, which a POSITA would understand to involve a circumferential arrangement about the axis of the pen. A POSITA would have understood that circumferential electrodes, whether shown as the outer electrode 604a in YOSHIDA or the ring electrode in IKEDA, could be implemented using plural electrode pieces distributed around the pen axis. Segmenting the electrode into multiple pieces

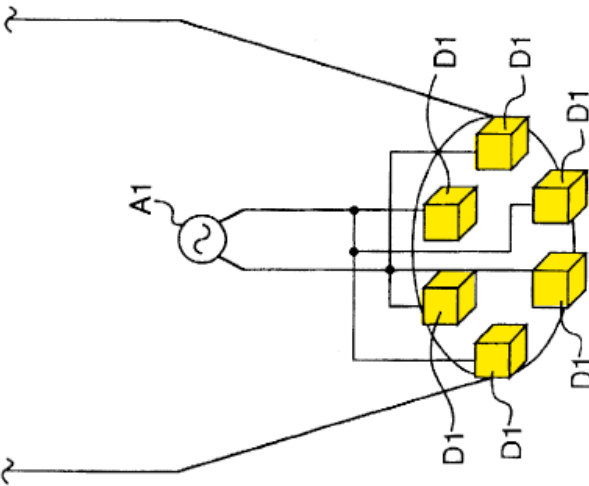
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	Fig.28  The outer electrode 604a of Fig. 6a is depicted as extending circumferentially around the pen axis, and a POSITA would have recognized that such an arrangement may be implemented using plural electrode pieces to enable independent signal control or directional sensing. Segmenting a circumferential electrode to form plural electrode pieces surrounding the axis was a known technique	was a known and predictable technique in capacitive sensor design, allowing greater sensitivity, independent signal control, and the generation of differential signals for enhanced angular detection. A POSITA would have been motivated to integrate IKEDA's circumferential ring electrode with YOSHIDA's surrounding outer electrode design, recognizing that segmentation into plural pieces was a routine design choice in capacitive stylus systems, and as explicitly taught by YOSHIDA (see, e.g., Fig. 28). This modification would predictably improve tilt detection accuracy and angular resolution. At the time, commercial demand strongly favored professional-grade digital pens offering smooth and responsive tilt performance. Incorporating IKEDA's displaced ring electrode approach into YOSHIDA's stylus configuration would have been an obvious improvement to satisfy user expectations and market needs. <u>IGUCHI</u> IGUCHI discloses a pen-shaped input device with a main electrode 304 positioned at the center axis of the pen tip and an auxiliary electrode 305 arranged around the main electrode to form a capacitive

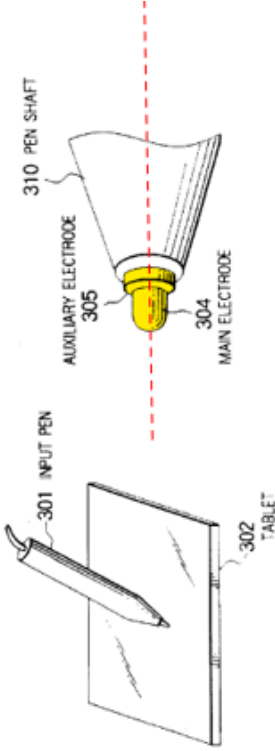
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	in the field to enhance resolution or detect angular orientation, as explicitly disclosed by YOSHIDA, as explained above.	relationship with the sensor surface. IGUCHI, Figs. 26a, 26b, 30:25–29 (“The main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310. The auxiliary electrode 305 is arranged around this main electrode 304.”). This radial configuration positions the auxiliary electrode to surround the axis of the pen. FIG. 26a FIG. 26b IGUCHI also teaches that inclination data can be extracted from differences in coordinate signals received from the respective electrodes, indicating that the auxiliary electrode comprises multiple pieces or segments that can register spatial variation. IGUCHI, 15:6–12 (explaining how “[i]nclination data of the pen shaft can be taken out by a difference between timing signals caused by a difference between these coordinates.”). A POSITA would

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		have understood that implementing the auxiliary electrode as plural electrode pieces distributed around the pen axis facilitates signal differentiation based on orientation, a well-known approach in capacitive sensor design for detecting tilt or angular displacement and as explicitly taught by YOSHIDA (<i>see, e.g.,</i> Fig. 28). IGUCHI specifically teaches that differences in coordinate signals among electrode segments can be used to extract inclination data, enabling both the direction and magnitude of tilt to be determined. YOSHIDA provides a compatible capacitive framework in which multiple electrodes already couple to the sensor surface, making it straightforward to integrate IGUCHI's segmented auxiliary electrode configuration. A POSITA would have been motivated to combine these teachings because circumferential segmentation of electrodes was a well-established method for improving directional sensitivity in capacitive stylus systems. Incorporating IGUCHI's segmented auxiliary electrode arrangement into YOSHIDA's outer electrode design would have been a predictable and advantageous modification, yielding a stylus capable of more accurate and higher-resolution angular detection without sacrificing capacitive functionality. Both references

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		are directed to the same commercial products, digital pens and tablets, and their combination reflects a normal design progression driven by market demand for precise stylus performance. At the time, consumers expected styluses to replicate natural handwriting and artistic motion, which required accurate tilt sensing. A POSITA would have recognized that integrating IGUCHI’s segmentation approach into YOSHIDA’s stylus would directly respond to these technical and commercial needs.
Claim 4		
4[pre] The pen-shaped position indicator according to claim 1,	<i>See supra</i> 1[pre] – 1[g].	<i>See supra</i> 1[pre] – 1[g].
4[a] wherein the first and second electrodes are arranged to surround the axis of the penshaped	YOSHIDA discloses a pen-shaped electric field generator in which an inner electrode 604b is surrounded by a megaphone-shaped outer electrode 604a at the pen tip. YOSHIDA, Fig. 6A, 24:58–25:5.	<u>IKEDA</u> IKEDA discloses two detection electrode units, one for coordinate detection and one for angle detection, disposed along the pen axis, including a ring-shaped electrode 3 for angle detection. IKEDA, Figs. 1 and 5, ¶[0006].

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position indicator.	Fig. 6A  As shown in Fig. 6A, this concentric configuration places both electrodes symmetrically around the axis of the pen. A POSITA would have understood this arrangement as being centered about the axis, with both electrodes structurally and electrically configured to surround it. <i>See also</i> Fig. 28; 26:36-48 (“In the electrode structure, a plurality of electrodes D1 are mounted on a circumference of the tip end portion of the pen.”).	[Fig 1.]  [Fig.5]  IKEDA confirms the same design principle by disclosing a ring-shaped detection electrode 3 positioned on the pen body and surrounding the axis

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	Fig.28  Arranging both (or multiple) electrodes to surround the axis as disclosed by YOSHIDA was a conventional design approach in capacitive stylus systems to ensure uniform field distribution and enable angle-dependent signal variation.	of the shaft for angle detection. IKEDA, ¶[0006], Figs. 1, 5. A POSITA would have recognized this concentric structure as demonstrating that surrounding the axis with electrodes was a conventional design approach in capacitive stylus technology to facilitate tilt detection. A POSITA would have been motivated to combine YOSHIDA's coaxial electrode arrangement with IKEDA's ring electrode disclosure because arranging electrodes symmetrically around the axis was a known way to ensure uniform field distribution and consistent tilt measurements. Such an arrangement predictably reduces error caused by uneven electric fields and improves angular detection accuracy. At the same time, commercial demand for high-precision styluses, particularly for applications requiring smooth and reliable tilt input, such as digital art and professional drafting, would have further encouraged a POSITA to adopt this concentric design. Combining YOSHIDA's and IKEDA's disclosures would therefore have been a straightforward and advantageous improvement in the field. <u>IGUCHI</u>

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		IGUCHI discloses a concentric configuration in which main electrode 304 is placed at the pen center and auxiliary electrode 305 is positioned around it, forming a radial structure. IGUCHI, Figs. 26a, 26b, 30:25-29 ("The main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310. The auxiliary electrode 305 is arranged around this main electrode 304."). FIG. 26a FIG. 26b  This layout results in both electrodes being arranged to surround the pen axis, supporting angle detection through capacitive differences. YOSHIDA discloses an outer electrode 604a arranged concentrically around a rod-shaped inner electrode 604b at the pen tip. IGUCHI similarly discloses a concentric arrangement, with a main electrode 304 positioned at the center axis of the pen

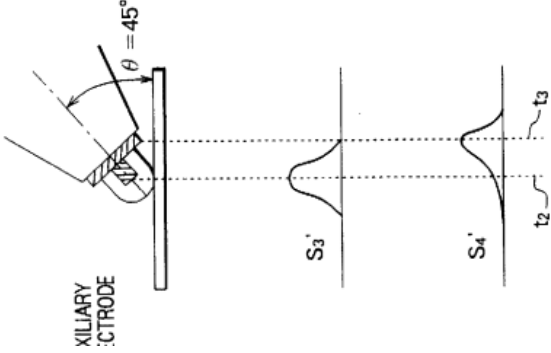
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		tip and an auxiliary electrode 305 arranged around the main electrode. A POSITA would have recognized that combining IGUCHI's concentric main-and-auxiliary electrode arrangement into YOSHIDA's stylus framework would provide the benefits disclosed in IGUCHI, including enhanced angular resolution and consistent field detection, and would have implemented it as a predictable design refinement. A POSITA would have been motivated to combine these teachings because arranging electrodes concentrically around the pen axis was a known way to achieve uniform electric field distribution, thereby improving tilt detection accuracy. YOSHIDA and IGUCHI both pursue the same technical objective of accurate stylus tracking through capacitive coupling and were directed to similar consumer devices. Their combination would have predictably reduced noise and positional error while enhancing angular detection. At the same time, commercial demand for more advanced digital pens, particularly in professional design and illustration applications, would have encouraged a POSITA to adopt this refinement as part of normal design progression in the field.

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Claim 5 5[pre] The pen-shaped position indicator according to claim 1,	<i>See supra</i> 1[pre] – 1[g].	<i>See supra</i> 1[pre] – 1[g].
5[a] wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.	YOSHIDA discloses a capacitive stylus system where multiple electrodes interact with a sensor surface to generate detection signals. YOSHIDA, Fig. 26, 27:13-25. Fig.26	<u>IKEDA</u> IKEDA discloses a coordinate detection pen that measures the inclination angle relative to the sensor surface: “By detecting each coordinate using the detection unit 2 for coordinate detection and the detection unit 3 for angle detection of the coordinate detection pen 1, control over the angle of the coordinate detection pen 1 can be achieved.” IKEDA, [0015], Fig. 5 (shows pen angle detection); [0014]; [0001] (“By analyzing the positional dimensions between the two coordinate detection units and the dimensions of the coordinates read by each detection unit, it is possible to detect the pen’s tilt.”).

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	The relative strengths of these detection signals vary depending on the inclination of the pen-shaped position indicator, which a POSITA would have understood to correspond to the tilt angle of the pen relative to the sensor surface. Such variations are a direct result of changes in the spatial relationship between each electrode and the sensor surface during pen tilt, thereby changing the detected capacitances. See also Fig. 28; 26:36-48 (“In the electrode structure, a plurality of electrodes D1 are mounted on a circumference of the tip end portion of the pen, and the electrodes D1 are connected to an AC power source A1 so that a rotational electric field is generated on the circumference.”).	Figure 5 is a perspective view of a pen-shaped detection unit. The pen has a tip (1) and a body (2). A ring-shaped detection unit (3) is mounted on the body. A red arrow indicates the 'tilt angle' θ relative to the surface (P). A red circle highlights the angle θ. IKEDA Fig. 5 IKEDA's system includes a first detection unit at the pen tip and a second, ring-shaped detection unit on the pen body, allowing capacitive measurements at different positions to determine the pen's tilt angle relative to the surface. A POSITA would have recognized that incorporating IKEDA's explicit tilt detection method into YOSHIDA's capacitive stylus design was a routine and predictable approach to achieving tilt angle measurement. Because YOSHIDA already discloses multiple electrodes forming distinct capacitive relationships with a sensor surface,

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		adding IKEDA's ring-shaped detection electrode would naturally extend the system to provide tilt information. This integration would improve angular resolution without requiring additional mechanical sensors, reducing complexity while enhancing performance. A POSITA would have been motivated to combine these teachings because both references operate in the same field of capacitive stylus design and address the closely related problem of capturing not just coordinate position but also angular posture. The combination would have predictably resulted in a stylus capable of reporting both position and tilt. At the time, there was a strong commercial demand for more sophisticated input devices for drawing and design, particularly in professional markets such as digital illustration and CAD. A POSITA would have recognized that the combination of YOSHIDA's electrode framework with IKEDA's tilt-specific disclosure directly responded to these market needs and represented a logical progression of known stylus technology. <u>IGUCHI</u>

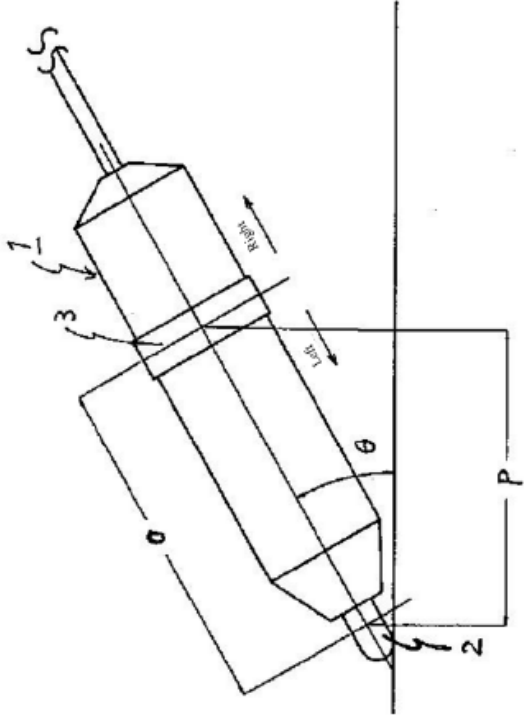
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
		IGUCHI discloses tilt detection by describing how capacitive signal variations can be used to measure angular displacement over time. IGUCHI, Fig. 29b, 31:37-41. Specifically, IGUCHI states: "[A] time difference is caused between timing t2 of a peak of an output signal S3' provided by the main electrode and timing t3 of a peak of an output signal S4' provided by the auxiliary electrode." IGUCHI, 31:37-41, Fig. 29b.

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		FIG. 29b ($\theta = 45^\circ$)  The diagram illustrates a tilted pen (labeled 'PEN') at an angle $\theta = 45^\circ$ relative to a horizontal surface. A 'SECONDARY ELECTRODE' is positioned near the pen tip. Below the pen, two signal profiles are shown: S_3' at time t_2 and S_4' at time t_3. The profiles show a peak that shifts and changes shape as the pen moves. A POSITA would have understood that such timing differences arise when the pen is tilted, as changes in the relative distances between the electrodes and the sensor surface alter the capacitive coupling and the resulting signal profiles. IGUCHI's explicit teaching that these timing differences can be measured to determine angular displacement provides a direct

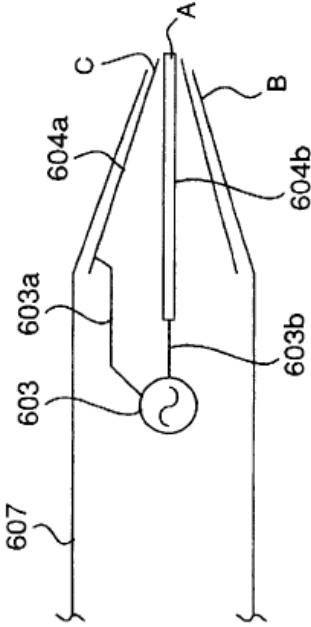
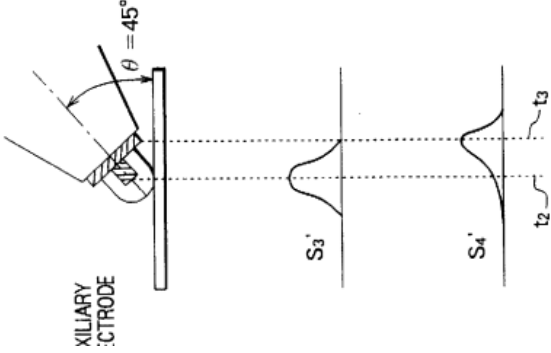
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
		basis for detecting a tilt angle. Incorporating IGUCHI's time-differentiated signal approach into YOSHIDA's capacitive stylus framework would have been a predictable and straightforward enhancement, using well-known capacitive signal processing techniques to achieve accurate tilt detection without mechanical sensors. A POSITA would have been motivated to combine these teachings because IGUCHI's disclosure of temporal signal analysis naturally complements YOSHIDA's capacitive system for position detection. Integrating the two would predictably yield a stylus capable of both coordinate and tilt measurement, leveraging established capacitive principles. This combination would directly address commercial trends toward feature-rich digital pens designed to replicate natural handwriting and artistic motions. At the time, tablet and interactive display markets were driven by demand for tools offering higher accuracy and versatility, and a POSITA would have recognized that combining YOSHIDA and IGUCHI provided an obvious path to meeting those expectations.
Claim 7		

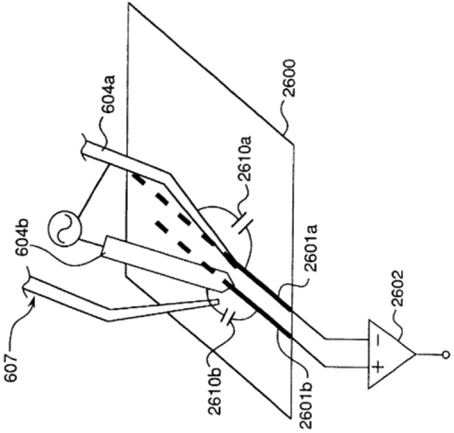
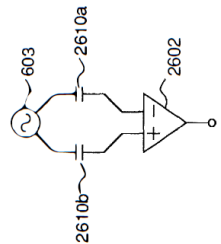
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
7[pre] The pen-shaped position indicator according to claim 1,	<i>See supra</i> 1[pre] – 1[g].	<i>See supra</i> 1[pre] – 1[g].
7[a] wherein the first and second signals are different in type from each other.		<u>IKEDA</u> IKEDA discloses a stylus system with two detection units: a coordinate detection electrode (unit 2) and a ring-shaped angle detection electrode (unit 3), each producing coordinate data stored separately. IKEDA, ¶[0006], ¶[0013], Figs. 3 and 5.

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		[Fig. 3]

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		[Fig.5]  The respective outputs are processed differently and compared in memory to extract angular position. A POSITA would have understood that these outputs differ in type not only because they originate from physically distinct electrodes, but also because they are processed through separate detection channels designed for different purposes. A POSITA would have been motivated to combine Ikeda's explicit disclosure of signal separation with Yoshida's time-differentiated signals, recognizing this as a

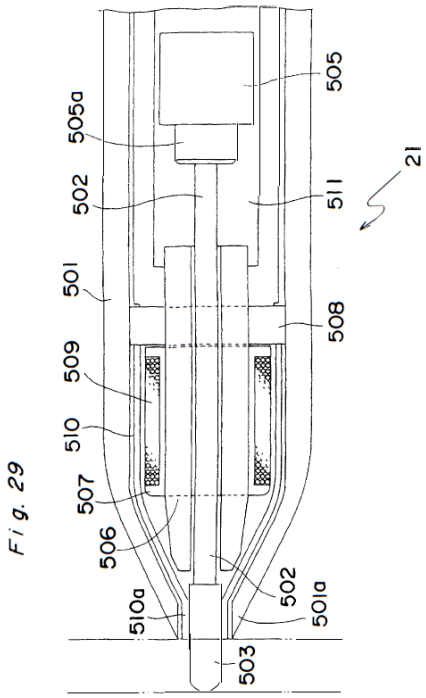
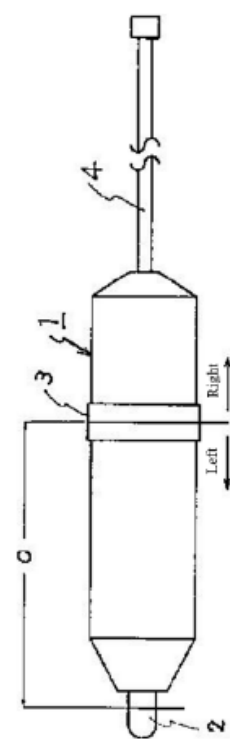
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		predictable and routine way to improve angular and positional tracking in capacitive stylus systems.
Claim 8		
8[pre] The pen-shaped position indicator according to claim 1,	<i>See supra</i> 1[pre] – 1[g].	<i>See supra</i> 1[pre] – 1[g].
8[a] wherein the first and second signals are of the same type but have a time difference from each other.	YOSHIDA discloses a capacitive pen system in which an AC power source 603 applies alternating current signals of the same waveform type to the rod-shaped inner electrode 604b and the megaphone-shaped outer electrode 604a, but with opposite phase. YOSHIDA, Fig. 6A, 24:58–25:5; 26:23–26. YOSHIDA further explains that these electrodes generate distinct detection signals in the sensor surface during operation. YOSHIDA, Figs. 26–27, 27:13–25.	<u>IGUCHI</u> IGUCHI discloses a capacitive pen system where the signals from the first and second electrodes are of the same type but have a measurable time difference. Specifically, IGUCHI discloses “a time difference is caused between timing t2 of a peak of an output signal S3’ provided by the main electrode and timing t3 of a peak of an output signal S4’ provided by the auxiliary electrode.” IGUCHI, 31:37-41, Fig. 29b.

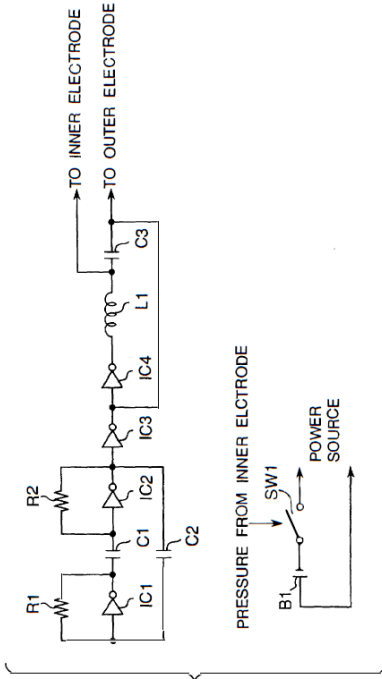
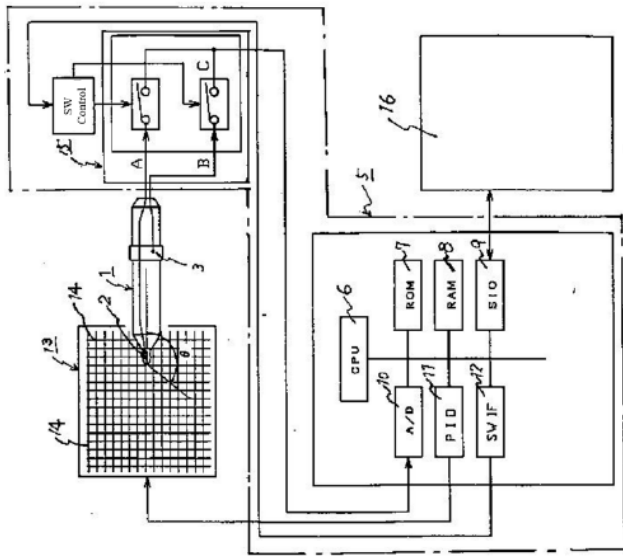
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
	Fig.6A 	FIG. 29b $(\theta = 45^\circ)$  In Figure 29b of IGUCHI, the output signals S3' and S4' from the main and auxiliary electrodes are plotted over time. The graph demonstrates that while both signals are of the same type (e.g., voltage signals), there is a measurable time difference between them, which is utilized to determine the pen's tilt or angle. The figure presents a waveform diagram illustrating the time difference between

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	<i>Fig.26</i>  <i>Fig.27</i>  The AC power source 603 applies alternating current signals of the same waveform type to the rod-shaped inner electrode 604b and the megaphone-shaped outer electrode 604a, but with opposite phase. A POSITA would have understood	output signals S3' and S4'. The figure visually demonstrates how these signals shift over time, supporting the argument that signals from different electrodes have a detectable phase difference. This timing offset allows for accurate angular detection of the pen's tilt relative to the sensor surface. Additionally, IGUCHI describes a systematic operation cycle where the capacitive pen interacts with a grid of electrodes in an X-Y coordinate system. Specifically, IGUCHI also discloses that: “[o]ne cycle of a systematic operation of the coordinate inputting apparatus is shown as one frame in FIG. 31 and is constructed by three periods composed of a Y-coordinate detecting period, an X-coordinate detecting period and an additional information transmitting period”; “the electrodes Y1 to Ym at Y-coordinates are sequentially turned on in the Y-coordinate detecting period, and the electrodes X1 to Xn at X-coordinates are sequentially turned on in the X-coordinate detecting period”; “a detecting portion of the detecting pen outputs a signal when an electrode closest to a pen tip is turned on”; and “it is possible to discriminate a position of the pen tip on the tablet by timing of the signal from the detecting pen.” IGUCHI, 32:64–67, 33:1, 33:8–16, Fig. 31.

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	that when two AC signals of the same type are driven in opposite phase, the phase offset necessarily produces a measurable time difference between the signals when compared to one another. This time-offset relationship between signals of the same waveform type is consistent with the claim requirement that the “first and second signals are of the same type but have a time difference from each other.” YOSHIDA’s disclosure therefore teaches the use of same-type capacitive signals that are differentiated by their temporal offset, providing a direct basis for meeting this limitation.	FIG. 31 A POSITA would also have recognized or found obvious that the signals from the two sets of electrodes $X1-Xn$ and $Y1-Ym$ both use electrostatic coupling and are of the same type but have a time difference from each other. IGUCHI, 13:6-12, 31:26-44. IGUCHI explicitly discloses that a time difference exists between signals detected from

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		different electrodes positioned at separate locations along the stylus body. IGUCHI, Fig. 29b, 31:37-41. Given YOSHIDA’s disclosure of a capacitive stylus system generating two AC signals of the same type which necessarily produces a corresponding time difference in the signals, a POSITA would have found it obvious to incorporate IGUCHI’s timing-based signal differentiation into YOSHIDA’s system to refine detection accuracy. Time-differentiated capacitive signals were a well-known feature in stylus-based input devices, and using this method in conjunction with YOSHIDA’s capacitive framework would have been a predictable and advantageous modification for improving signal processing and distinguishing angular displacement. Integrating IGUCHI’s signal timing variation approach into YOSHIDA’s stylus system represents an expected design refinement that aligns with established principles in capacitive input technology.
Claim 9 9[pre] The pen-shaped position indicator according to claim 1,	<i>See supra</i> 1[pre] – 1[g].	<i>See supra</i> 1[pre] – 1[g].

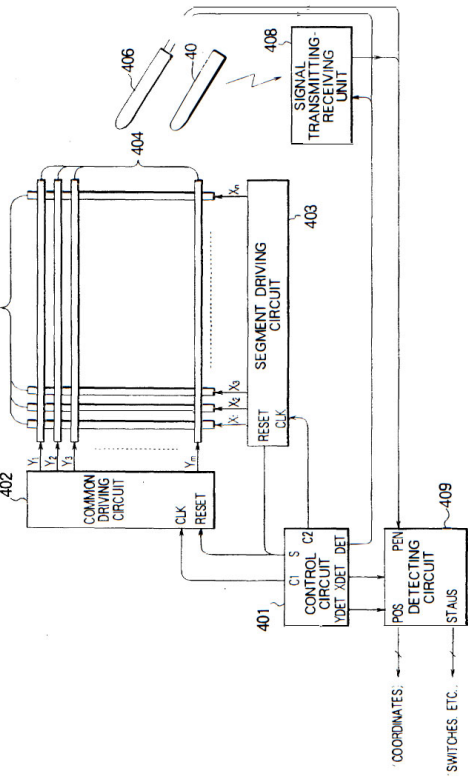
Claim Elements U.S. Patent No. 10,108,277 further comprising:	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
9[a] a coil configured to receive an excitation signal; and	YOSHIDA discloses a stylus coil driven by an oscillator. “The electric circuit further includes a serial resonance circuit comprised of an inductance L1 and a capacitor C3” and “[t]he inductance L1 is implemented by the coil 509.” YOSHIDA, 20:60-65. YOSHIDA further explains, “when the switch SW1 is closed . . . the oscillator circuit oscillates to supply signals which are opposite in phase to the serial resonance circuit comprised of the inductance L1 and the capacitor C3. . . . Then the voltage is transmitted to the inner electrode 502 and the outer electrode 510.” <i>Id.</i>, 21:10-25, Figs. 29 and 30.  <i>Fig. 29</i>	<u>IKEDA</u> IKEDA discloses a coordinate detection pen in which the detection units are driven by an excitation signal supplied from the coordinate input device. The pen includes a tip-based coordinate detection unit 2 and a ring-shaped angle detection unit 3, each connected through a cable 4 to the main body 5 of the coordinate input device. The detection units are selectively connected to the A/D converter 10 through a switching switch 15, enabling them to receive driving signals from the electrode lines of the tablet via capacitive coupling. IKEDA, ¶[0008]–[0010], Figs. 1 and 3. [Fig 1.] 

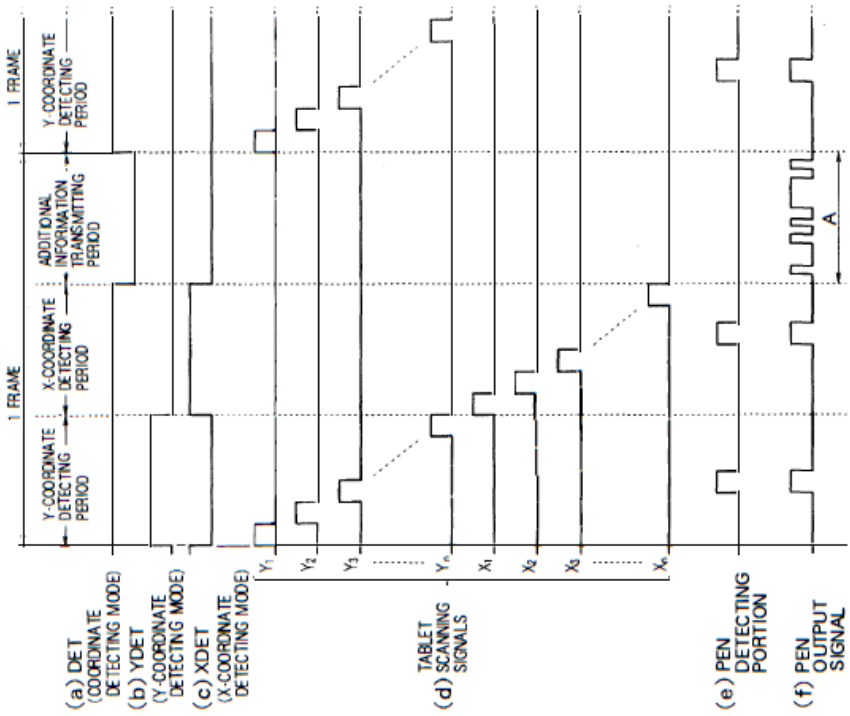
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
Fig.30	 A POSITA would understand from these disclosures that the stylus coil (coil 509 / inductance L1) is configured to receive the oscillator's excitation signal.	[Fig. 3]  A POSITA would have understood from these disclosures that the detection units function in a manner analogous to a stylus coil configured to receive an excitation signal, since they are designed to pick up driven signals from the tablet's electrode lines for subsequent processing. <u>IGUCHI</u>

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		IGUCHI discloses a coordinate inputting apparatus in which the main electrode 304 and auxiliary electrode 305 of the detecting pen receive drive signals from the tablet through capacitive coupling. The control circuit 401, common driving circuit 402, and segment driving circuit 403 sequentially drive the common electrodes Y1-Ym and segment electrodes X1-Xn during Y-coordinate and X-coordinate detecting periods, with the detecting pen outputting a signal when an electrode closest to the pen tip is energized. IGUCHI, 32:64-33:16, Figs. 26a, 26b, 29a, 29b, 30, 31. FIG. 26a FIG. 26b

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		FIG. 29a $(\theta = 90^\circ)$ FIG. 29b $(\theta = 45^\circ)$ FIG. 29a and FIG. 29b illustrate electrode structures at different angles θ. FIG. 29a shows the structure at $\theta = 90^\circ$, and FIG. 29b shows the structure at $\theta = 45^\circ$. Both diagrams include a substrate 302, a main electrode 304, and an auxiliary electrode 305. The auxiliary electrode is positioned at an angle θ relative to the main electrode. The cross-section 310 is shown in both diagrams. The graphs below each diagram show the signal response for the main and auxiliary electrodes. In FIG. 29a, the main electrode signal S3 has a peak at time t1, and the auxiliary electrode signal S4 has a peak at time t1. In FIG. 29b, the main electrode signal S3' has a peak at time t2, and the auxiliary electrode signal S4' has a peak at time t3.

FIG. 30



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		FIG. 31  The diagram illustrates the timing of various signals over one frame. It is divided into three main sections: Y-COORDINATE DETECTING PERIOD, X-COORDINATE DETECTING PERIOD, and ADDITIONAL INFORMATION TRANSMITTING PERIOD. The Y-COORDINATE DETECTING PERIOD includes (a) DET (COORDINATE DETECTING MODE), (b) YDET, and (c) XDDET (X-COORDINATE DETECTING MODE). The X-COORDINATE DETECTING PERIOD includes (d) TABLET SCANNING SIGNALS. The ADDITIONAL INFORMATION TRANSMITTING PERIOD includes (e) PEN DETECTING PORTION and (f) PEN OUTPUT SIGNAL. The signals are labeled Y1, Y2, Y3, ..., Yn, X1, X2, X3, ..., Xn. The pen output signal is labeled A. IGUCHI further explains that these drive signals are used to generate output signals from the pen's electrodes (e.g., signals S3' and S4'), which are then

Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		processed to determine position and angle information. IGUCHI, 31:26-44; 33:8-16. A POSITA would have understood from these disclosures that the pen’s electrodes, functioning as detection elements, are configured to receive excitation signals from the tablet in a manner analogous to a stylus coil being driven by an oscillator, enabling capacitive detection.
9[b] a power generation circuit configured to generate a drive voltage based on the excitation signal;	YOSHIDA discloses a power generation circuit that receives an excitation signal and generates a corresponding drive voltage for the stylus electrodes. Specifically, YOSHIDA explains that “the oscillator circuit oscillates to supply signals . . . to the serial resonance circuit comprised of the inductance L1 and the capacitor C3.” YOSHIDA, 21:10–14. This serial resonance circuit, implemented by coil 509 (inductance L1) and capacitor C3, is driven by the oscillator’s excitation signal and converts that signal into a voltage waveform suitable for electrode operation. The developed voltage is then transmitted “to the inner electrode 502 and the outer electrode 510.” <i>Id.</i>, 21:22-25, Figs. 29, 30.	<u>IKEDA</u> IKEDA discloses that the coordinate input device includes circuitry for processing signals from the pen’s detection units and for generating the voltages that drive those units in coordination with the tablet’s scanning system. The coordinate detection pen 1 communicates with the main body 5 of the coordinate input device via cable 4, through which excitation signals and detection signals are exchanged between the pen and the device. IKEDA, Fig. 3, ¶[0008]. Within the main body 5, a CPU 6, ROM 7, and RAM 8 operate with dedicated driving circuitry to control the amplitude, phase, and timing of the excitation signals, thereby generating the

Claim
Elements U.S.
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10,108,277

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(“YOSHIDA”) (35 U.S.C. § 103)

Secondary Reference: Japanese Patent
Application Publication No. JPH1011206A
(“IKEDA”) or U.S. Patent No. 5,736,980
(“IGUCHI”)

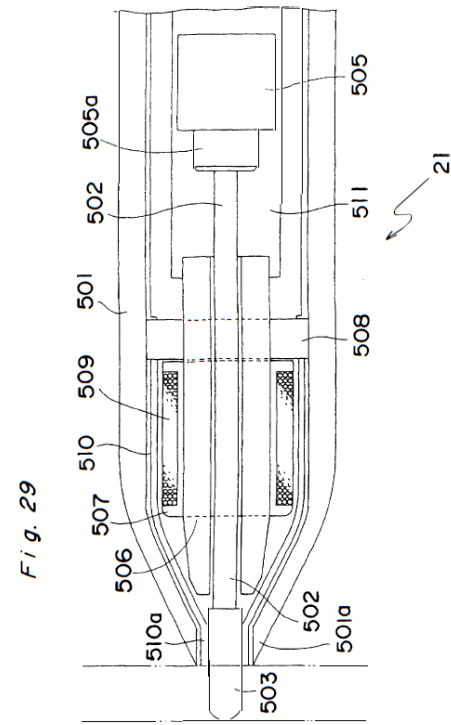
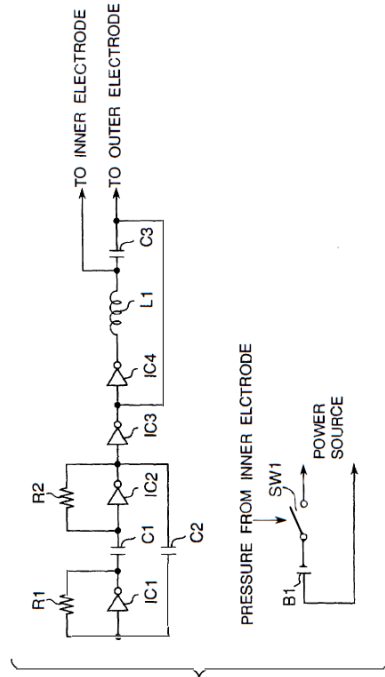


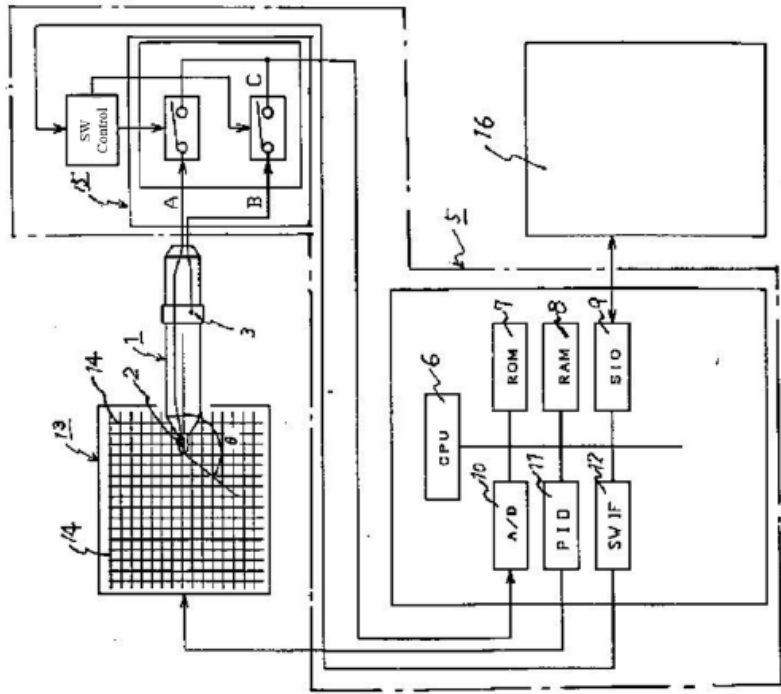
Fig.30



A POSITA would have understood that the inductance L1 (coil 509) and capacitor C3 form a tuned circuit that transforms the oscillator’s excitation signal into the appropriate drive voltage

voltages that drive the detection electrodes. *Id.*, ¶[0009], Fig. 3.

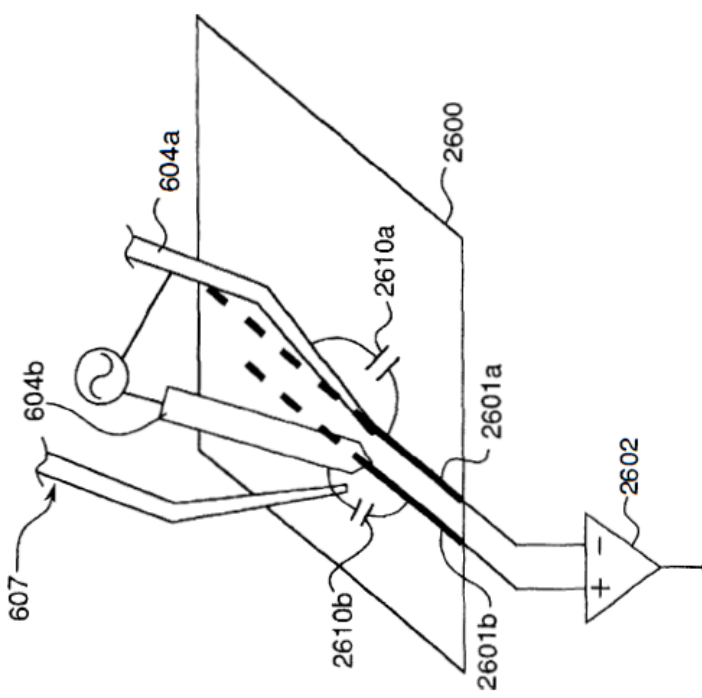
[Fig. 3]

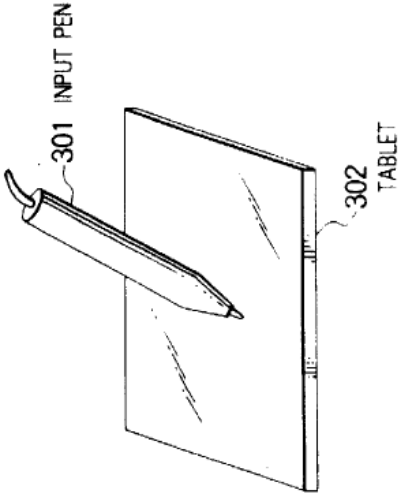
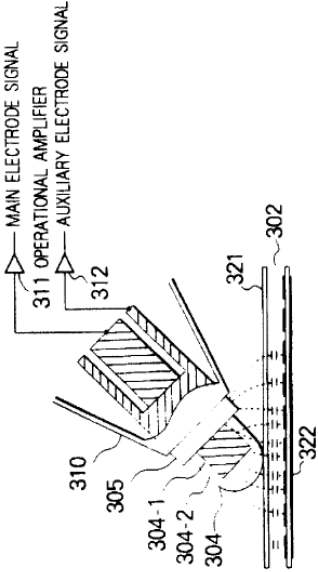


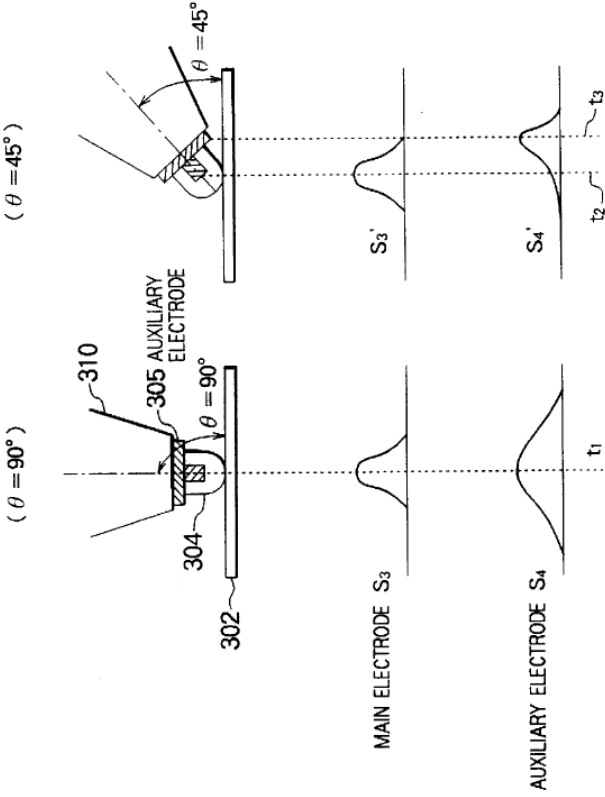
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
	for the stylus's inner and outer electrodes, thus performing the function of a "power generation circuit" in the claimed sense.	A POSITA would have understood that this driving circuitry meets the requirements of a "power generation circuit" because it takes an excitation signal and outputs a drive voltage tailored for the coordinate detection electrode (unit 2) and the angle detection electrode (unit 3), enabling synchronized operation with the tablet's coordinate detection system. <u>IGUCHI</u> IGUCHI discloses that the coordinate inputting apparatus supplies controlled drive voltages to the pen's electrodes through capacitive coupling. The control circuit 401 outputs driving signals (YDET, XDET, and DET) to the common driving circuit 402 and segment driving circuit 403, which convert these control signals into corresponding voltage waveforms and sequentially energize the common electrodes Y1-Ym and segment electrodes X1-Xn during the coordinate detecting periods. IGUCHI, 32:64-33:16, Figs. 30, 31. These driving circuits perform the function of a power generation circuit by transforming the excitation/control signals from the control circuit 401 into the actual drive voltages

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		FIG. 31 (a) DET (COORDINATE DETECTING MODE) (b) YDET (Y-COORDINATE DETECTING MODE) (c) XDET (X-COORDINATE DETECTING MODE) TABLET SCANNING SIGNALS (e) PEN DETECTING PORTION (f) PEN OUTPUT SIGNAL

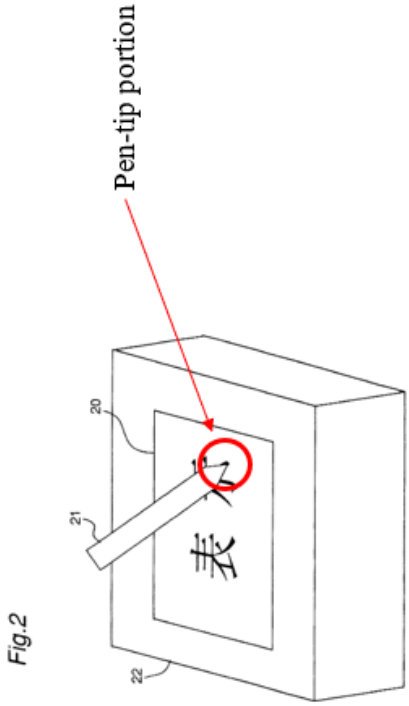
IGUCHI further explains that when the electrode closest to the pen tip is energized, the detecting pen outputs a corresponding signal, which is then processed to determine the pen’s position and angle. IGUCHI, 31:26-44; 33:8-16. A POSITA would have

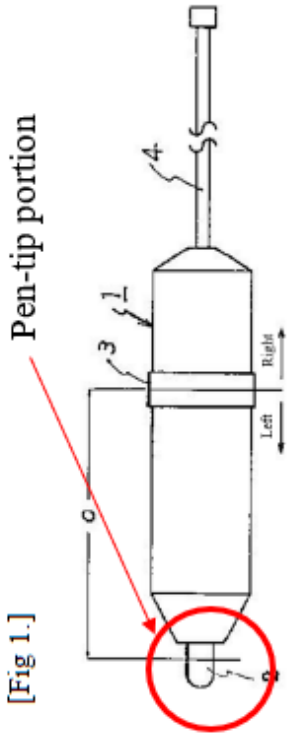
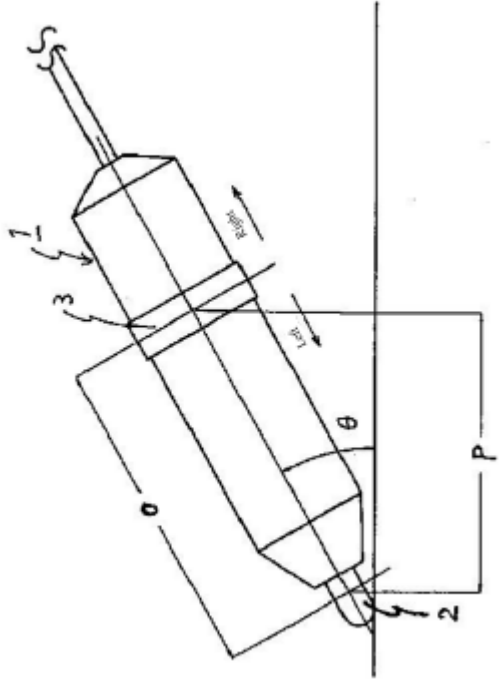
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
	Fig.26  A POSITA would have understood that integrating a coil to receive an excitation signal from the sensor panel, along with a power generation circuit to convert that excitation signal into the proper drive voltage, would enable the signal production circuit (AC power source 603) to operate without a	routed to a signal production circuit within the pen, would enable the generation of first and second signals for capacitive detection. Although IKEDA depicts a wired configuration, a POSITA would have recognized that replacing or supplementing the cable with a coil and power generation circuit, well known in the art for inductive power transfer, would enable wireless operation. In that arrangement, the drive voltage developed by the power generation circuit would be supplied to the signal production circuit, thereby producing the first and second signals, as in supra 1 [d]–1 [e]. <u>IGUCHI</u> IGUCHI discloses a capacitive coordinate inputting apparatus in which the main electrode 304 and auxiliary electrode 305 of the detecting pen receive drive signals from the tablet through capacitive coupling. IGUCHI, Figs. 26a, 27c, 29b, 31:5–44.

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	battery. The resulting drive voltage would be supplied to the signal production circuit to produce the first and second signals, distinguishable as disclosed in Claim 1 and <i>supra</i> 1[d]–1[e], and deliver them to the electrodes. Such inductively powered, battery-free capacitive styluses were well known, and applying that design to YOSHIDA’s system would have been a predictable and routine modification.	FIG. 26a  FIG. 27c 

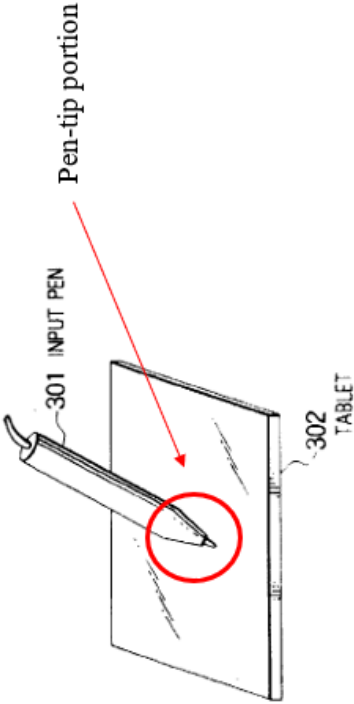
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		FIG. 29a FIG. 29b ($\theta = 90^\circ$) ($\theta = 45^\circ$)  FIG. 29a shows a cross-sectional view of a capacitive coordinate inputting apparatus at $\theta = 90^\circ$. It includes a substrate 302, a main electrode 304, and an auxiliary electrode 305. A cross-sectional view S3 is shown. FIG. 29b shows a cross-sectional view at $\theta = 45^\circ$, including a cross-sectional view S3'. Both diagrams include cross-sectional views S4 and S4' showing the electrodes on a substrate 302. Time points t_1, t_2, and t_3 are marked on the cross-sections. IGUCHI discloses a capacitive coordinate inputting apparatus in which the main electrode 304 and auxiliary electrode 305 of the detecting pen receive drive signals from the tablet through capacitive coupling. A POSITA would have understood that IGUCHI's stylus could alternatively be powered using an inductively coupled coil and a power generation circuit, in place of or in addition to any wired or direct capacitive powering arrangement. In such a configuration, the drive voltage produced by

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		the power generation circuit would feed the stylus’s signal production circuit, which in turn would generate the first and second signals supplied to the electrodes for capacitive detection, consistent with the structure described in supra 1[d]–1[e]. A POSITA would have recognized this as a predictable adaptation of IGUCHI’s stylus using well-established wireless powering techniques that were already widely known in the art of input devices. Inductive powering had been applied in related capacitive systems to eliminate the need for internal batteries or direct wiring, and offered practical benefits including reduced device weight and simplified maintenance. Incorporating an inductively coupled power scheme into IGUCHI’s stylus would therefore have been an obvious and advantageous refinement that complemented YOSHIDA’s capacitive stylus framework and aligned with industry efforts to develop lighter, more reliable digital pens.
Claim 10 (Ind.) 10[pre] A pen-shaped position indicator	<i>See supra</i> 1[pre].	<i>See supra</i> 1[pre].

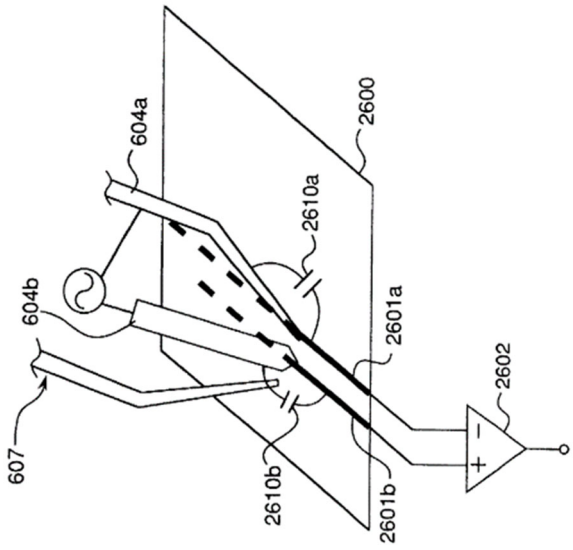
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configured to capacitively couple with a sensor surface, the pen-shaped position indicator comprising:		
10[a] a pen-shaped body having a pen-tip portion;	<i>See supra</i> 1[pre] – [a]. YOSHIDA discloses a pen-shaped body with a pen-tip portion. YOSHIDA, Fig.2.  Fig.2	<i>See supra</i> 1[pre] – [a]. <u>IKEDA</u> IKEDA discloses a coordinate detection pen with a pen tip portion (“detection unit 2”): “Fig. 1 is a configuration diagram of the coordinate detection pen of this invention, where an axis-shaped detection unit 2 is positioned at the tip of the coordinate detection pen 1 to read the coordinates of the indicated point, and a ring-shaped detection unit 3 for indicating the angle is positioned on the body of the coordinate detection pen.” IKEDA, [0008], Figs. 1 (block diagram of the coordinate detection pen showing key components), 5 (shows coordinate detection pen with tilt detection).

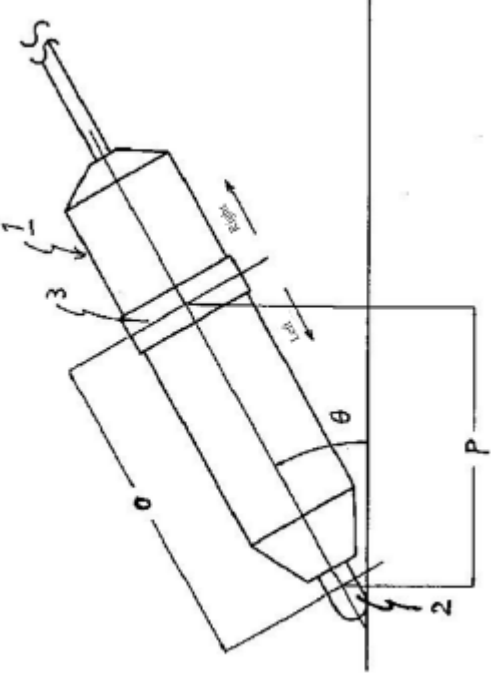
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	YOSHIDA's Fig. 2 illustrates a pen-shaped electronic pen 21 featuring a distinct pen-tip portion, which serves as the primary contact point for capacitive coupling. This figure provides a side view of the pen, highlighting its elongated cylindrical body and the tapered tip designed for interaction with a sensor surface.	[Fig 1.]  IKEDA Fig. 1 [Fig.5]  IKEDA Fig. 5

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		A POSITA would have recognized that capacitive input devices commonly utilize a pen-shaped body with a distinct pen-tip portion to facilitate precise interaction with a sensor surface. Given that YOSHIDA discloses a pen-shaped stylus with capacitive coupling and IKEDA explicitly discloses a coordinate detection pen with a defined pen-tip portion for input detection, a POSITA would have understood that incorporating IKEDA’s pen structure into YOSHIDA’s system represents a predictable and routine application of known design principles. The combination of YOSHIDA’s capacitive stylus system with IKEDA’s detailed pen structure would have been an obvious refinement to optimize capacitive signal detection and stylus positioning. <u>IGUCHI</u> IGUCHI discloses a capacitive pen system that includes a pen-shaped structure with a main electrode at the tip. IGUCHI, Fig. 26a, 30:25-29.

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		FIG. 26a  A POSITA would have recognized that capacitive input devices commonly incorporate a pen-shaped structure to facilitate stable and accurate interaction with a sensor surface. IGUCHI discloses a capacitive pen system with a pen-shaped body and a main electrode positioned at the tip, reinforcing the conventional design principles for capacitive styluses. Given YOSHIDA's disclosure of a capacitive stylus and IGUCHI's explicit depiction of a pen-shaped input device with a tip electrode, a POSITA would have understood that modifying YOSHIDA's stylus system in view of IGUCHI would be a predictable optimization to improve

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10[b] first and second electrodes arranged near the pen-tip portion to surround an axis of the pen-shaped position indicator; and	<i>See supra</i> 1[b] (describing first electrode) – 1[c] (describing second electrode); <i>see also</i> Claim 4 (first and second electrodes arranged to surround the axis of the pen shaped position indicator), <i>supra</i>.	capacitive signal transmission and precision in input detection. <i>See supra</i> 1[b] (describing first electrode) – 1[c] (describing second electrode); <i>see also</i> Claim 4 (first and second electrodes arranged to surround the axis of the pen shaped position indicator), <i>supra</i>.
10[c] a signal production circuit configured to generate first and second signals that are distinguishable from each other; and	<i>See supra</i> 1[c] – 1[e]; <i>see also</i> Claim 7, <i>supra</i>. YOSHIDA discloses a signal production circuit that generates first and second signals that are distinguishable from each other. Specifically, YOSHIDA discloses “in a manner as shown in FIG.26, when electrodes 2601a and 2601b provided in an LCD panel 2600 are connected to a differential amplifier 2602 . . .” (YOSHIDA, 26:12-16) and “as shown in FIG, 26, the outer electrode 604a and the inner electrode 604b are coupled most intensely with the electrodes 2601a and 2601b via capacitors 2610a and 2610b. In the above place, electric fields applied to the outer electrodes 604a	<i>See supra</i> 1[c] – 1[e]; <i>see also</i> Claim 7, <i>supra</i>. <u>IKEDA</u> IKEDA describes two detection units for coordinate and angle determination, indicating that its system produces separate signals for positional tracking and angular displacement. IKDEA, Fig. 3, [0008] (“[C]oordinate detection is performed using the two detection units 2 and 3, and the coordinate data detected via electrostatic capacitance coupling with the tablet’s electrodes . . . is applied to the main body 5 of the coordinate input device . . .”). Additionally, the electrical block diagram (Fig. 3) illustrates how signals are processed: “The main

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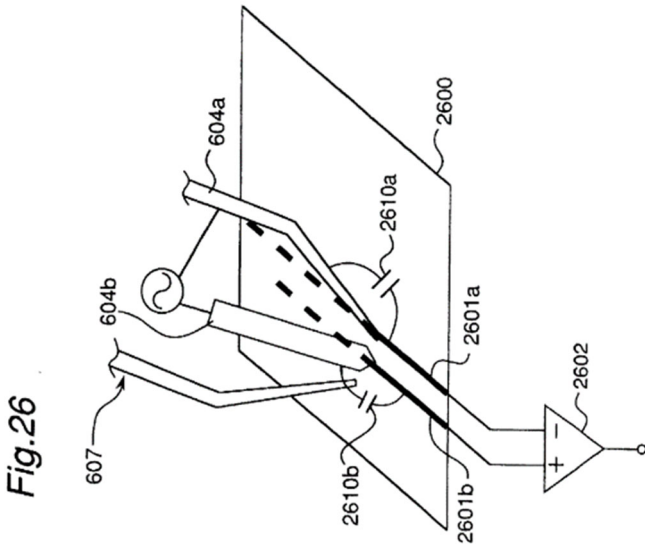
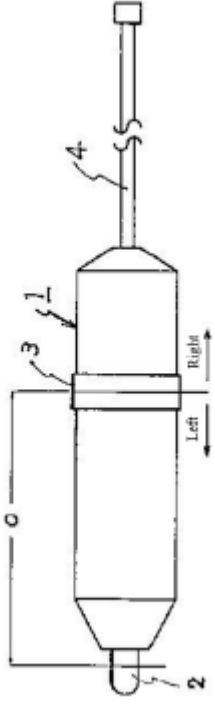
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	an AC power source 603 (a signal production circuit) connected to electrodes 604a and 604b as depicted in Fig. 26. The output of the AC power source 603 applied to the outer electrodes 604a and the inner electrode 604b are opposite in phase to each other. The phase of the first signal to the inner electrode 604b is inverted with respect to the phase of the second signal to the outer electrode 604a. The diagram indicates that the power source generates distinguishable signals suggesting opposite electrodes, with annotations suggesting opposite phases or differing frequencies to facilitate signal differentiation. Additionally, YOSHIDA Figure 27 expands on the signal transmission process, illustrating how the signals interact with the sensor surface during operation.	dimensional control program converts the dimensions between the detection unit for coordinate detection and the detection unit for angle detection, storing the angle dimension P where the coordinate detection pen 1 is located in RAM 8 of the coordinate input device." IKEDA, [0013], Fig. 5. [Fig.5]  YOSHIDA discloses an AC power source that generates distinguishable signals through differential capacitive coupling, providing opposite-phase outputs from a signal production circuit. IKEDA further describes multiple detection units that generate separate signals for coordinate and angle

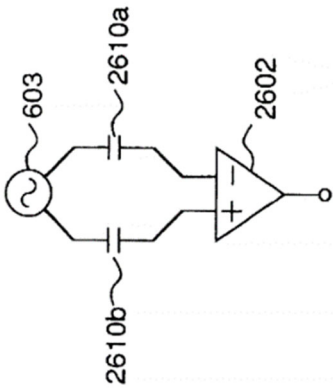
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		determination. A POSITA would recognize that incorporating IKEDA's detection system into YOSHIDA's stylus configuration would enhance signal processing for both coordinate and angular tracking, further confirming distinguishable signals. A POSITA would understand that generating distinguishable signals for multiple electrodes is essential to capacitive stylus operation. YOSHIDA discloses such signals via opposite-phase outputs from a signal production circuit, and IKEDA reinforces the same principle by showing distinguishable signals for coordinate and angle detection. A POSITA would have been motivated to combine IKEDA's disclosure of a signal-separation approach with YOSHIDA's stylus circuitry because both references operate in the common field of capacitive stylus technology and address similar problems of improving signal processing. A POSITA would have recognized that combining these teachings would predictably enable a more robust system for distinguishing positional and angular information, thereby enhancing detection accuracy. The combination would also improve performance by meeting the commercial demand for

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		more sophisticated input devices with enhanced accuracy for both position and angle detection. <u>IGUCHI</u> IGUCHI discloses capacitive signal differentiation, where time-differentiated signals from capacitive electrodes encode positional information. IGUCHI, Fig. 29b. FIG. 29a FIG. 29b ($\theta = 90^\circ$) ($\theta = 45^\circ$) FIG. 29a shows a cross-sectional view of a capacitive electrode assembly at an angle $\theta = 90^\circ$. It includes a main electrode 302 and an auxiliary electrode 304. Below the electrodes are signal waveforms labeled S3 (MAIN ELECTRODE) and S4 (AUXILIARY ELECTRODE). Time markers t1, t2, and t3 are indicated on the S4 waveform. FIG. 29b shows a cross-sectional view of a capacitive electrode assembly at an angle $\theta = 45^\circ$. It includes a main electrode 302 and an auxiliary electrode 305. Below the electrodes are signal waveforms labeled S3' (MAIN ELECTRODE) and S4' (AUXILIARY ELECTRODE). Time markers t2 and t3 are indicated on the S4' waveform.

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		IGUCHI further discloses: "The main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310. The auxiliary electrode 305 is arranged around this main electrode 304." IGUCHI, 30:25-29. IGUCHI also discloses: "Since the auxiliary electrode is located in a position separated from the main electrode, coordinates of the main and auxiliary electrodes with respect to a tablet plate are separately detected when the pen shaft is inclined" and that "[i]nclination data of the pen shaft can be taken out by a difference between timing signals caused by a difference between these coordinates." IGUCHI, 15:6-12. This confirms that IGUCHI describes a system in which signals from different electrodes are separately detected, supporting the generation of distinguishable signals. A POSITA would have recognized that capacitive input systems inherently generate and differentiate signals based on electrode positioning and coupling dynamics. IGUCHI explicitly discloses time-differentiated capacitive signals that encode positional information, demonstrating a method for distinguishing signals based on temporal variations. IGUCHI, Fig. 29b. By modifying YOSHIDA's signal production circuit to incorporate IGUCHI's

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		time-differentiation techniques, a POSITA would have found it obvious to enhance signal distinguishability for improved stylus input detection. Given that both references address capacitive input devices and signal processing, integrating IGUCHI's time-dependent capacitive variations into YOSHIDA's stylus system would have been a predictable design choice to refine signal resolution and tracking accuracy.
10[d] conducting lines extending between the signal production circuit and the first and second electrodes, respectively,	<i>See supra</i> 1[d]-1[e]. YOSHIDA discloses conductive lines transmitting signals between AC power source 603 and electrodes 604a, 604b. YOSHIDA, Figs. 26, 27. The signal of the AC power source 603 (the "signal production circuit") is applied to the outer electrodes 604a and the inner electrode 604b (the "first and second electrodes") through conductive lines. <i>Id.</i> at 26:31-35 ("the AC power source 603 included in the electric field generator 607 is connected to the differential amplifier 2602 via the capacitors 2610a and 2610b," showing each electrode coupled through separate conductive pathways.)	<i>See supra</i> 1[d]-1[e]. <u>IKEDA</u> Ikeda discloses that the tip detection unit 2 and body detection unit 3 are connected by conductive lines to processing circuitry. Ex. 1006, ¶[0008] ("an axis-shaped detection unit 2 is positioned at the tip. . . and a ring-shaped detection unit 3 for indicating the angle is positioned on the body of the coordinate detection pen"), with Figure 1 depicting the physical connection, and Figure 3 showing the signal flow from both electrodes to the CPU 6, ROM 7, and RAM 8. <i>Id.</i> , ¶[0009], Fig. 3.

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	Fig.26  YOSHIDA's Figure 26 illustrates the internal circuit of the pen, where conductive lines extend between the AC power source 603 and the first and second electrodes (604a, 604b). These conductive lines serve as the transmission medium for signals from the power source to the electrodes, ensuring proper operation of the capacitive coupling mechanism. <i>See also</i> Figs. 27 and 6A (cross-sectional view illustrating the electrode structure and connections inside the pen); 24:66-25:14 (“As	[Fig 1.]  IKEDA further discloses: “[C]oordinate detection is performed using the two detection units 2 and 3, and the coordinate data detected via electrostatic capacitance coupling with the tablet's electrodes . . . is applied to the main body 5 of the coordinate input device through a cable 4 connected to the coordinate detection pen 1.” IKEDA, [0008], Fig. 3. In addition, IKEDA discloses, “The main body 5 of the coordinate input device includes a CPU 6 for performing coordinate control, a ROM 8 for storing the program for coordinate control, a RAM 8 for storing the detected coordinate data and the reference dimensions O corresponding to the two detection units 2 and 3 of the coordinate detection pen 1” IKEDA, [0009], Fig. 3. This confirms that IKEDA discloses a signal transmission structure using

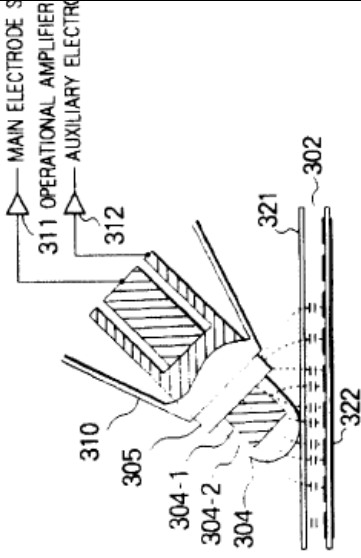
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	shown in FIG. 6A, the electric field generator 607 has a structure in which both the output terminals of the AC power source 603 are connected to the outer electrode 604a and the inner electrode 604b of the coaxial electrode.") <i>Fig.27</i> 	conductive connections from a detection unit to an external system. Additionally, IKEDA Figure 3 discloses an electrical block diagram showing the signal paths and interconnections of the stylus system, reinforcing that conductive pathways are used to transfer signals from the detection pen to processing electronics. IKEDA, Fig. 3.

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Fig. 6A	[Fig. 3]	YOSHIDA discloses conductive lines that extend between a signal production circuit and electrodes arranged in the pen-tip portion. IKEDA explicitly describes a structure where capacitive signals detected at the stylus tip are transmitted via conductive lines to a processing unit.

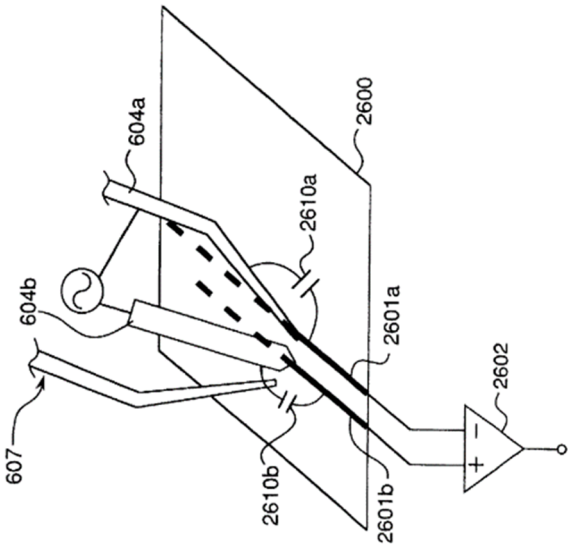
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		A POSITA would have understood that conductive lines are necessary to route signals from electrodes within the pen to the signal production circuit, and that capacitive stylus systems commonly include such conductive pathways. Both YOSHIDA and IKEDA explicitly show conductive connections, confirming that these configurations were well known in the field. Incorporating IKEDA's explicit disclosure of conductive connections into YOSHIDA's stylus design would have been a routine application of known stylus design principles. A POSITA would have been motivated to combine YOSHIDA and IKEDA's disclosures because both references address the same fundamental challenge: routing signals between electrodes and signal-generation circuitry. Combining their teachings would predictably result in a practical and reliable electrical connection scheme, improving manufacturing efficiency and ensuring accurate transmission of distinct signals. Given the strong commercial push for styluses with increased capabilities, a POSITA would have recognized the benefit of leveraging IKEDA's clearly illustrated

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		wiring techniques alongside YOSHIDA's electrode layout to build a higher-performance, market-ready device. <u>IGUCHI</u> IGUCHI discloses conductive connections between the main and auxiliary electrodes and associated circuits. Specifically, IGUCHI discloses: "Since the auxiliary electrode is located in a position separated from the main electrode, coordinates of the main and auxiliary electrodes with respect to a tablet plate are separately detected when the pen shaft is inclined." IGUCHI, 15:6-12. Further, IGUCHI's Figure 27c shows the arrangement of electrodes and connections, supporting that the capacitive signals are transmitted through conductive pathways. IGUCHI, 31:5-11, Fig. 27c.

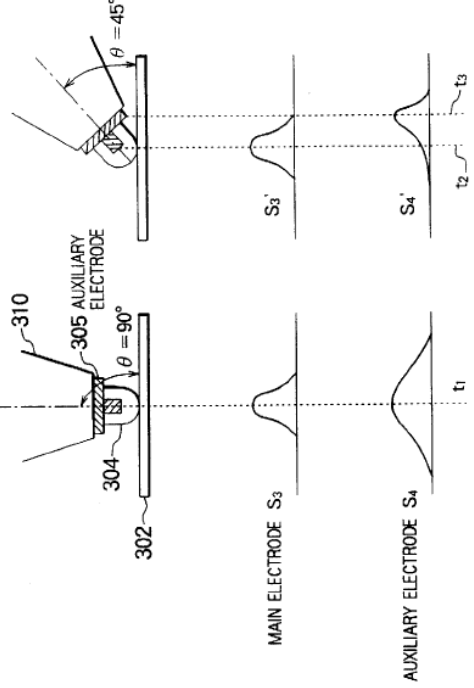
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		FIG. 27c  Additionally, IGUCHI discloses: “[T]he main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310” and “[t]he auxiliary electrode 305 is arranged around this main electrode 304.” IGUCHI, 30:25-29. This demonstrates the structured connectivity within IGUCHI’s capacitive stylus system. A POSITA would have recognized that capacitive stylus systems inherently require conductive pathways to transmit signals between multiple electrodes and a processing circuit. IGUCHI explicitly discloses a structured configuration where the main and auxiliary electrodes are positioned separately and interact with the sensor surface through capacitive coupling, confirming the

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		presence of distinct signal transmission paths. IGUCHI further describes how capacitive signals are detected independently at different electrode locations, demonstrating that conductive connections are necessary for accurate position and inclination tracking. Incorporating IGUCHI’s disclosure of structured conductive pathways into YOSHIDA’s stylus system would have been a predictable and straightforward modification, as capacitive input devices commonly employ multiple electrodes connected through conductive lines to facilitate signal transmission. A POSITA would have understood that integrating IGUCHI’s signal transmission structure into YOSHIDA’s system would enhance the accuracy of capacitive detection by ensuring reliable signal propagation between the electrodes and the processing circuitry.
10[e] wherein the first and second signals generated by the signal production circuit, in operation, are transmitted to	<i>See supra</i> 1[f]. YOSHIDA discloses capacitive coupling between electrodes 604a, 604b and the LCD panel electrodes 2601a, 2601b. YOSHIDA, Fig.26, 27:5-7 (“the outer electrode 604a and the inner electrode 604b are coupled most intensely with the electrodes 2601a and 2601b via capacitors 2610a and 2610b”).	<i>See supra</i> 1[f]. <u>IKEDA</u> IKEDA describes a coordinate detection pen where signals are transmitted to multiple detection electrodes via circuit pathways. Specifically, IKEDA discloses: “[C]oordinate detection is performed using the two detection units 2 and 3, and the coordinate data detected via electrostatic capacitance

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the first and second electrodes via the conductive lines;	<i>Fig.26</i>  <i>See also Fig. 27:</i>	coupling with the tablet's electrodes . . . is applied to the main body 5 of the coordinate input device through a cable 4 connected to the coordinate detection pen 1.” IKEDA, [0008], Fig. 3. Further, IKEDA describes a structure where coordinate detection is performed by multiple detection units, connected to circuit pathways that process and transmit signals: “The main body 5 of the coordinate input device includes a CPU 6 for performing coordinate control, a ROM 7 storing the program for coordinate control, a RAM 8 for storing the detected coordinate data and the reference dimensions 0 corresponding to the two detection units 2 and 3 of the coordinate detection pen 1” IKEDA, [0009], Fig. 3. This indicates an organized system of conductive pathways that allow for the transmission of capacitive detection signals. Additionally, IKEDA Figure 3 presents an electrical block diagram detailing the connections of signal paths between the capacitive detection units and signal processing circuits, reinforcing that conductive pathways transmit signals between the signal production circuit and detection electrodes. IKEDA, Fig. 3.

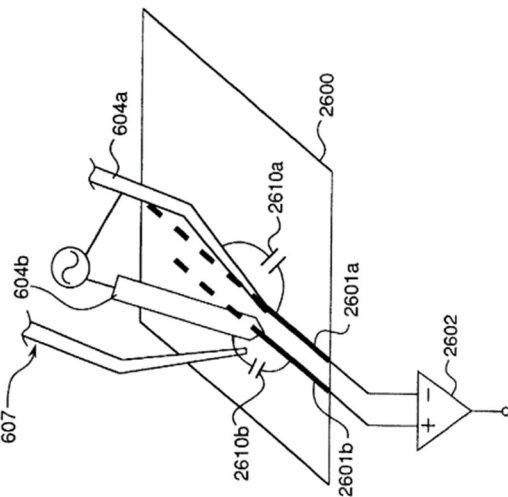
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	Therefore the coordinates (x, y) of the position in which the electrodes 604a and 604b of the electric field generator 607 are located can be specified". YOSHIDA, 27:17-25. YOSHIDA further discloses that the electrodes 202 of LCD panel 200 can detect the coordinates (x, y) of the position in which the electrodes 604a and 604b are located.	reinforces this principle by showing capacitive data paths from multiple electrodes to the processing circuitry, confirming that such coupling mechanisms were standard in the field. Both references, therefore, disclose that the first and second signals are configured to capacitively couple with the sensor surface. A POSITA would have understood that capacitive coupling between stylus electrodes and tablet electrodes was a well-known mechanism for transmitting distinct detection signals, and that capacitive input devices commonly employed such structured signal pathways to ensure accurate processing of positional and angular data. Integrating IKEDA's capacitive data paths into YOSHIDA's stylus system would have been a predictable and routine modification to improve signal accuracy and enable simultaneous detection of coordinate and angular information. A POSITA would have been motivated to combine YOSHIDA's and IKEDA's teachings regarding capacitive coupling because both disclose highly compatible techniques within the same field of

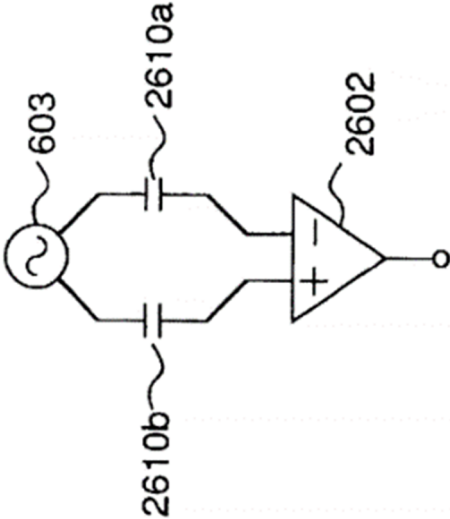
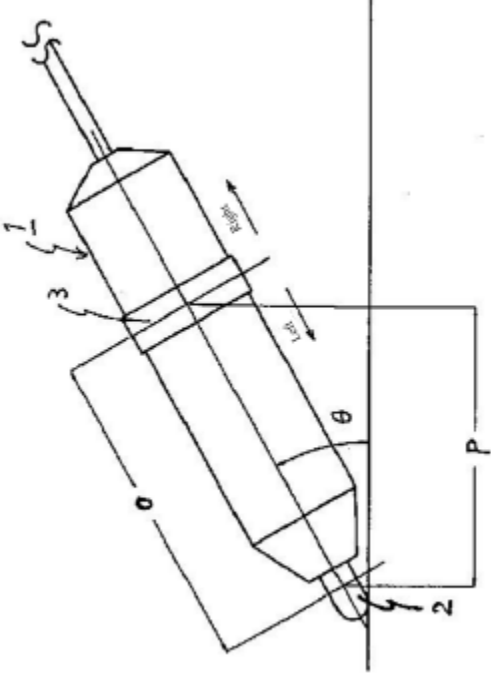
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		capacitive stylus technology. Capacitive coupling was a well-established method for transmitting stylus position and angle data, and combining these designs would predictably enhance performance by allowing the system to simultaneously process coordinate and angular information. There was a recognized market demand for advanced pen inputs in professional applications like CAD and digital illustration, making this combination an expected and commercially sensible step. <u>IGUCHI</u> IGUCHI discloses time-differentiated signals traveling through capacitive pathways, demonstrating that signal transmission via conductive lines is an inherent feature. Specifically, IGUCHI states: "[A] time difference is caused between timing t2 of a peak of an output signal S3' provided by the main electrode and timing t3 of a peak of an output signal S4' provided by the auxiliary electrode." IGUCHI, 31:37-41, Fig. 29b.

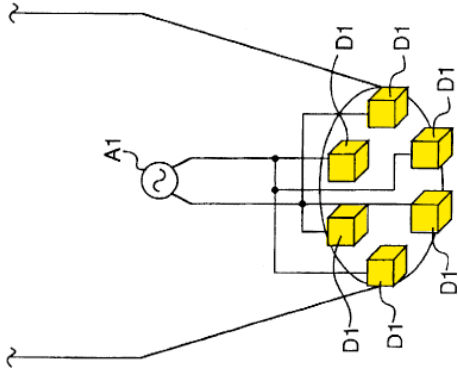
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		FIG. 29a FIG. 29b ($\theta = 90^\circ$) ($\theta = 45^\circ$)  Further, IGUCHI discloses that capacitive signals are detected by electrodes positioned at different locations, confirming the presence of transmission paths: “Since the auxiliary electrode is located in a position separated from the main electrode, coordinates of the main and auxiliary electrodes with respect to a tablet plate are separately detected when the pen shaft is inclined.” IGUCHI, 15:6-9. Additionally, IGUCHI Figure 27c provides a schematic representation of capacitive signal transmission paths, demonstrating how signals

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		generated at different electrode locations travel through conductive pathways before interacting with the sensor surface. IGUCHI, Fig. 27c, 31:5-11. FIG. 27c A POSITA would recognize that capacitive stylus systems inherently require structured signal transmission to ensure accurate detection of positional and angular displacement. IGUCHI discloses that capacitive signals are detected by electrodes positioned at different locations and transmitted through conductive pathways, demonstrating that signal differentiation and transmission via conductive lines are essential components of capacitive stylus operation. Given YOSHIDA’s disclosure of capacitive signal generation and transmission, a POSITA would have found it obvious to incorporate IGUCHI’s structured

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		signal transmission methods to enhance the detection of time-differentiated capacitive signals. By integrating IGUCHI's time-differentiated capacitive signal transmission into YOSHIDA's capacitive stylus framework, a POSITA would recognize the predictable advantage of improved tilt detection and signal resolution, making this combination an expected and beneficial modification.
10[f] wherein the first and second electrodes are configured to form first and second capacitive relationships with the sensor surface, respectively, to generate detection signals in the sensor surface based on which angle	<i>See supra</i> 1 [g]. YOSHIDA discloses a capacitive stylus system where multiple electrodes 604a and 604b interact with a sensor surface to generate detection signals. YOSHIDA explains that an electric field is generated from the stylus electrodes and capacitively coupled with the sensor surface to provide positional data. YOSHIDA, Figs. 26, 27, 27:13–25 ("by performing two times similar detection operations from the segment electrode side and from the common electrode side so as to detect and decide the coordinates . . . the coordinates (x, y) of the position in which the electrodes 604a and 604b of the electric field generator 607 are located can be specified"). These disclosures demonstrate that each stylus electrode independently forms a capacitive relationship with	<i>See supra</i> 1 [g]. <u>IKEDA</u> IKEDA discloses a capacitive stylus that detects tilt angle using multiple electrodes positioned along the stylus body. Specifically, IKEDA states: "A coordinate detection electrode (first detection unit) is positioned at the tip of the coordinate detection pen, and a ring-shaped coordinate detection electrode (second detection unit) for angle reading is placed on the body of the coordinate detection pen." IKEDA, [0006], Fig. 5 (illustrating angle detection using capacitive coupling). Additionally, IKEDA discloses how these electrodes form capacitive relationships that allow tilt detection: "Using the coordinate data from the two detection units 2 and 3 stored in the regions of RAM

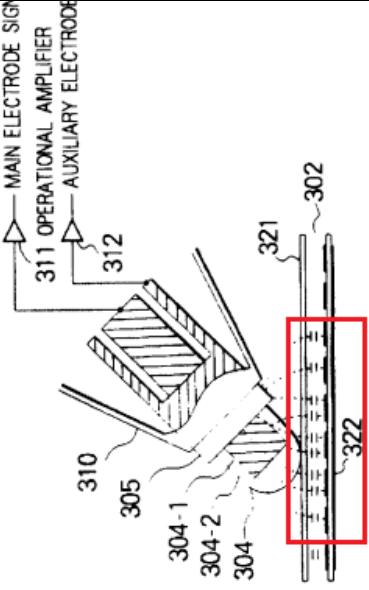
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information of the pen-shaped position indicator is obtainable.	the panel's electrode matrix, and that the positional information is extracted by comparing signals from the different capacitive couplings. Fig.26 	8, the dimensional control program converts the dimensions between the detection unit for coordinate detection and the detection unit for angle detection, storing the angle dimension P where the coordinate detection pen 1 is located in RAM 8 of the coordinate input device.” IKEDA, [0013], Fig. 5. Further, IKEDA confirms that capacitive stylus systems inherently generate multiple capacitive relationships for tilt detection: “By detecting each coordinate using the detection unit 2 for coordinate detection and the detection unit 3 for angle detection of the coordinate detection pen 1, control over the angle of the coordinate detection pen 1 can be achieved.” IKEDA, [0015], Fig. 5; <i>see also id.</i>, Abstract (“[Problem to be Solved]: In a coordinate input device using capacitive coupling, the presence of only one electrode for coordinate detection prevents input control based on the angle of use of the coordinate detection pen against the board surface...[Means for Solving the Problem]: An electrode for coordinate detection is arranged at the tip of the coordinate detection pen and the body of the pen. The pen body is equipped with an electrode designed to detect a ring-shaped angle.”); Claim 1 (“two detection electrode units: one for detecting coordinates and another for detecting

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	Fig.27  YOSHIDA further explains that the stylus can employ a plurality of electrodes (D1) to generate a “rotational electric field,” which provides stability against changes in roll orientation. In particular, YOSHIDA notes that “even though the pen which serves as the electric field generator rolls, the electrostatic capacity between the electrodes of the pen and the electrodes of the panel do not change.” YOSHIDA, 26:36–48; see also 8:66–9:11; 57:1–20. This teaching shows that the system can be configured so that some angular variations (such as roll) do not affect the detected signal, thereby	angles...enabling the detection of the tilt angle of the aforementioned coordinate detection pen itself”). [Fig.5]  IKEDA Fig. 5 Figure 5 of IKEDA discloses how the first detection unit is positioned at the pen tip, and the second detection unit is ring-shaped and positioned along the pen body, allowing the system to measure tilt by analyzing changes in capacitive coupling at different locations along the pen axis.

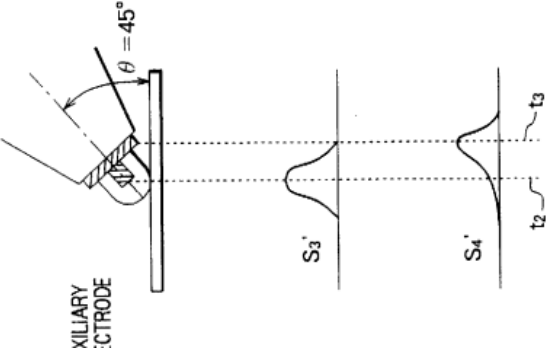
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	allowing consistent positional data even as the pen rotates. <i>Fig.28</i>  A POSITA would have understood that YOSHIDA describes a capacitive architecture in which an AC field is driven from the pen tip and sensed by the LCD panel's existing X/Y electrode matrix. Those electrodes are time-multiplexed into detection circuitry (e.g., a differential amplifier) so that the same panel hardware performs both display and input functions. In such arrangements, the mutual capacitances between the stylus electrodes and the	A POSITA would have understood that when a stylus includes multiple conductive electrodes, each electrode establishes its own capacitive coupling with the sensor surface, producing distinct relationships that can be analyzed for input data. YOSHIDA illustrates this with electrodes 604a and 604b, which form separate capacitive links with the panel's X/Y grid. IKEDA reinforces this principle by teaching that a tip electrode and an additional electrode along the pen body create distinct capacitive couplings that can be used not only for coordinate determination but also for inclination detection. A POSITA would have been motivated to integrate IKEDA's tilt-specific configuration into YOSHIDA's capacitive stylus architecture to extend its capabilities from coordinate tracking to precise angle measurement. Both references address similar design challenges in capacitive stylus technology and are directed to improving how stylus posture is sensed. Because the techniques are technically compatible, their combination would have been straightforward and would predictably yield a stylus capable of reporting both position and angular information with greater accuracy. Moreover, market demand at the time strongly favored styluses that

Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103) panel grid are the key signal carriers. Variations in those capacitances reflect not only the x–y position and distance of the pen tip, but also its angular posture relative to the surface. For example, as the pen tilts, the electric field distribution shifts asymmetrically across the panel electrodes, producing detectable differences in the capacitive coupling strengths. At the same time, YOSHIDA illustrates that by arranging electrodes to generate a rotationally symmetric field, certain angular components (such as roll) can be designed out of the measurement, thereby improving stability. A POSITA would recognize that these disclosures collectively confirm that YOSHIDA teaches the use of electrode-to-panel capacitive relationships for extracting not just coordinate data but also angular information.	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”) could capture tilt and rotation, as evidenced by contemporaneous commercial products such as Wacom’s tilt-sensitive pens. A POSITA would have recognized that merging IKEDA’s angle-sensing disclosure with YOSHIDA’s electrode configuration was a natural response to these commercial pressures and would achieve improved performance without introducing technical incompatibilities. <u>IGUCHI</u> IGUCHI discloses generating detection signals in the sensor surface from which angle information is obtainable. As shown in FIG. 26a and FIG. 26b, “[t]he main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310” and “[t]he auxiliary electrode 305 is arranged around this main electrode 304”. IGUCHI, 30:25-29, Figs. 26a–26b.
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		FIG. 26a FIG. 26b IGUCHI also discloses how capacitive signals interact to determine pen inclination: “No shape of the electrostatic capacity is formed with right and left symmetry with respect to the main electrode. This is because no peak of the electrostatic capacity provided by the main electrode 304 is in conformity with a peak of the electrostatic capacity provided by the auxiliary electrode 305 by inclining the pen shaft.” IGUCHI, 31:5-11, Fig. 27c.

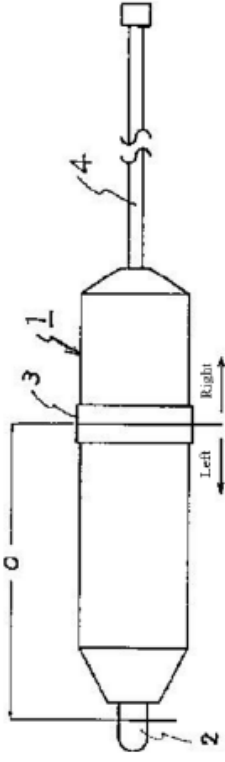
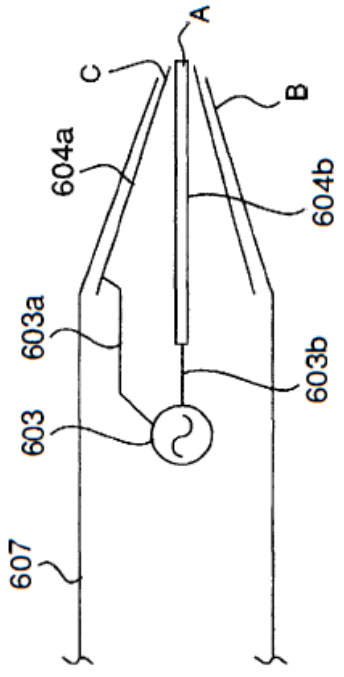
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		FIG. 27c  IGUCHI's Figure 27c presents an analysis of how capacitive relationships between multiple electrodes on a pen allow for angle detection. The capacitive signals generated by the electrodes interact with the sensor surface, producing detection signals that reveal tilt and angular movements of the pen. As shown in Figure 27c, variations in detected capacitance between electrodes allow for the calculation of angular displacement, supporting the claim that the generated detection signals provide angle information. IGUCHI also discloses “[s]ince the auxiliary electrode is located in a position separated from the main electrode, coordinates of the main and auxiliary electrodes with respect to a tablet plate are

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		separately detected when the pen shaft is inclined" and that "[i]nclination data of the pen shaft can be taken out by a difference between timing signals caused by a difference between these coordinates". IGUCHI, 15: 6-12. A POSITA would have understood or found obvious that the "inclination data of the pen shaft" is corresponding to the "angle information of the pen-shaped position indicator" in 1[g], and the "the difference between timing signals" caused by a difference between these coordinates" is corresponding to the "detection signals in the sensor surface" in 1[g]. <i>See also</i> IGUCHI 31:26-44. The limitation "to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable" in 1[g] has been disclosed by IGUCHI. IGUCHI further supports the detectability of angular displacement by describing how time-differentiated signals from capacitive electrodes encode tilt information. IGUCHI, Fig. 29b, 31:47-50. Specifically, IGUCHI discloses "a time difference is caused between timing t2 of a peak of an output signal S3' provided by the main electrode and timing

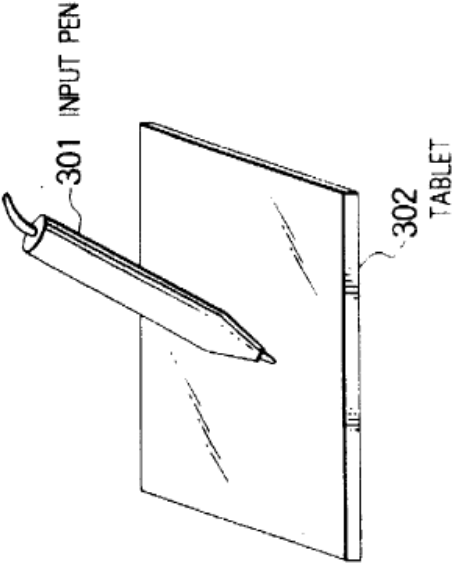
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		t3 of a peak of an output signal S4' provided by the auxiliary electrode.” IGUCHI, 31:37-41, Fig. 29b. FIG. 29b ($\theta = 45^\circ$)  In Figure 29b of IGUCHI, the output signals S3' and S4' from the main and auxiliary electrodes are plotted over time. The graph demonstrates that while both signals are of the same type (e.g., voltage signals), there is a measurable time difference between them, which is utilized to determine the

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		pen's tilt or angle. The figure presents a waveform diagram illustrating the time difference between output signals S3' and S4'. The figure visually demonstrates how these signals shift over time, supporting the argument that signals from different electrodes have a detectable phase difference. This timing offset allows for accurate angular detection of the pen's tilt relative to the sensor surface. A POSITA would have understood that capacitive stylus systems inherently generate multiple capacitive relationships between electrodes in the pen and electrodes on the sensor surface, and that variations among those couplings can be exploited for angular detection. YOSHIDA discloses capacitive signals from electrodes 604a and 604b that interact with the LCD panel grid, while IGUCHI teaches that main and auxiliary electrodes form distinct capacitive couplings whose relative signal strengths can be used to determine inclination of the pen. A POSITA would have been motivated to combine these teachings because YOSHIDA and IGUCHI both operate in the same technical field of capacitive stylus input and address the common problem of detecting not only stylus position but also angular

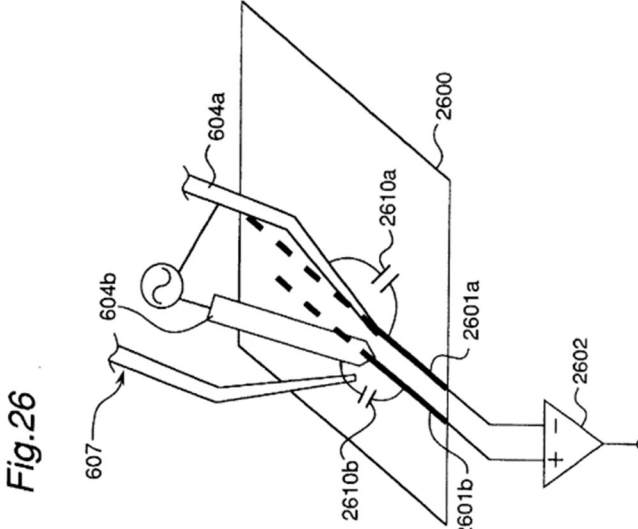
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		posture. Incorporating IGUCHI's offset electrode arrangement and time-differentiated signal processing into YOSHIDA's capacitive stylus framework would have been a predictable enhancement, as each reference discloses complementary features designed to improve angular detection accuracy. Such a combination would have improved performance by providing more reliable tilt measurements without relying on mechanical sensors, thereby reducing device complexity, manufacturing cost, and size. In addition, there was significant commercial demand at the time for advanced digital pens that could support professional graphics applications and consumer electronics markets such as tablets and smartphones. Market trends toward thinner, more accurate styluses would have further incentivized a POSITA to integrate IGUCHI's angular detection methods with YOSHIDA's established capacitive system to meet user expectations for precision and expanded functionality.
Claim 11 11[pre] The pen-shaped position indicator	<i>See supra</i> 10[pre]-10[f].	<i>See supra</i> 10[pre]-10[f].

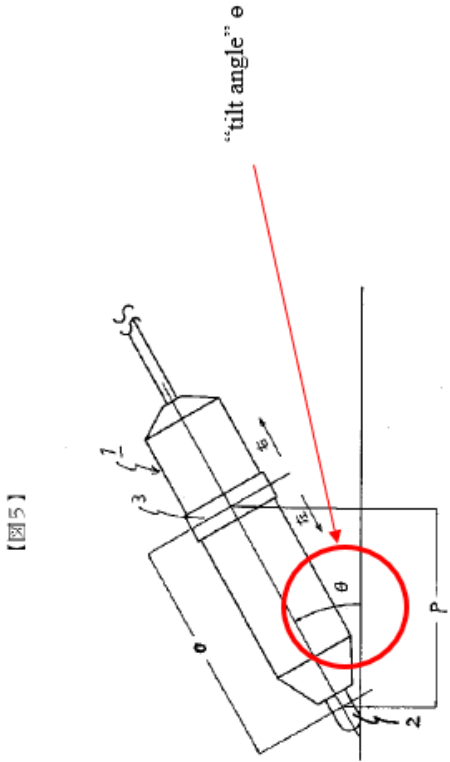
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according to claim 10,	11[a] wherein the pen-tip portion includes a conductive pen tip, to which the signal production circuit transmits a signal via a conductive line.	<i>IKEDA</i> IKEDA discloses a coordinate detection pen with a pen-tip portion (detection unit 2) that includes a conductive structure for capacitive coupling with the tablet surface. IKEDA, Fig. 1, ¶[0006], [0008]. [Fig 1.]  The pen-tip detection unit is driven by signals from the signal production circuitry in the main body (CPU 6, ROM 7, RAM 8), and these signals are used to establish capacitive coupling with electrodes on the tablet to detect position and orientation. The signal applied to the pen-tip portion thereby forms the required capacitive relationship with the sensor surface. IKEDA, Fig. 3, ¶[0011].
	YOSHIDA discloses a pen-shaped stylus in which the electric field generator includes an inner rod-shaped electrode 604b located at the pen tip. This electrode is driven by one terminal of the AC power source 603, and a POSITA would understand this connection to be implemented via a conductive path. The inner electrode is the active signal-emitting component at the tip of the pen, and a POSITA would recognize this as a conductive structure for emitting the electric field. YOSHIDA, Fig. 6A, 24:58–25:5. <i>Fig. 6A</i> 	

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		A POSITA would have been motivated to combine these teachings because Yoshida and Ikeda each teach aspects of stylus tip design in capacitive systems. Yoshida’s inner rod-shaped electrode and Ikeda’s tip-based detection unit both operate to transmit signals at the point of user interaction with the tablet surface. Combining these would predictably improve tip sensitivity and ensure accurate signal transmission. Both references address the same design challenge of providing a reliable conductive path to the tip electrode, and a POSITA would have recognized that leveraging the best features of each system would result in a stylus with superior accuracy and responsiveness. <u>IGUCHI</u> IGUCHI discloses a conductive main electrode 304 located at the end of the pen shaft 310 and coupled to a signal line 306, which supplies timing signals. The signal originates from the circuit and travels via the line to the conductive tip element. IGUCHI, Figs. 26a, 29b, 30:25–29.

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		FIG. 26a 

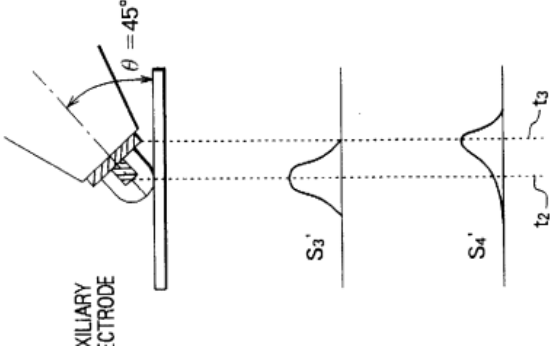
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		FIG. 29a FIG. 29b ($\theta = 90^\circ$) ($\theta = 45^\circ$) A POSITA would have understood that electrode 304 functions as a conductive tip element, directly connected by line 306 to the signal generation circuitry, thereby providing the claimed conductive electrode at the pen tip for transmitting signals used in angle detection.
Claim 12 12[pre] The pen-shaped position	See <i>supra</i> 10[pre]-10[f]; see also Claim 5, <i>supra</i>.	See <i>supra</i> 10[pre]-10[f]; see also Claim 5, <i>supra</i>.

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indicator according to claim 10,		
12[a] wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.	YOSHIDA discloses a capacitive stylus system where multiple electrodes interact with a sensor surface to generate detection signals. YOSHIDA, Fig. 26, 27:13-25. Fig.26  The relative strengths of these detection signals vary depending on the inclination of the pen-shaped	<u>IKEDA</u> IKEDA discloses a coordinate detection pen that measures the inclination angle relative to the sensor surface: “By detecting each coordinate using the detection unit 2 for coordinate detection and the detection unit 3 for angle detection of the coordinate detection pen 1, control over the angle of the coordinate detection pen 1 can be achieved.” IKEDA, [0015], Fig. 5 (shows pen angle detection); [0014]; [0001] (“By analyzing the positional dimensions between the two coordinate detection units and the dimensions of the coordinates read by each detection unit, it is possible to detect the pen’s tilt.”).

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		 IKEDA Fig. 5 IKEDA’s system includes a first detection unit at the pen tip and a second, ring-shaped detection unit on the pen body, allowing capacitive measurements at different positions to determine the pen’s tilt angle relative to the surface. A POSITA would have recognized that incorporating IKEDA’s explicit tilt detection method into YOSHIDA’s capacitive stylus design was a routine and predictable approach to achieving tilt angle measurement. Because YOSHIDA already discloses multiple electrodes forming distinct capacitive relationships with a sensor surface,

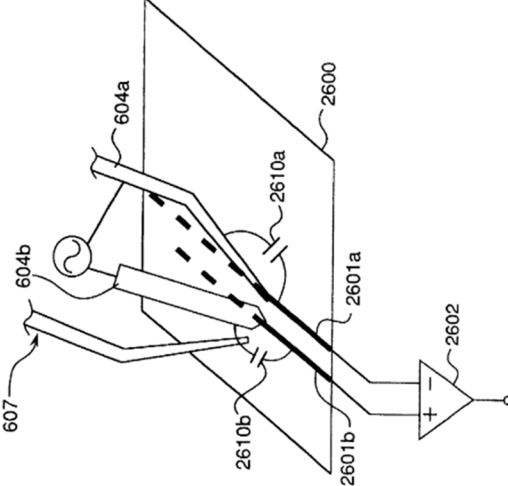
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		adding IKEDA's ring-shaped detection electrode would naturally extend the system to provide tilt information. This integration would improve angular resolution without requiring additional mechanical sensors, reducing complexity while enhancing performance. A POSITA would have been motivated to combine these teachings because both references operate in the same field of capacitive stylus design and address the closely related problem of capturing not just coordinate position but also angular posture. The combination would have predictably resulted in a stylus capable of reporting both position and tilt. At the time, there was a strong commercial demand for more sophisticated input devices for drawing and design, particularly in professional markets such as digital illustration and CAD. A POSITA would have recognized that the combination of YOSHIDA's electrode framework with IKEDA's tilt-specific disclosure directly responded to these market needs and represented a logical progression of known stylus technology.

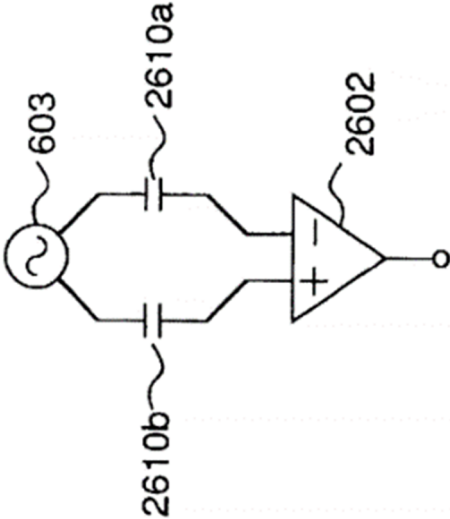
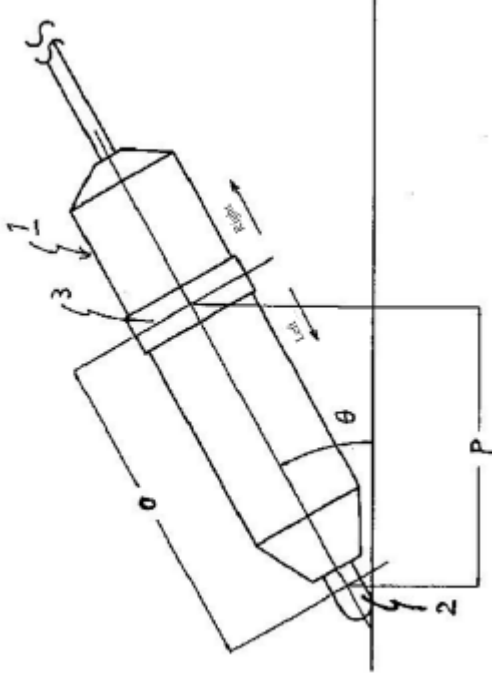
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		<u>IGUCHI</u> IGUCHI discloses tilt detection by describing how capacitive signal variations can be used to measure angular displacement over time. IGUCHI, Fig. 29b, 31:37-41. Specifically, IGUCHI states: “[A] time difference is caused between timing t2 of a peak of an output signal S3’ provided by the main electrode and timing t3 of a peak of an output signal S4’ provided by the auxiliary electrode.” IGUCHI, 31:37-41, Fig. 29b.

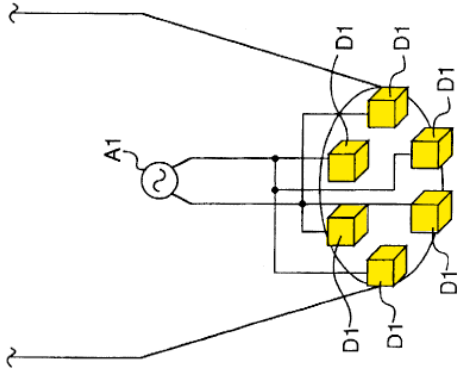
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		FIG. 29b ($\theta = 45^\circ$)  A POSITA would have understood that such timing differences arise when the pen is tilted, as changes in the relative distances between the electrodes and the sensor surface alter the capacitive coupling and the resulting signal profiles. IGUCHI's explicit teaching that these timing differences can be measured to determine angular displacement provides a direct

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		basis for detecting a tilt angle. Incorporating IGUCHI's time-differentiated signal approach into YOSHIDA's capacitive stylus framework would have been a predictable and straightforward enhancement, using well-known capacitive signal processing techniques to achieve accurate tilt detection without mechanical sensors. A POSITA would have been motivated to combine these teachings because IGUCHI's disclosure of temporal signal analysis naturally complements YOSHIDA's capacitive system for position detection. Integrating the two would predictably yield a stylus capable of both coordinate and tilt measurement, leveraging established capacitive principles. This combination would directly address commercial trends toward feature-rich digital pens designed to replicate natural handwriting and artistic motions. At the time, tablet and interactive display markets were driven by demand for tools offering higher accuracy and versatility, and a POSITA would have recognized that combining YOSHIDA and IGUCHI provided an obvious path to meeting those expectations.

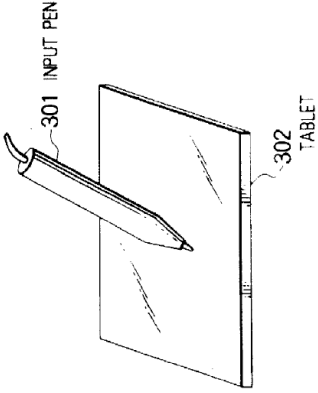
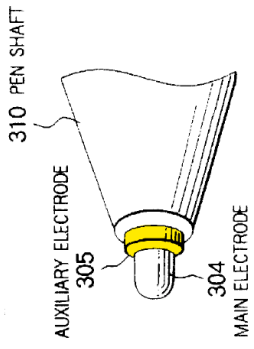
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Claim 14 (Ind.) 14[pre] A method of detecting angle information of a pen-shaped position indicator, the method comprising:	<i>See supra</i> 1 [g]. YOSHIDA discloses a capacitive stylus system where multiple electrodes 604a and 604b interact with a sensor surface to generate detection signals. YOSHIDA explains that an electric field is generated from the stylus electrodes and capacitively coupled with the sensor surface to provide positional data. YOSHIDA, Figs. 26, 27, 27:13–25 (“by performing two times similar detection operations from the segment electrode side and from the common electrode side so as to detect and decide the coordinates . . . the coordinates (x, y) of the position in which the electrodes 604a and 604b of the electric field generator 607 are located can be specified”). These disclosures demonstrate that each stylus electrode independently forms a capacitive relationship with the panel’s electrode matrix, and that the positional information is extracted by comparing signals from the different capacitive couplings.	<i>See supra</i> 1 [g]. <u>IKEDA</u> IKEDA discloses a capacitive stylus that detects tilt angle using multiple electrodes positioned along the stylus body. Specifically, IKEDA states: “A coordinate detection electrode (first detection unit) is positioned at the tip of the coordinate detection pen, and a ring-shaped coordinate detection electrode (second detection unit) for angle reading is placed on the body of the coordinate detection pen.” IKEDA, [0006], Fig. 5 (illustrating angle detection using capacitive coupling). Additionally, IKEDA discloses how these electrodes form capacitive relationships that allow tilt detection: “Using the coordinate data from the two detection units 2 and 3 stored in the regions of RAM 8, the dimensional control program converts the dimensions between the detection unit for coordinate detection and the detection unit for angle detection, storing the angle dimension P where the coordinate detection pen 1 is located in RAM 8 of the coordinate input device.” IKEDA, [0013], Fig. 5.

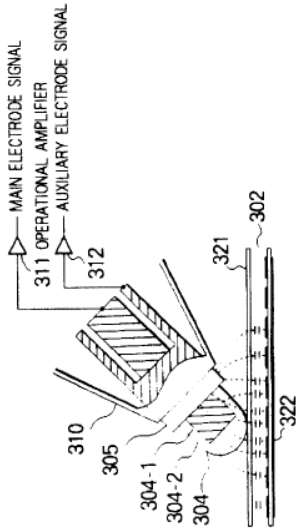
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	Fig.26 	Further, IKEDA confirms that capacitive stylus systems inherently generate multiple capacitive relationships for tilt detection: “By detecting each coordinate using the detection unit 2 for coordinate detection and the detection unit 3 for angle detection of the coordinate detection pen 1, control over the angle of the coordinate detection pen 1 can be achieved.” IKEDA, [0015], Fig. 5; <i>see also id.</i>, Abstract (“[Problem to be Solved]: In a coordinate input device using capacitive coupling, the presence of only one electrode for coordinate detection prevents input control based on the angle of use of the coordinate detection pen against the board surface...[Means for Solving the Problem]: An electrode for coordinate detection is arranged at the tip of the coordinate detection pen and the body of the pen. The pen body is equipped with an electrode designed to detect a ring-shaped angle.”); Claim 1 (“two detection electrode units: one for detecting coordinates and another for detecting angles...enabling the detection of the tilt angle of the aforementioned coordinate detection pen itself”).

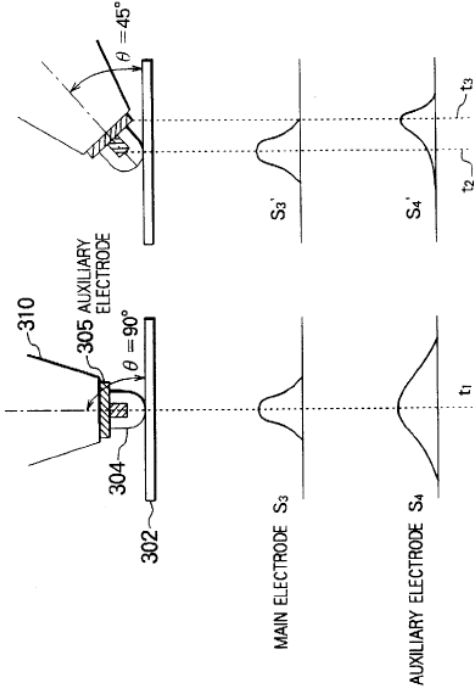
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	Fig.27  YOSHIDA further explains that the stylus can employ a plurality of electrodes (D1) to generate a “rotational electric field,” which provides stability against changes in roll orientation. In particular, YOSHIDA notes that “even though the pen which serves as the electric field generator rolls, the electrostatic capacity between the electrodes of the pen and the electrodes of the panel do not change.” YOSHIDA, 26:36–48; see also 8:66–9:11; 57:1–20. This teaching shows that the system can be configured so that some angular variations (such as roll) do not affect the detected signal, thereby	[Fig.5]  IKEDA Fig. 5 Figure 5 of IKEDA discloses how the first detection unit is positioned at the pen tip, and the second detection unit is ring-shaped and positioned along the pen body, allowing the system to measure tilt by analyzing changes in capacitive coupling at different locations along the pen axis. A POSITA would have understood that when a stylus includes multiple conductive electrodes, each electrode establishes its own capacitive coupling

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	allowing consistent positional data even as the pen rotates. <i>Fig.28</i>  A POSITA would have understood that YOSHIDA describes a capacitive architecture in which an AC field is driven from the pen tip and sensed by the LCD panel's existing X/Y electrode matrix. Those electrodes are time-multiplexed into detection circuitry (e.g., a differential amplifier) so that the same panel hardware performs both display and input functions. In such arrangements, the mutual capacitances between the stylus electrodes and the	with the sensor surface, producing distinct relationships that can be analyzed for input data. YOSHIDA illustrates this with electrodes 604a and 604b, which form separate capacitive links with the panel's X/Y grid. IKEDA reinforces this principle by teaching that a tip electrode and an additional electrode along the pen body create distinct capacitive couplings that can be used not only for coordinate determination but also for inclination detection. A POSITA would have been motivated to integrate IKEDA's tilt-specific configuration into YOSHIDA's capacitive stylus architecture to extend its capabilities from coordinate tracking to precise angle measurement. Both references address similar design challenges in capacitive stylus technology and are directed to improving how stylus posture is sensed. Because the techniques are technically compatible, their combination would have been straightforward and would predictably yield a stylus capable of reporting both position and angular information with greater accuracy. Moreover, market demand at the time strongly favored styluses that could capture tilt and rotation, as evidenced by contemporaneous commercial products such as Wacom's tilt-sensitive pens. A POSITA would have

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	panel grid are the key signal carriers. Variations in those capacitances reflect not only the x-y position and distance of the pen tip, but also its angular posture relative to the surface. For example, as the pen tilts, the electric field distribution shifts asymmetrically across the panel electrodes, producing detectable differences in the capacitive coupling strengths. At the same time, YOSHIDA illustrates that by arranging electrodes to generate a rotationally symmetric field, certain angular components (such as roll) can be designed out of the measurement, thereby improving stability. A POSITA would recognize that these disclosures collectively confirm that YOSHIDA teaches the use of electrode-to-panel capacitive relationships for extracting not just coordinate data but also angular information.	recognized that merging IKEDA's angle-sensing disclosure with YOSHIDA's electrode configuration was a natural response to these commercial pressures and would achieve improved performance without introducing technical incompatibilities. <u>IGUCHI</u> IGUCHI discloses a method of detecting angle information of a pen-shaped position indicator by generating detection signals in the sensor surface from which angular data can be obtained. As shown in FIG. 26a and FIG. 26b, "the main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310" and "the auxiliary electrode 305 is arranged around this main electrode 304." IGUCHI, 30:25-29, Figs. 26a-26b.

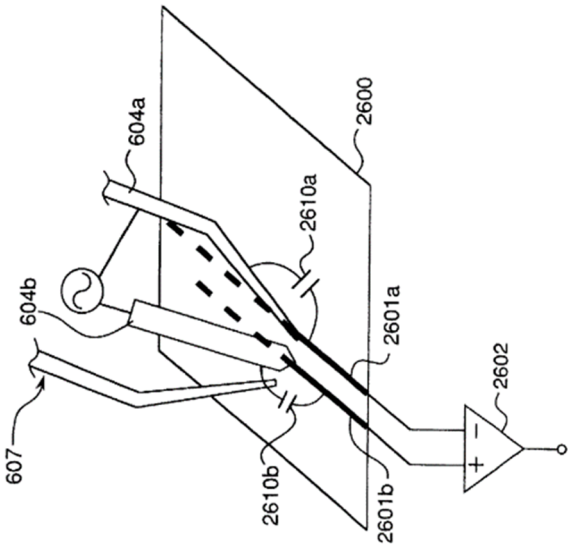
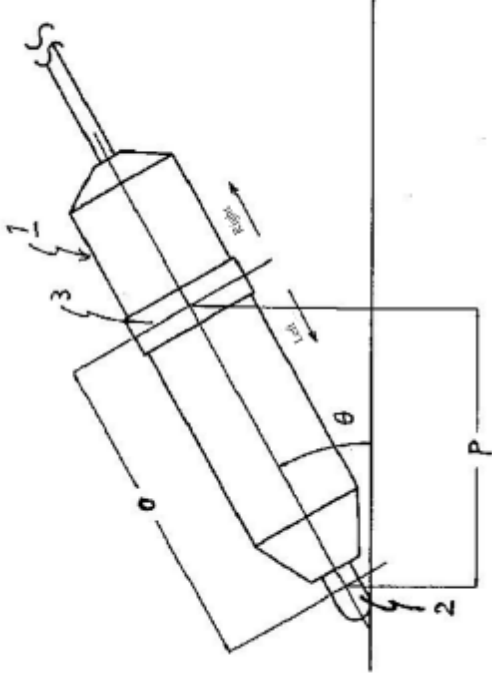
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		FIG. 26a  FIG. 26b  IGUCHI explains that the capacitive relationships formed by these electrodes vary as the pen tilts, and that asymmetry between the main and auxiliary electrode couplings produces inclination-dependent signals: "No shape of the electrostatic capacity is formed with right and left symmetry with respect to the main electrode. This is because no peak of the electrostatic capacity provided by the main electrode 304 is in conformity with a peak of the electrostatic capacity provided by the auxiliary electrode 305 by inclining the pen shaft." IGUCHI, 31:5-11, Fig. 27c.

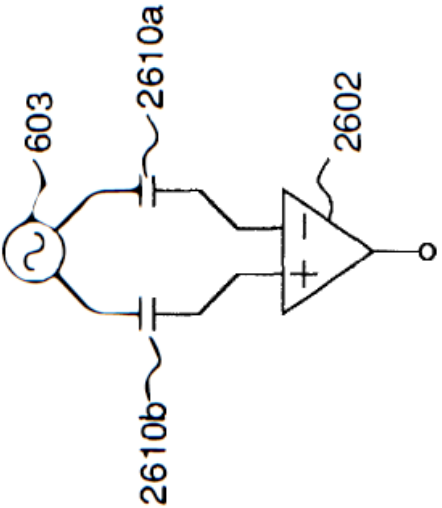
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		FIG. 27c  These asymmetric capacitive couplings yield detection signals in the sensor surface that reveal tilt and angular movement of the pen. IGUCHI's Figure 27c demonstrates how variations in capacitance between the main and auxiliary electrodes allow calculation of angular displacement. In addition, IGUCHI discloses that "inclination data of the pen shaft can be taken out by a difference between timing signals caused by a difference between these coordinates." IGUCHI, 15:6-12. A POSITA would have understood that the "inclination data of the pen shaft" corresponds to "angle information of the pen-shaped position indicator," and that the "difference between timing signals" corresponds to the "detection signals in the sensor surface." IGUCHI, 31:26-44.

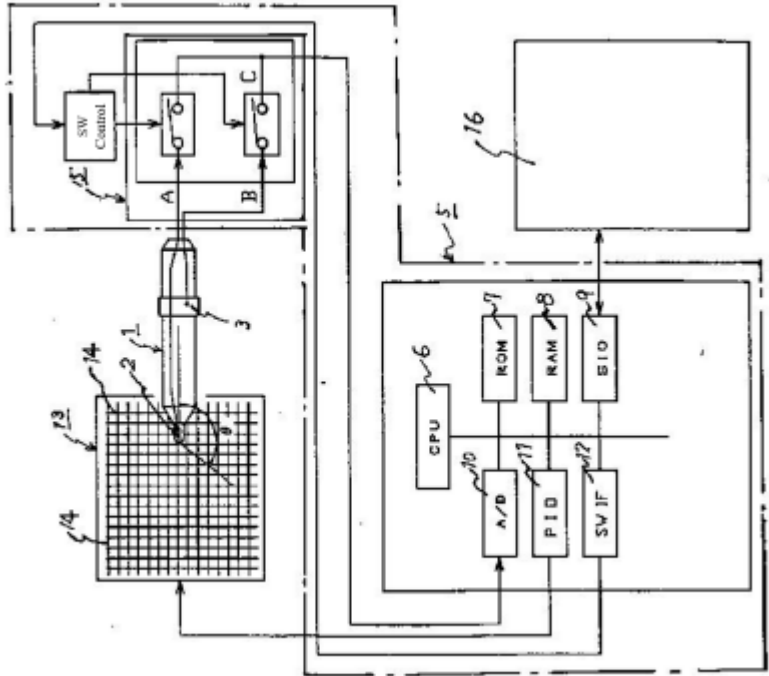
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		IGUCHI also supports the detectability of angular displacement by describing how time-differentiated signals from electrodes at different positions encode tilt. For example, IGUCHI states that “a time difference is caused between timing t2 of a peak of an output signal S3’ provided by the main electrode and timing t3 of a peak of an output signal S4’ provided by the auxiliary electrode.” IGUCHI, 31:37-41, Fig. 29b. FIG. 29a FIG. 29b ($\theta = 90^\circ$) ($\theta = 45^\circ$)  Figure 29b plots output signals S3’ and S4’ from the main and auxiliary electrodes over time, visually illustrating the measurable timing offset between

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		them. This phase difference allows accurate determination of the pen's tilt angle relative to the sensor surface, confirming that IGUCHI discloses generating detection signals based on capacitive relationships from which angular information of the pen-shaped position indicator is obtainable. A POSITA would have understood that capacitive stylus systems create multiple capacitive relationships when more than one electrode interacts with the sensor surface. YOSHIDA discloses that electrodes 604a and 604b of the stylus each form capacitive couplings with the LCD panel electrodes, and that variations in those couplings reflect not only positional coordinates but also angular posture. YOSHIDA, Figs. 26, 27; 27:13–25; 26:36–48. IGUCHI complements this disclosure by expressly teaching how off-axis electrode placement at the pen tip and measurable timing differences between electrode outputs encode tilt and inclination data (IGUCHI, 15:6–12; 30:25–29; 31:5–11, 31:37–41; Figs. 26a–26b, 27c, 29b). A POSITA would have been motivated to combine YOSHIDA's disclosure of electrode-to-panel capacitive relationships with IGUCHI's disclosure

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		of timing-based signal differentiation because doing so would predictably yield a stylus capable of detecting not only positional coordinates but also angular information of the pen-shaped position indicator. This combination represents a straightforward application of known capacitive input principles, improving the accuracy and robustness of stylus-based systems.
14[a] forming a first capacitive relationship between a sensor surface and first electrode, which is arranged at a first position of a pen-tip portion of the pen-shaped position indicator and is supplied with a first signal generated by a	Yoshida discloses forming a first capacitive relationship between a sensor surface and a first electrode (<i>see</i> 14[pre], 1[g]) arranged at a first position at the pen tip portion (<i>see</i> 1[b]) that is supplied with a signal generated by a signal production circuit and transmitted via a conductive path in the pen (<i>see</i> 1[d] (signal production circuit configured to generate first signal), 1[e] (conductive lines extending between the signal production circuit and the first electrode), and 1[f] (the first signal generated by the signal production circuit is transmitted to the first electrode via the conductive line)). YOSHIDA discloses capacitive coupling between a first electrode and a sensor surface. YOSHIDA, Fig. 26.	<u>IKEDA</u> Ikeda discloses forming a first capacitive relationship between a sensor surface and a first electrode (<i>see</i> 14[pre], 1[g]) arranged at a first position at the pen tip portion (<i>see</i> 1[b]) that is supplied with a signal generated by a signal production circuit and transmitted via a conductive path in the pen (<i>see</i> 1[d] (signal production circuit configured to generate first signal), 1[e] (conductive lines extending between the signal production circuit and the first electrode), and 1[f] (the first signal generated by the signal production circuit is transmitted to the first electrode via the conductive line)). IKEDA discloses forming a first capacitive relationship between a sensor surface and a first

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signal production circuit and transmitted via a first conductive line in the pen-shaped position indicator;	Fig. 26  Figure 26 of YOSHIDA illustrates the capacitive interaction between the pen's first electrode 604b and the LCD panel electrode 2601b (at the sensor surface), demonstrating the fundamental capacitive relationship necessary for signal transmission. YOSHIDA's Figure 27 presents a schematic diagram of the electronic pen's circuitry, including an AC power source 603 (a signal production circuit) connected to electrodes 604a and 604b as depicted in Fig. 26.	electrode, which is positioned at the pen tip and supplied with a signal from a signal production circuit via a conductive line: “[A]n axis-shaped detection unit 2 is positioned at the tip of the coordinate detection pen 1 to read the coordinates of the indicated point, and a ring-shaped detection unit 3 for indicating the angle is positioned on the body of the coordinate detection pen.” IKEDA, [0008], Fig. 5. [Fig. 5]  IKEDA, Fig. 5

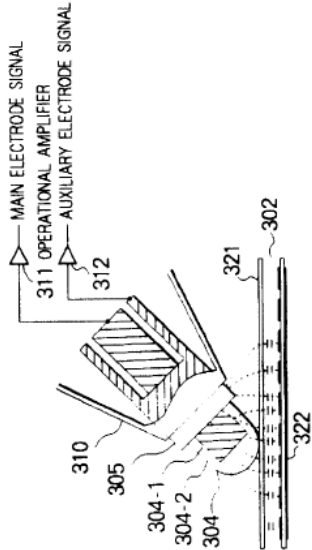
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	Fig. 27 	Additionally, IKEDA discloses that the first electrode is part of a capacitive system that transmits signals via a conductive pathway: "The coordinate detection is performed using the two detection units 2 and 3, and the coordinate data detected via electrostatic capacitance coupling with the tablet's electrodes is applied to the main body 5 of the coordinate input device through a cable 4 connected to the coordinate detection pen 1." IKEDA, [0008], Fig. 3.

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		[Fig. 3]  IKEDA, Fig. 3. Further, IKEDA discloses how the signal is transmitted and processed in the main body via a signal production circuit: “The main body 5 of the coordinate input device includes a CPU 6 for

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		performing coordinate control, a ROM 7 storing the program for coordinate control, a RAM 8 for storing the detected coordinate data and the reference dimensions O corresponding to the two detection units 2 and 3 of the coordinate detection pen 1” IKEDA, [0009], Fig. 3 Finally, IKEDA discloses how the signals are transmitted via conductive lines from the detection pen to the processing circuit: “The selection control of the switching switch 15 is set so that the detection unit 2 for coordinate detection of the coordinate detection pen 1 is selected (connecting A-C through the switching switch 15). The electrode lines 14, 14, 14, ... in the X and Y axis directions of the tablet 13 are driven by applying PIO 11 pulses, and the coordinate signal is sent to the connected A/D converter 10 through electrostatic capacitance coupling between each electrode line 14, 14, 14, ... and the detection unit 2 for coordinate detection.” IKEDA, [0011], Fig. 3. A POSITA would have recognized that placing the first electrode at the tip improves capacitive signal detection, ensuring accurate touch response and alignment with the sensor surface. Given that YOSHIDA already teaches capacitive interaction at

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		the pen tip, incorporating IKEDA's explicit teaching reinforces that this placement was a routine design consideration for stylus-based systems. <u>IGUCHI</u> IGUCHI discloses forming a first capacitive relationship between a sensor surface and a first electrode (<i>see</i> 14[pre], 1[g]) arranged at a first position at the pen tip portion (<i>see</i> 1[b]) that is supplied with a signal generated by a signal production circuit and transmitted via a conductive path in the pen (<i>see</i> 1[d] (signal production circuit configured to generate first signal), 1[e] (conductive lines extending between the signal production circuit and the first electrode), and 1[f] (the first signal generated by the signal production circuit is transmitted to the first electrode via the conductive line)). IGUCHI describes a stylus that employs capacitive electrodes at the tip, establishing a capacitive relationship with the sensor surface. "The main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310. The auxiliary electrode 305 is arranged around this main electrode 304." IGUCHI, 30:25-29; Figs. 26a–26b.

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		FIG. 26a FIG. 26b IGUCHI further explains that because the auxiliary electrode is physically separated from the main electrode, the system detects signals from each electrode independently: "Since the auxiliary electrode is located in a position separated from the main electrode, coordinates of the main and auxiliary electrodes with respect to a tablet plate are separately detected when the pen shaft is inclined." IGUCHI, 15:6-12, Fig. 27c. This separation allows the stylus to produce distinct detection signals that encode angle information.

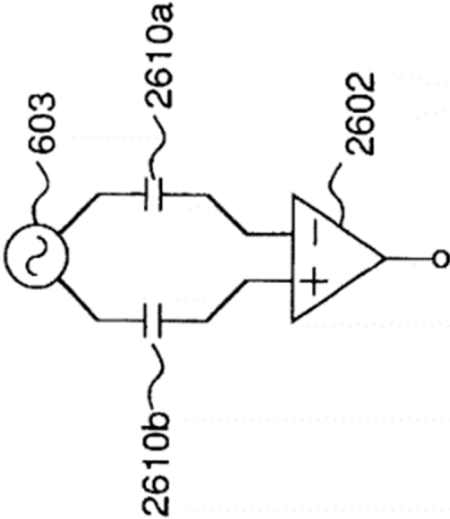
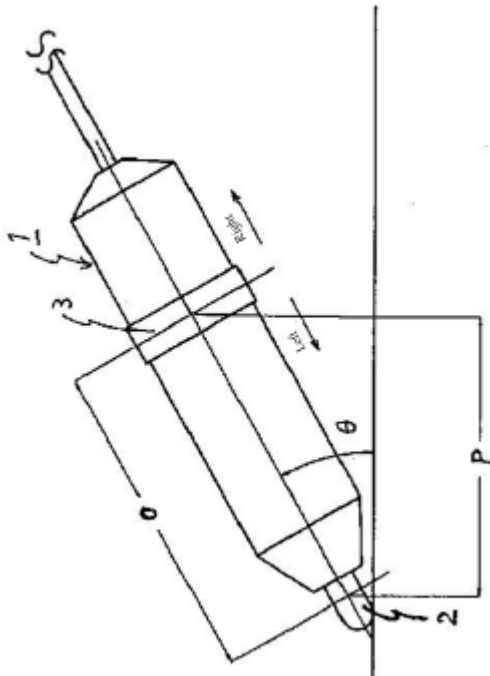
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		FIG. 27c  IGUCHI also shows that these electrodes are electrically connected to circuits via conductive lines. Figure 27c illustrates the electrode arrangement and conductive paths, while IGUCHI states that "a time difference is caused between timing t2 of a peak of an output signal S3' provided by the main electrode and timing t3 of a peak of an output signal S4' provided by the auxiliary electrode." IGUCHI, 31:37-41, Fig. 29b. This confirms that the signal generated by the circuit is transmitted via conductive pathways to the electrode at the pen tip. These disclosures together show that IGUCHI teaches: (i) an electrode at the pen tip forming a capacitive relationship with the sensor surface, (ii) that electrode being supplied with a generated signal

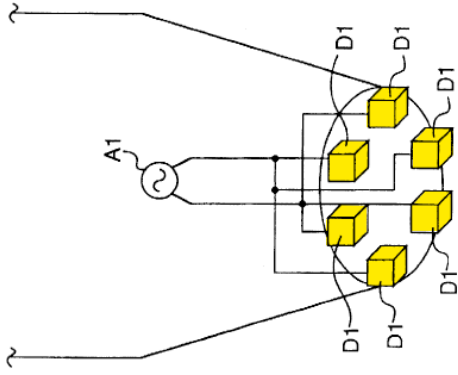
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		via conductive lines, and (iii) those signals being separately detectable for positional and angular information. A POSITA would have recognized that this arrangement corresponds to forming a first capacitive relationship between the sensor surface and a first electrode arranged at the tip, supplied with a signal generated by a signal production circuit and transmitted through a conductive line, as required by 14[a].
14[b] forming a second capacitive relationship between the sensor surface and a second electrode, which is arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen	Yoshida discloses forming a second capacitive relationship between a sensor surface and a second electrode (<i>see</i> 1[g]) arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen (<i>see</i> 1[c]) that is supplied with a signal generated by a signal production circuit and transmitted via a conductive path in the pen wherein the second signal is distinguishable from the first signal (<i>see</i> 1[d]) (signal production circuit configured to generate second signal), 1[e] (conductive lines extending between the signal production circuit and the second electrode), 1[f] (the second signal generated by the signal production circuit is transmitted to the second electrode via the conductive line), and 1[d] (the first and second signals are distinguishable from each other).	<u>IKEDA</u> Ikeda discloses forming a second capacitive relationship between a sensor surface and a second electrode (<i>see</i> 1[g]) arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen (<i>see</i> 1[c]) that is supplied with a signal generated by a signal production circuit and transmitted via a conductive path in the pen wherein the second signal is distinguishable from the first signal (<i>see</i> 1[d]) (signal production circuit configured to generate second signal), 1[e] (conductive lines extending between the signal production circuit and the second electrode), 1[f] (the second signal generated by the signal production circuit is transmitted to the second electrode via the conductive line), and 1[d] (the first

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position indicator and is supplied with a second signal generated by the signal production circuit and transmitted via a second conductive line in the pen-shaped position indicator, wherein the second signal is distinguishable from the first signal; and		and second signals are distinguishable from each other). A POSITA would recognize that multiple capacitive electrodes positioned at different locations allow for enhanced detection accuracy given that YOSHIDA already provides a system where multiple electrodes receive distinct signals and IKEDA explicitly teaches an off-axis second electrode to improve capacitive tracking for angle detection. <u>IGUCHI</u> Iguchi discloses forming a second capacitive relationship between a sensor surface and a second electrode (<i>see</i> 1[g]) arranged at a second position of the pen-tip portion different from the first position and off an axis of the pen (<i>see</i> 1[c]) that is supplied with a signal generated by a signal production circuit and transmitted via a conductive path in the pen wherein the second signal is distinguishable from the first signal (<i>see</i> 1[d]) (signal production circuit configured to generate second signal), 1[e] (conductive lines extending between the signal production circuit and the second electrode), 1[f] (the second signal generated by the signal production circuit is transmitted to the second

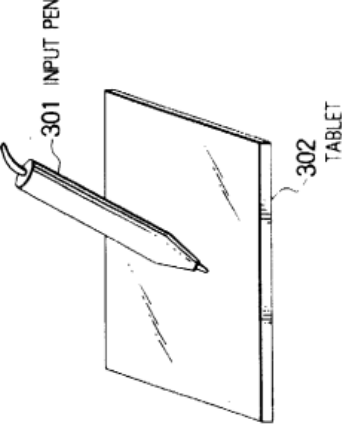
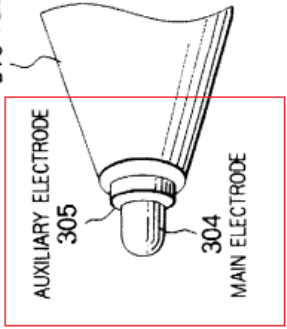
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		electrode via the conductive line), and l[d] (the first and second signals are distinguishable from each other).
14[c] detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.	<i>See supra</i> 1 [g]. YOSHIDA discloses a capacitive stylus system where multiple electrodes 604a and 604b interact with a sensor surface to generate detection signals. YOSHIDA explains that an electric field is generated from the stylus electrodes and capacitively coupled with the sensor surface to provide positional data. YOSHIDA, Figs. 26, 27, 27:13–25 (“by performing two times similar detection operations from the segment electrode side and from the common electrode side so as to detect and decide the coordinates . . . the coordinates (x, y) of the position in which the electrodes 604a and 604b of the electric field generator 607 are located can be specified”). These disclosures demonstrate that each stylus electrode independently forms a capacitive relationship with the panel’s electrode matrix, and that the positional information is extracted by comparing signals from the different capacitive couplings.	<i>See supra</i> 1 [g]. <u>IKEDA</u> IKEDA discloses a capacitive stylus that detects tilt angle using multiple electrodes positioned along the stylus body. Specifically, IKEDA states: “A coordinate detection electrode (first detection unit) is positioned at the tip of the coordinate detection pen, and a ring-shaped coordinate detection electrode (second detection unit) for angle reading is placed on the body of the coordinate detection pen.” IKEDA, [0006], Fig. 5 (illustrating angle detection using capacitive coupling). Additionally, IKEDA discloses how these electrodes form capacitive relationships that allow tilt detection: “Using the coordinate data from the two detection units 2 and 3 stored in the regions of RAM 8, the dimensional control program converts the dimensions between the detection unit for coordinate detection and the detection unit for angle detection,

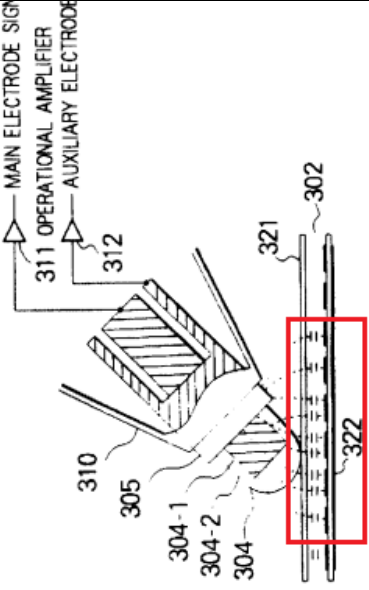
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
	Fig.26	storing the angle dimension P where the coordinate detection pen 1 is located in RAM 8 of the coordinate input device.” IKEDA, [0013], Fig. 5. Further, IKEDA confirms that capacitive stylus systems inherently generate multiple capacitive relationships for tilt detection: “By detecting each coordinate using the detection unit 2 for coordinate detection and the detection unit 3 for angle detection of the coordinate detection pen 1, control over the angle of the coordinate detection pen 1 can be achieved.” IKEDA, [0015], Fig. 5; <i>see also id.</i>, Abstract (“[Problem to be Solved]: In a coordinate input device using capacitive coupling, the presence of only one electrode for coordinate detection prevents input control based on the angle of use of the coordinate detection pen against the board surface...[Means for Solving the Problem]: An electrode for coordinate detection is arranged at the tip of the coordinate detection pen and the body of the pen. The pen body is equipped with an electrode designed to detect a ring-shaped angle.”); Claim 1 (“two detection electrode units: one for detecting coordinates and another for detecting angles...enabling the detection of the tilt angle of the aforementioned coordinate detection pen itself”).

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	Fig.27  YOSHIDA further explains that the stylus can employ a plurality of electrodes (D1) to generate a “rotational electric field,” which provides stability against changes in roll orientation. In particular, YOSHIDA notes that “even though the pen which serves as the electric field generator rolls, the electrostatic capacity between the electrodes of the pen and the electrodes of the panel do not change.” YOSHIDA, 26:36–48; see also 8:66–9:11; 57:1–20. This teaching shows that the system can be configured so that some angular variations (such as roll) do not affect the detected signal, thereby	[Fig.5]  IKEDA Fig. 5 Figure 5 of IKEDA discloses how the first detection unit is positioned at the pen tip, and the second detection unit is ring-shaped and positioned along the pen body, allowing the system to measure tilt by analyzing changes in capacitive coupling at different locations along the pen axis. A POSITA would have understood that when a stylus includes multiple conductive electrodes, each

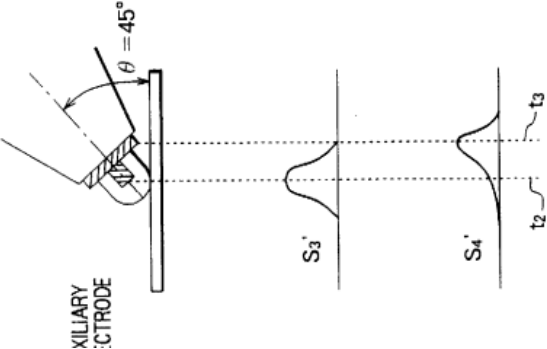
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
	allowing consistent positional data even as the pen rotates. <i>Fig.28</i>  A POSITA would have understood that YOSHIDA describes a capacitive architecture in which an AC field is driven from the pen tip and sensed by the LCD panel's existing X/Y electrode matrix. Those electrodes are time-multiplexed into detection circuitry (e.g., a differential amplifier) so that the same panel hardware performs both display and input functions. In such arrangements, the mutual capacitances between the stylus electrodes and the	electrode establishes its own capacitive coupling with the sensor surface, producing distinct relationships that can be analyzed for input data. YOSHIDA illustrates this with electrodes 604a and 604b, which form separate capacitive links with the panel's X/Y grid. IKEDA reinforces this principle by teaching that a tip electrode and an additional electrode along the pen body create distinct capacitive couplings that can be used not only for coordinate determination but also for inclination detection. A POSITA would have been motivated to integrate IKEDA's tilt-specific configuration into YOSHIDA's capacitive stylus architecture to extend its capabilities from coordinate tracking to precise angle measurement. Both references address similar design challenges in capacitive stylus technology and are directed to improving how stylus posture is sensed. Because the techniques are technically compatible, their combination would have been straightforward and would predictably yield a stylus capable of reporting both position and angular information with greater accuracy. Moreover, market demand at the time strongly favored styluses that could capture tilt and rotation, as evidenced by contemporaneous commercial products such as

Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103) panel grid are the key signal carriers. Variations in those capacitances reflect not only the x–y position and distance of the pen tip, but also its angular posture relative to the surface. For example, as the pen tilts, the electric field distribution shifts asymmetrically across the panel electrodes, producing detectable differences in the capacitive coupling strengths. At the same time, YOSHIDA illustrates that by arranging electrodes to generate a rotationally symmetric field, certain angular components (such as roll) can be designed out of the measurement, thereby improving stability. A POSITA would recognize that these disclosures collectively confirm that YOSHIDA teaches the use of electrode-to-panel capacitive relationships for extracting not just coordinate data but also angular information.	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		Wacom’s tilt-sensitive pens. A POSITA would have recognized that merging IKEDA’s angle-sensing disclosure with YOSHIDA’s electrode configuration was a natural response to these commercial pressures and would achieve improved performance without introducing technical incompatibilities. <u>IGUCHI</u> IGUCHI discloses generating detection signals in the sensor surface from which angle information is obtainable. As shown in FIG. 26a and FIG. 26b, “[t]he main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310” and “[t]he auxiliary electrode 305 is arranged around this main electrode 304”. IGUCHI, 30:25-29, Figs. 26a–26b.

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		FIG. 26a  FIG. 26b  IGUCHI also discloses how capacitive signals interact to determine pen inclination: "No shape of the electrostatic capacity is formed with right and left symmetry with respect to the main electrode. This is because no peak of the electrostatic capacity provided by the main electrode 304 is in conformity with a peak of the electrostatic capacity provided by the auxiliary electrode 305 by inclining the pen shaft." IGUCHI, 31:5-11, Fig. 27c.

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		FIG. 27c  IGUCHI's Figure 27c presents an analysis of how capacitive relationships between multiple electrodes on a pen allow for angle detection. The capacitive signals generated by the electrodes interact with the sensor surface, producing detection signals that reveal tilt and angular movements of the pen. As shown in Figure 27c, variations in detected capacitance between electrodes allow for the calculation of angular displacement, supporting the claim that the generated detection signals provide angle information. IGUCHI also discloses “[s]ince the auxiliary electrode is located in a position separated from the main electrode, coordinates of the main and auxiliary electrodes with respect to a tablet plate are

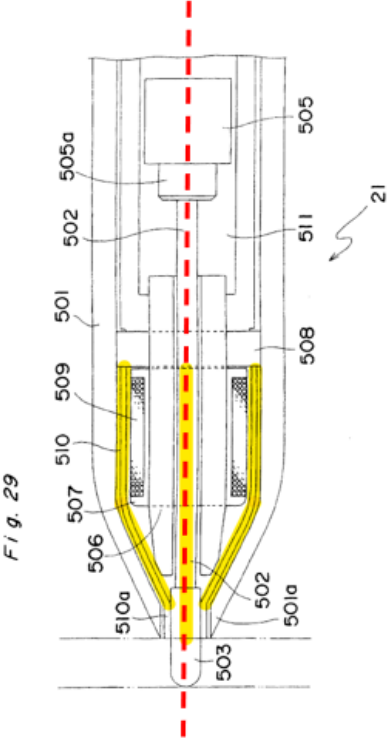
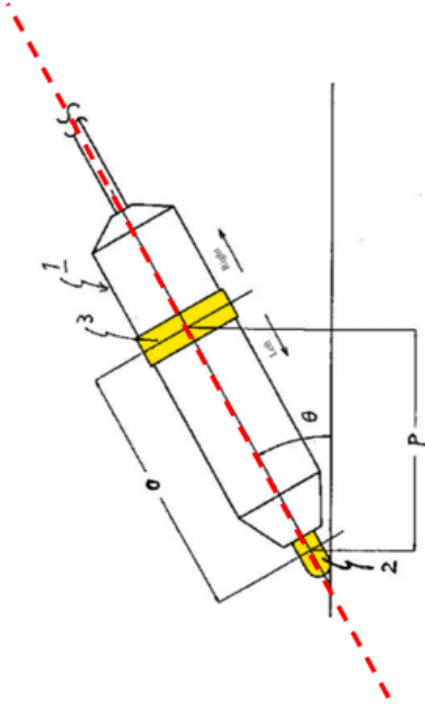
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
		separately detected when the pen shaft is inclined" and that "[i]nclination data of the pen shaft can be taken out by a difference between timing signals caused by a difference between these coordinates". IGUCHI, 15: 6-12. A POSITA would have understood or found obvious that the "inclination data of the pen shaft" is corresponding to the "angle information of the pen-shaped position indicator" in 1[g], and the "the difference between timing signals caused by a difference between these coordinates" is corresponding to the "detection signals in the sensor surface" in 1[g]. <i>See also</i> IGUCHI 31:26-44. The limitation "to generate detection signals in the sensor surface based on which angle information of the pen-shaped position indicator is obtainable" in 1[g] has been disclosed by IGUCHI. IGUCHI further supports the detectability of angular displacement by describing how time-differentiated signals from capacitive electrodes encode tilt information. IGUCHI, Fig. 29b, 31:47-50. Specifically, IGUCHI discloses "a time difference is caused between timing t2 of a peak of an output signal S3' provided by the main electrode and timing

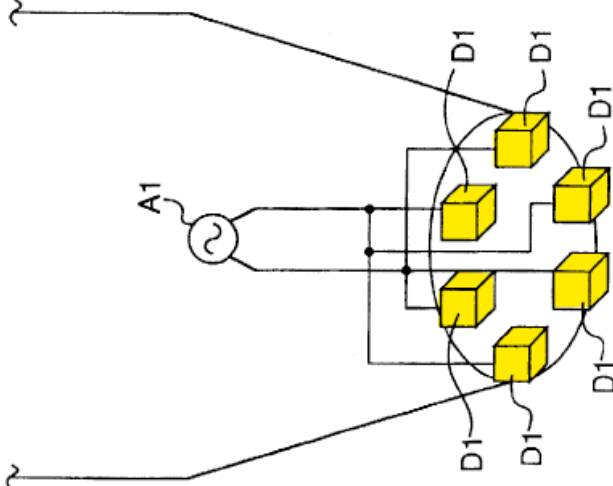
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		t3 of a peak of an output signal S4' provided by the auxiliary electrode.” IGUCHI, 31:37-41, Fig. 29b. FIG. 29b ($\theta = 45^\circ$)  In Figure 29b of IGUCHI, the output signals S3' and S4' from the main and auxiliary electrodes are plotted over time. The graph demonstrates that while both signals are of the same type (e.g., voltage signals), there is a measurable time difference between them, which is utilized to determine the

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		pen's tilt or angle. The figure presents a waveform diagram illustrating the time difference between output signals S3' and S4'. The figure visually demonstrates how these signals shift over time, supporting the argument that signals from different electrodes have a detectable phase difference. This timing offset allows for accurate angular detection of the pen's tilt relative to the sensor surface. A POSITA would have found it obvious to combine YOSHIDA's disclosure of a capacitive stylus system in which multiple electrodes (e.g., 604a, 604b) form separate capacitive relationships with a sensor panel to provide coordinate data (YOSHIDA, Figs. 26, 27, 27:13–25) with IGUCHI's disclosure of distinct main and auxiliary electrodes at the pen tip that produce independently detectable signals encoding tilt and inclination information. IGUCHI, 15:6-12, 30:25-29, 31:5-11, Figs. 26a–26b, 27c, 29b. YOSHIDA establishes that capacitive couplings between stylus electrodes and panel electrodes can be multiplexed to extract positional data and that angular posture affects the distribution of those couplings. YOSHIDA, 26:36–48, 57:1–20. IGUCHI complements this teaching by expressly showing that signals from electrodes arranged off-axis at the

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		pen tip exhibit measurable timing differences, which can be used to calculate inclination and angular displacement. IGUCHI, 15:6-12, 31:37-41, Fig. 29b. A POSITA would have understood that integrating IGUCHI’s explicit use of electrode separation and timing differences into YOSHIDA’s capacitive detection framework would predictably yield a stylus capable of detecting angular information based on the first and second capacitive relationships, as required by 14[c]. This combination would have been an obvious application of known capacitive input principles, using multiple electrode-to-panel couplings to encode not only x-y position but also tilt or angle information, thereby improving accuracy and functionality in stylus-based systems.
Claim 15		
15[pre] The method according to claim 14,	<i>See supra</i> regarding 14[pre] – 14[c]; <i>see also</i> 1[c] – 1[e].	<i>See supra</i> regarding 14[pre] – 14[c]; <i>see also</i> 1[c] – 1[e].
15[a] wherein the first and second electrodes are arranged at the	<i>See supra</i> Claim 2[a]. YOSHIDA discloses a megaphone-shaped outer electrode 604a positioned differently from the first electrode and off-axis. YOSHIDA, Fig.6A.	<i>See supra</i> Claim 2[a]. <u>IKEDA</u>

Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
first and second positions that are different along the axis of the pen-shaped indicator.	Fig. 6A Referring to Fig. 6A of YOSHIDA, a megaphone-shaped outer electrode 604a is also arranged at the pen-tip portion of the pen-shaped electric field generator 607, and the second position of the outer electrode 604a is different from the first position of the inner electrode 604b. Fig. 6A also shows that the position of the outer electrode 604a is off an axis of the pen-shaped position indicator. This arrangement is evident in this cross-sectional depiction, where the outer electrode surrounds the inner electrode asymmetrically, contributing to the detection of tilt or angle when interacting with the sensor surface. YOSHIDA also discloses rod-shaped inner electrode 502 and outer electrode 510 are arranged	IKEDA discloses that the first electrode (on the pen tip) and the second electrode (on the pen body) are at different positions along the axis of the coordinate detection pen: “In this invention, the operator can control coordinate detection without considering the angle of the coordinate detection pen. To achieve this, a coordinate detection electrode (first detection unit) is positioned at the tip of the coordinate detection pen, and a ring-shaped coordinate detection electrode (second detection unit) for angle reading is placed on the body of the coordinate detection pen.” IKEDA, [0006], Figs. 1, 5. [Fig 1.]

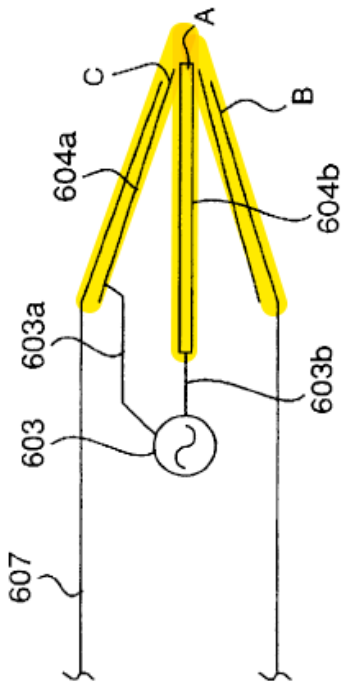
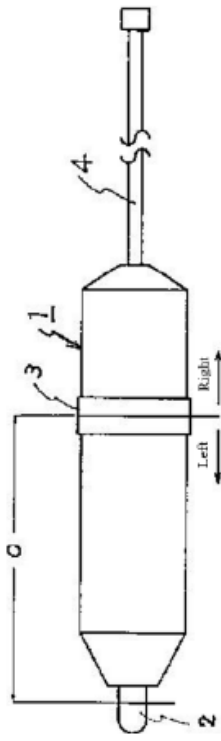
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
	at the first and second positions that are different along the axis of the pen 21. YOSHIDA, Fig.29.  YOSHIDA's Figure 29 provides a detailed view of the pen's internal structure, showing inner electrode 502 and outer electrode 510 positioned at different locations along the pen's longitudinal axis. This longitudinal section highlights the spatial separation between the electrodes, which is crucial for detecting different capacitive interactions along the pen's length. <i>See also</i> Fig. 28 (disclosing “plurality of electrodes D1 are mounted on a circumference of the tip end portion of the pen”).	 Figures 1 and 5 of IKEDA disclose a coordinate detection pen with multiple detection electrodes positioned at different locations along the stylus axis, confirming a design where electrodes are spaced along the longitudinal direction of the pen body. YOSHIDA discloses a pen-shaped stylus with multiple electrodes positioned near the pen tip, while IKEDA explicitly describes a configuration in which a tip electrode is longitudinally separated from another electrode along the pen body. A POSITA would have understood that employing electrodes at different axial positions, including off-axis relative

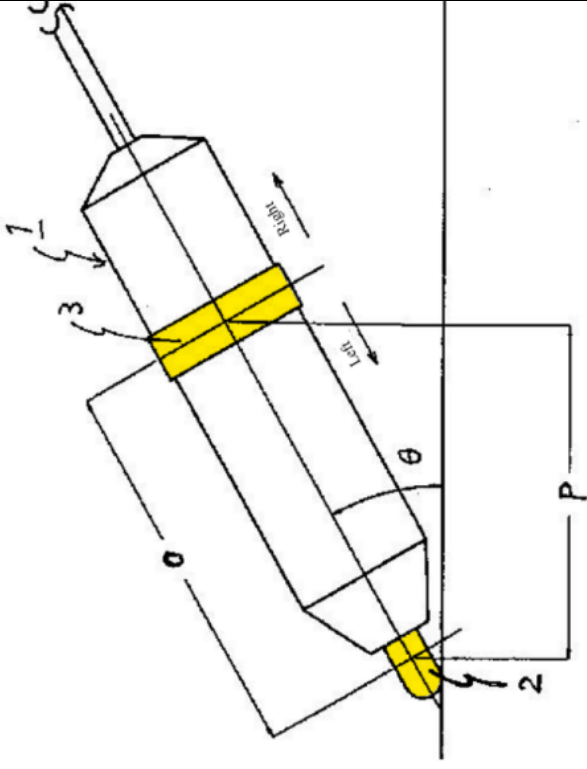
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
	Fig.28 	to one another, was a well-known and predictable configuration in capacitive stylus design because it creates multiple capacitive relationships that vary measurably with tilt. These variations in capacitance enable more accurate angular detection in addition to positional tracking. A POSITA would have been motivated to combine YOSHIDA’s detailed stylus body design with IKEDA’s explicit disclosure of longitudinally separated electrodes because both references operate in the same field and address the challenge of improving tilt sensitivity. This arrangement was a routine and predictable design choice, enhancing performance without requiring complex or costly mechanical sensors. Moreover, the commercial demand at the time for precise, feature-rich digital pens in applications such as professional graphics, CAD, and consumer touchscreen devices would have incentivized a POSITA to adopt this configuration to meet market expectations for accuracy and functionality. <u>IGUCHI</u> IGUCHI discloses a pen-shaped input device in which the main electrode 304 is positioned at the

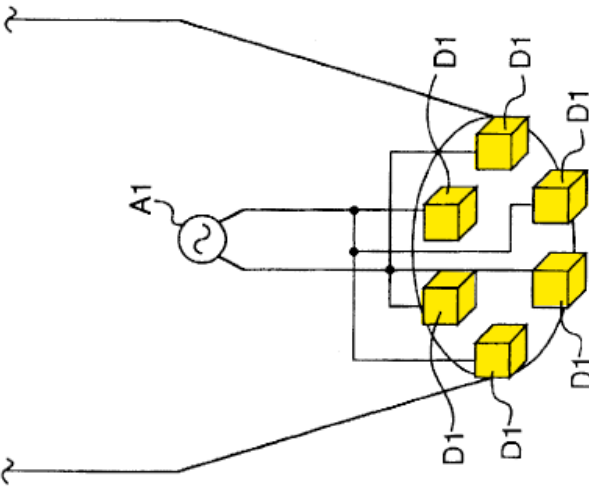
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
		center of the pen tip and the auxiliary electrode 305 is arranged around the main electrode but located along the shaft of the pen. IGUCHI, Figs. 26a, 26b, 30:25–29 ("The main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310. The auxiliary electrode 305 is arranged around this main electrode 304."). FIG. 26a FIG. 26b In addition, as shown in Figs. 29a and 29b, IGUCHI's longitudinal cross-sectional illustrations show that the auxiliary electrode is spaced axially from the main electrode along the pen body.

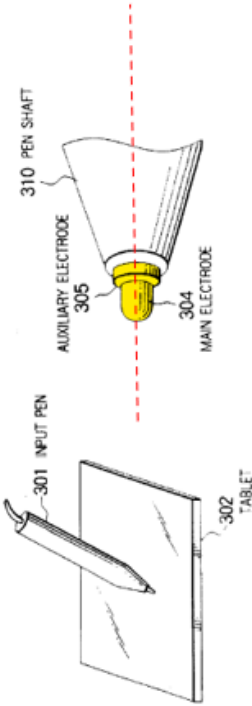
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		FIG. 29a FIG. 29b YOSHIDA discloses a stylus with electrodes 604a and 604b arranged at the pen tip that form separate capacitive couplings with the LCD panel. IGUCHI teaches a configuration with a main electrode and auxiliary electrodes separated along the pen's longitudinal axis, producing distinct capacitive interactions that can be used to detect inclination. A POSITA would have understood that positioning electrodes at different locations along the pen's axis enables detection of multiple capacitive relationships with the sensor surface. Differences in signal

Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”) strength or timing among those couplings can be used to determine angular displacement or to refine positional accuracy. This arrangement was a known and predictable technique in multi-electrode stylus design to increase sensitivity and differentiation of signals. A POSITA would have been motivated to combine YOSHIDA’s capacitive detection framework with IGUCHI’s refined electrode configuration because the teachings are complementary and address the same problem of enhancing angular detection. The combination would predictably improve tilt measurement accuracy by producing distinct, measurable capacitance variations as the pen tilts. Both references were developed in the same field and even assigned to the same company, reflecting shared engineering objectives. In addition, consumer demand for precise stylus tracking in applications like CAD and digital illustration provided a strong commercial incentive to integrate IGUCHI’s advanced electrode arrangement into YOSHIDA’s proven capacitive system.
Claim 16		
16[pre] The method	<i>See supra</i> 14[pre] – 14[c]; <i>see also supra</i> 2[a] and 10[pre]-10[f].	<i>See supra</i> 14[pre] – 14[c]; <i>see also supra</i> 2[a] and 10[pre]-10[f].

Claim Elements U.S. Patent No. 10,108,277 according to claim 14,	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
16[a] wherein the second electrode comprises plural electrode pieces arranged to surround the axis of the penshaped position indicator.	<i>See supra</i> 3[a]. YOSHIDA discloses an outer electrode 604a surrounding a rod-shaped inner electrode 604b at the pen tip, where both are part of a pen-shaped electric field generator. YOSHIDA, Fig. 6A; 24:58–25:5; 8:66-9:11. Fig. 6A  Yoshida further discloses a second electrode comprising plural electrode pieces arranged to surround the axis of the pen-shaped indicator. <i>Id.</i> 26:36-48 (“<i>plurality of electrodes D1</i> are mounted on a circumference of the tip end portion of the pen”). <i>See also id.</i> 57:1-20 (“the first [‘cylinder	<i>See supra</i> 3[a]. <u>IKEDA</u> IKEDA discloses a coordinate detection pen comprising multiple detection electrode units, including a ring-shaped detection electrode 3 for angle detection that surrounds the pen axis. IKEDA, Figs. 1 and 5, ¶[0006]. [Fig 1.] 

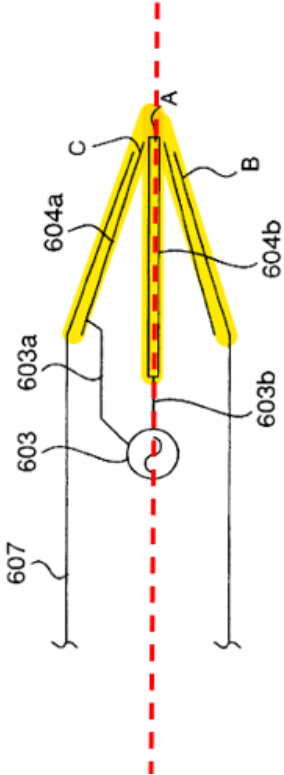
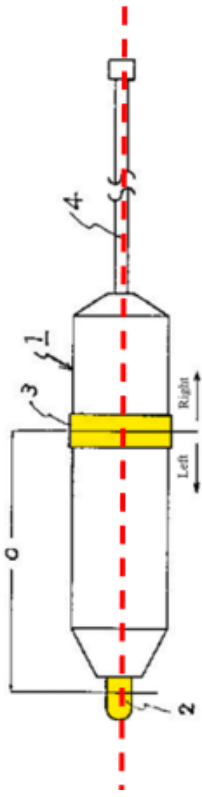
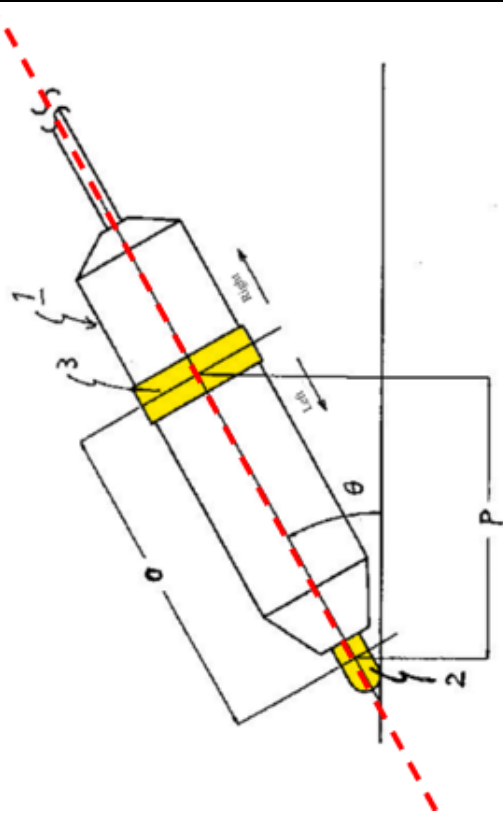
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103) shaped'] electrode of the coordinate pointing device is arranged as separated apart at approximately regular intervals around the circumference of the second electrode." This cylinder-shaped electrode must comprise plural electrode pieces if the electrode "is arranged as separated apart at [] regular intervals around the circumference of the" pen axis. <i>Id.</i> 57:14-16.	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
		[Fig.5]  The structure and placement of detection electrode 3 is further shown to surround the pen shaft, which a POSITA would understand to involve a circumferential arrangement about the axis of the pen. A POSITA would have understood that circumferential electrodes, whether shown as the outer electrode 604a in YOSHIDA or the ring electrode in IKEDA, could be implemented using

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	Fig.28  The outer electrode 604a of Fig. 6a is depicted as extending circumferentially around the pen axis, and a POSITA would have recognized that such an arrangement may be implemented using plural electrode pieces to enable independent signal control or directional sensing. Segmenting a circumferential electrode to form plural electrode pieces surrounding the axis was a known technique	plural electrode pieces distributed around the pen axis. Segmenting the electrode into multiple pieces was a known and predictable technique in capacitive sensor design, allowing greater sensitivity, independent signal control, and the generation of differential signals for enhanced angular detection. A POSITA would have been motivated to integrate IKEDA's circumferential ring electrode with YOSHIDA's surrounding outer electrode design, recognizing that segmentation into plural pieces was a routine design choice in capacitive stylus systems, and as explicitly taught by YOSHIDA (<i>see, e.g., Fig. 28</i>). This modification would predictably improve tilt detection accuracy and angular resolution. At the time, commercial demand strongly favored professional-grade digital pens offering smooth and responsive tilt performance. Incorporating IKEDA's displaced ring electrode approach into YOSHIDA's stylus configuration would have been an obvious improvement to satisfy user expectations and market needs. <u>IGUCHI</u> IGUCHI discloses a pen-shaped input device with a main electrode 304 positioned at the center axis of

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	in the field to enhance resolution or detect angular orientation, as explicitly disclosed by YOSHIDA, as explained above.	the pen tip and an auxiliary electrode 305 arranged around the main electrode to form a capacitive relationship with the sensor surface. IGUCHI, Figs. 26a, 26b, 30:25–29 (“The main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310. The auxiliary electrode 305 is arranged around this main electrode 304.”). This radial configuration positions the auxiliary electrode to surround the axis of the pen. FIG. 26a FIG. 26b  IGUCHI also teaches that inclination data can be extracted from differences in coordinate signals received from the respective electrodes, indicating that the auxiliary electrode comprises multiple pieces or segments that can register spatial variation. IGUCHI, 15:6–12 (explaining how “[i]nclination data of the pen shaft can be taken out by a difference

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		between timing signals caused by a difference between these coordinates.”). A POSITA would have understood that implementing the auxiliary electrode as plural electrode pieces distributed around the pen axis facilitates signal differentiation based on orientation, a well-known approach in capacitive sensor design for detecting tilt or angular displacement and as explicitly taught by YOSHIDA. IGUCHI specifically teaches that differences in coordinate signals among electrode segments can be used to extract inclination data, enabling both the direction and magnitude of tilt to be determined. YOSHIDA provides a compatible capacitive framework in which multiple electrodes already couple to the sensor surface, making it straightforward to integrate IGUCHI’s segmented auxiliary electrode configuration. A POSITA would have been motivated to combine these teachings because circumferential segmentation of electrodes was a well-established method for improving directional sensitivity in capacitive stylus systems. Incorporating IGUCHI’s segmented auxiliary electrode arrangement into YOSHIDA’s outer electrode design would have been a predictable and advantageous modification, yielding a stylus capable of more accurate and

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		higher-resolution angular detection without sacrificing capacitive functionality. Both references are directed to the same commercial products, digital pens and tablets, and their combination reflects a normal design progression driven by market demand for precise stylus performance. At the time, consumers expected styluses to replicate natural handwriting and artistic motion, which required accurate tilt sensing. A POSITA would have recognized that integrating IGUCHI’s segmentation approach into YOSHIDA’s stylus would directly respond to these technical and commercial needs.
Claim 17		
17[pre] The method according to claim 14,	<i>See supra</i> 14[pre]–14[c]; <i>see also</i> 1[pre]–1[g], Claim 4.	<i>See supra</i> 14[pre]–14[c]; <i>see also</i> 1[pre]–1[g], Claim 4.
17[a] wherein the first and second electrodes are arranged to surround the axis of the pen-	<i>See supra</i> Claim 4. YOSHIDA discloses a pen-shaped electric field generator in which an inner electrode 604b is surrounded by a megaphone-shaped outer electrode 604a at the pen tip. YOSHIDA, Fig. 6A, 24:58–25:5.	<i>See Supra</i> Claim 4. <u>IKEDA</u> IKEDA discloses two detection electrode units, one for coordinate detection and one for angle detection, disposed along the pen axis, including a ring-shaped electrode 3 for angle detection. IKEDA, Figs. 1 and 5, ¶[0006].

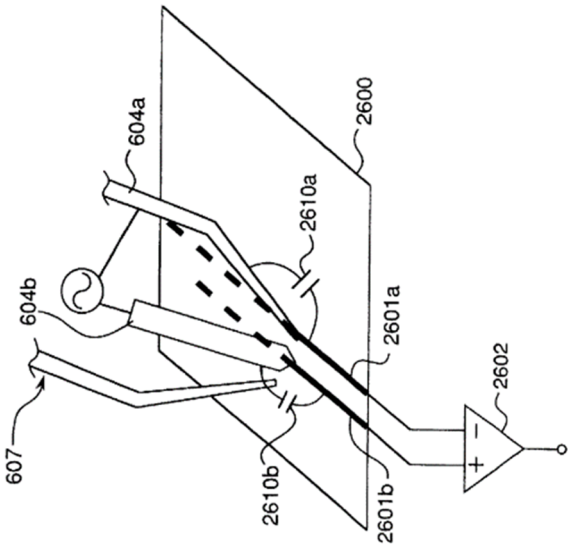
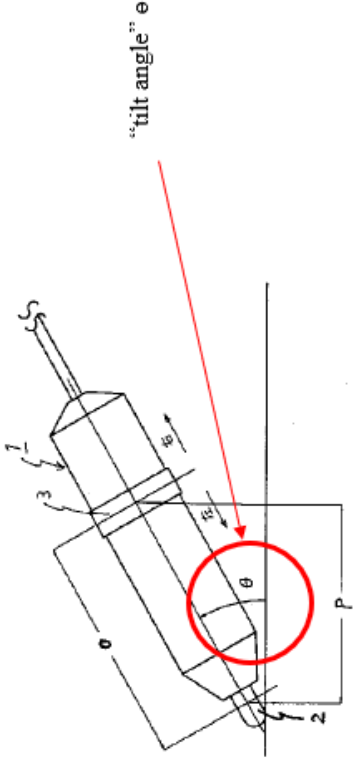
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
shaped position indicator.	Fig. 6A  As shown in Fig. 6A, this concentric configuration places both electrodes symmetrically around the axis of the pen. A POSITA would have understood this arrangement as being centered about the axis, with both electrodes structurally and electrically configured to surround it. <i>See also</i> Fig. 28; 26:36-48 (“In the electrode structure, a plurality of electrodes D1 are mounted on a circumference of the tip end portion of the pen.”).	[Fig 1.]  [Fig.5]  IKEDA confirms the same design principle by disclosing a ring-shaped detection electrode 3 positioned on the pen body and surrounding the axis

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		of the shaft for angle detection. IKEDA, ¶[0006], Figs. 1, 5. A POSITA would have recognized this concentric structure as demonstrating that surrounding the axis with electrodes was a conventional design approach in capacitive stylus technology to facilitate tilt detection. A POSITA would have been motivated to combine YOSHIDA’s coaxial electrode arrangement with IKEDA’s ring electrode disclosure because arranging electrodes symmetrically around the axis was a known way to ensure uniform field distribution and consistent tilt measurements. Such an arrangement predictably reduces error caused by uneven electric fields and improves angular detection accuracy. At the same time, commercial demand for high-precision styluses, particularly for applications requiring smooth and reliable tilt input, such as digital art and professional drafting, would have further encouraged a POSITA to adopt this concentric design. Combining YOSHIDA’s and IKEDA’s disclosures would therefore have been a straightforward and advantageous improvement in the field.

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		<u>IGUCHI</u> IGUCHI discloses a concentric configuration in which main electrode 304 is placed at the pen center and auxiliary electrode 305 is positioned around it, forming a radial structure. IGUCHI, Figs. 26a, 26b, 30:25–29 ("The main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310. The auxiliary electrode 305 is arranged around this main electrode 304."). FIG. 26a FIG. 26b This layout results in both electrodes being arranged to surround the pen axis, supporting angle detection through capacitive differences. YOSHIDA discloses an outer electrode 604a arranged concentrically around a rod-shaped inner electrode 604b at the pen tip. IGUCHI similarly discloses a concentric arrangement, with a main

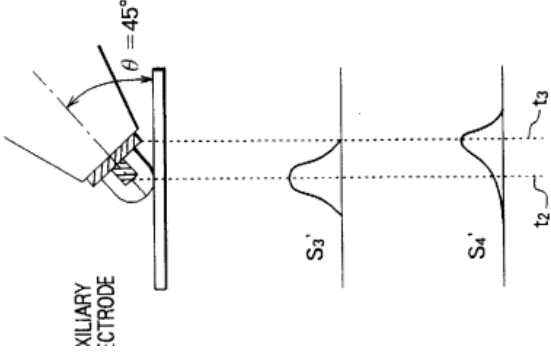
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
		electrode 304 positioned at the center axis of the pen tip and an auxiliary electrode 305 arranged around the main electrode. A POSITA would have recognized that combining IGUCHI's concentric main-and-auxiliary electrode arrangement into YOSHIDA's stylus framework would provide the benefits disclosed in IGUCHI, including enhanced angular resolution and consistent field detection, and would have implemented it as a predictable design refinement. A POSITA would have been motivated to combine these teachings because arranging electrodes concentrically around the pen axis was a known way to achieve uniform electric field distribution, thereby improving tilt detection accuracy. YOSHIDA and IGUCHI both pursue the same technical objective of accurate stylus tracking through capacitive coupling and were directed to similar consumer devices. Their combination would have predictably reduced noise and positional error while enhancing angular detection. At the same time, commercial demand for more advanced digital pens, particularly in professional design and illustration applications, would have encouraged a POSITA to adopt this

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		refinement as part of normal design progression in the field.
Claim 18		
18 [pre] The method according to claim 14,	<i>See supra</i> 14[pre] – 14[c]; <i>see also</i> 1[pre] – 1[g].	<i>See supra</i> 14[pre] – 14[c]; <i>see also</i> 1[pre] – 1[g].
18[a] wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.	<i>See supra</i> Claim 5. YOSHIDA discloses a capacitive stylus system where multiple electrodes interact with a sensor surface to generate detection signals. YOSHIDA, Fig. 26, 27:13-25.	<i>See Supra</i> Claim 5. <u>IKEDA</u> IKEDA discloses a coordinate detection pen that measures the inclination angle relative to the sensor surface: “By detecting each coordinate using the detection unit 2 for coordinate detection and the detection unit 3 for angle detection of the coordinate detection pen 1, control over the angle of the coordinate detection pen 1 can be achieved.” IKEDA, [0015], Fig. 5 (shows pen angle detection); [0014]; [0001] (“By analyzing the positional dimensions between the two coordinate detection units and the dimensions of the coordinates read by each detection unit, it is possible to detect the pen’s tilt.”).

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	Fig.26  The relative strengths of these detection signals vary depending on the inclination of the pen-shaped position indicator, which a POSITA would have understood to correspond to the tilt angle of the pen relative to the sensor surface. Such variations are a direct result of changes in the spatial relationship between each electrode and the sensor surface during pen tilt, thereby changing the detected capacitances.	IKEDA Fig. 5  IKEDA's system includes a first detection unit at the pen tip and a second, ring-shaped detection unit on the pen body, allowing capacitive measurements at different positions to determine the pen's tilt angle relative to the surface. A POSITA would have recognized that incorporating IKEDA's explicit tilt detection method into YOSHIDA's capacitive stylus design was a routine and predictable approach to achieving tilt angle measurement. Because YOSHIDA already discloses multiple electrodes forming distinct capacitive relationships with a sensor surface,

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	<i>See also</i> Fig. 28; 26:36-48 ("In the electrode structure, a plurality of electrodes D1 are mounted on a circumference of the tip end portion of the pen, and the electrodes D1 are connected to an AC power source A1 so that a rotational electric field is generated on the circumference.").	adding IKEDA's ring-shaped detection electrode would naturally extend the system to provide tilt information. This integration would improve angular resolution without requiring additional mechanical sensors, reducing complexity while enhancing performance. A POSITA would have been motivated to combine these teachings because both references operate in the same field of capacitive stylus design and address the closely related problem of capturing not just coordinate position but also angular posture. The combination would have predictably resulted in a stylus capable of reporting both position and tilt. At the time, there was a strong commercial demand for more sophisticated input devices for drawing and design, particularly in professional markets such as digital illustration and CAD. A POSITA would have recognized that the combination of YOSHIDA's electrode framework with IKEDA's tilt-specific disclosure directly responded to these market needs and represented a logical progression of known stylus technology.

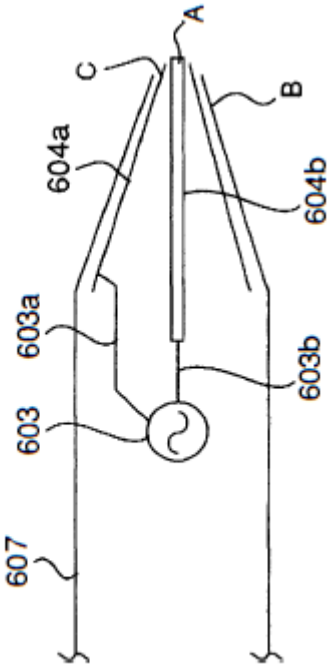
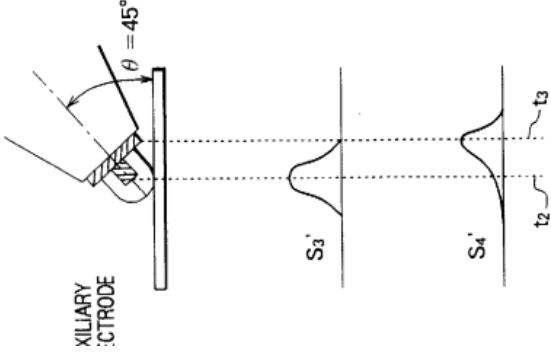
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
		<u>IGUCHI</u> IGUCHI discloses tilt detection by describing how capacitive signal variations can be used to measure angular displacement over time. IGUCHI, Fig. 29b, 31:37-41. Specifically, IGUCHI states: "[A] time difference is caused between timing t2 of a peak of an output signal S3' provided by the main electrode and timing t3 of a peak of an output signal S4' provided by the auxiliary electrode." IGUCHI, 31:37-41, Fig. 29b.

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		FIG. 29b ($\theta = 45^\circ$)  A POSITA would have understood that such timing differences arise when the pen is tilted, as changes in the relative distances between the electrodes and the sensor surface alter the capacitive coupling and the resulting signal profiles. IGUCHI's explicit teaching that these timing differences can be measured to determine angular displacement provides a direct

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		basis for detecting a tilt angle. Incorporating IGUCHI’s time-differentiated signal approach into YOSHIDA’s capacitive stylus framework would have been a predictable and straightforward enhancement, using well-known capacitive signal processing techniques to achieve accurate tilt detection without mechanical sensors. A POSITA would have been motivated to combine these teachings because IGUCHI’s disclosure of temporal signal analysis naturally complements YOSHIDA’s capacitive system for position detection. Integrating the two would predictably yield a stylus capable of both coordinate and tilt measurement, leveraging established capacitive principles. This combination would directly address commercial trends toward feature-rich digital pens designed to replicate natural handwriting and artistic motions. At the time, tablet and interactive display markets were driven by demand for tools offering higher accuracy and versatility, and a POSITA would have recognized that combining YOSHIDA and IGUCHI provided an obvious path to meeting those expectations.

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Claim 20		
20[pre] The method according to claim 14,	<i>See supra</i> 14[pre] – 14[c].	<i>See supra</i> 14[pre] – 14[c].
20[a] wherein the first and second signals are different in type from each other.		<i>See supra</i> Claim 7. <u>IKEDA</u> Ikeda discloses a coordinate detection electrode (unit 2) and a ring-shaped angle detection electrode (unit 3), each producing coordinate data stored and processed separately. Ex. 1006, ¶¶ [0006], [0013], Figs. 3, 5. A POSITA would have understood that these outputs differ in type because they originate from physically distinct electrodes and are processed through separate detection channels designed for different purposes. A POSITA would have been motivated to combine Ikeda's explicit disclosure of signal separation with Yoshida's time-differentiated signals, recognizing this as a predictable and routine way to improve angular and positional tracking in capacitive stylus systems.

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Claim 21		
21[pre] The method according to claim 14,	<i>See supra</i> 14[pre] – 14[c]; <i>see also</i> 1[g].	<i>See supra</i> 14[pre] – 14[c]; <i>see also</i> 1[g].
21[a] wherein the first and second signals are of the same type but have a time difference from each other.	<i>See supra</i> Claim 8. YOSHIDA discloses a capacitive stylus system where multiple electrodes interact with a sensor surface to generate distinct signals. Specifically, YOSHIDA discloses how electrodes 604a and 604b interact with capacitive elements on a sensor panel to generate detection signals: “[A] signal which is generated by an electric field from the electrodes of the coordinate pointing device at the electrodes of the panel coupled through an electrostatic capacitive coupling with the coordinate pointing device is detected.” YOSHIDA, 14:62-67, Fig. 6A.	<i>See supra</i> Claim 8. <u>IGUCHI</u> IGUCHI discloses a capacitive pen system where the signals from the first and second electrodes are of the same type but have a measurable time difference. Specifically, IGUCHI discloses “a time difference is caused between timing t2 of a peak of an output signal S3’ provided by the main electrode and timing t3 of a peak of an output signal S4’ provided by the auxiliary electrode.” IGUCHI, 31:37-41, Fig. 29b.

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	Fig. 6A  YOSHIDA expressly discloses signals being “opposite in phase” (<i>id.</i> at 26:23–26). A POSITA would understand that a phase offset between two AC signals of the same type necessarily produces a corresponding time difference in the signals.	FIG. 29b ($\theta = 45^\circ$)  In Figure 29b of IGUCHI, the output signals S3’ and S4’ from the main and auxiliary electrodes are plotted over time. The graph demonstrates that while both signals are of the same type (e.g., voltage signals), there is a measurable time difference between them, which is utilized to determine the pen’s tilt or angle. The figure presents a waveform diagram illustrating the time difference between

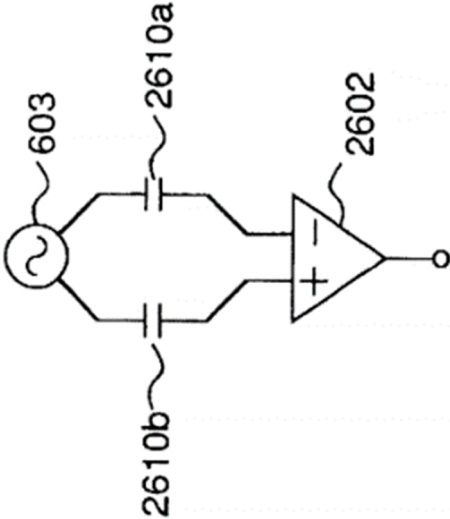
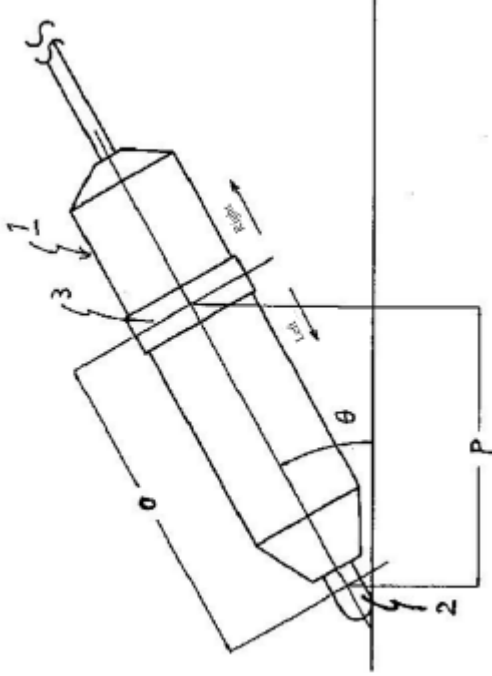
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
		output signals S3' and S4'. The figure visually demonstrates how these signals shift over time, supporting the argument that signals from different electrodes have a detectable phase difference. This timing offset allows for accurate angular detection of the pen's tilt relative to the sensor surface. Additionally, IGUCHI describes a systematic operation cycle where the capacitive pen interacts with a grid of electrodes in an X-Y coordinate system. Specifically, IGUCHI also discloses that: "[o]ne cycle of a systematic operation of the coordinate inputting apparatus is shown as one frame in FIG. 31 and is constructed by three periods composed of a Y-coordinate detecting period, an X-coordinate detecting period and an additional information transmitting period"; "the electrodes Y1 to Ym at Y-coordinates are sequentially turned on in the Y-coordinate detecting period, and the electrodes X1 to Xn at X-coordinates are sequentially turned on in the X-coordinate detecting period"; "a detecting portion of the detecting pen outputs a signal when an electrode closest to a pen tip is turned on"; and "it is possible to discriminate a position of the pen tip on the tablet by timing of the signal from the detecting pen." IGUCHI, 32:64-67, 33:1, 33:8-16, Fig. 31.

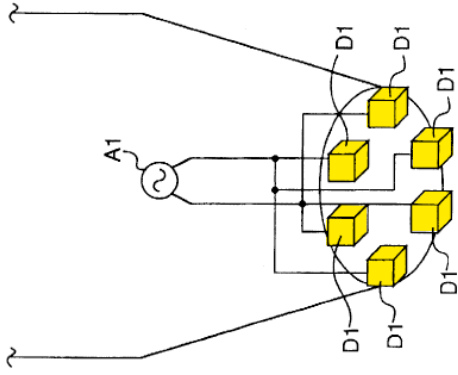
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		FIG. 31 A POSITA would also have recognized or found obvious that the signals from the two sets of electrodes $X1-Xn$ and $Y1-Ym$ both use electrostatic coupling and are of the same type but have a time difference from each other. IGUCHI, 13:6-12, 31:26-44. IGUCHI explicitly discloses that a time difference exists between signals detected from different electrodes positioned at separate locations

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		along the stylus body. IGUCHI, Fig. 29b, 31:37-41. Given YOSHIDA's disclosure of a capacitive stylus system generating two AC signals of the same type which necessarily produces a corresponding time difference in the signals, a POSITA would have found it obvious to incorporate IGUCHI's timing-based signal differentiation into YOSHIDA's system to refine detection accuracy. Time-differentiated capacitive signals were a well-known feature in stylus-based input devices, and using this method in conjunction with YOSHIDA's capacitive framework would have been a predictable and advantageous modification for improving signal processing and distinguishing angular displacement. Integrating IGUCHI's signal timing variation approach into YOSHIDA's stylus system represents an expected design refinement that aligns with established principles in capacitive input technology.
Claim 22 (Ind.)		
22[pre]A method of detecting angle information of a penshaped	<i>See supra</i> 14[pre] – 14[c]; <i>see also</i> 1[pre] – 1[g]. YOSHIDA discloses a capacitive stylus system where multiple electrodes 604a and 604b interact with a sensor surface to generate detection signals.	<i>See supra</i> 14[pre] – 14[c]; <i>see also</i> 1[pre] – 1[g]. <u>IKEDA</u> IKEDA discloses a capacitive stylus that detects tilt angle using multiple electrodes positioned along the

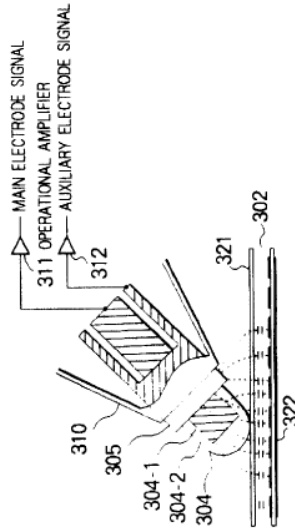
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
position indicator, the method comprising:	YOSHIDA explains that an electric field is generated from the stylus electrodes and capacitively coupled with the sensor surface to provide positional data. YOSHIDA, Figs. 26, 27, 27:13–25 (“by performing two times similar detection operations from the segment electrode side and from the common electrode side so as to detect and decide the coordinates . . . the coordinates (x, y) of the position in which the electrodes 604a and 604b of the electric field generator 607 are located can be specified”). These disclosures demonstrate that each stylus electrode independently forms a capacitive relationship with the panel’s electrode matrix, and that the positional information is extracted by comparing signals from the different capacitive couplings.	stylus body. Specifically, IKEDA states: “A coordinate detection electrode (first detection unit) is positioned at the tip of the coordinate detection pen, and a ring-shaped coordinate detection electrode (second detection unit) for angle reading is placed on the body of the coordinate detection pen.” IKEDA, [0006], Fig. 5 (illustrating angle detection using capacitive coupling). Additionally, IKEDA discloses how these electrodes form capacitive relationships that allow tilt detection: “Using the coordinate data from the two detection units 2 and 3 stored in the regions of RAM 8, the dimensional control program converts the dimensions between the detection unit for coordinate detection and the detection unit for angle detection, storing the angle dimension P where the coordinate detection pen 1 is located in RAM 8 of the coordinate input device.” IKEDA, [0013], Fig. 5. Further, IKEDA confirms that capacitive stylus systems inherently generate multiple capacitive relationships for tilt detection: “By detecting each coordinate using the detection unit 2 for coordinate detection and the detection unit 3 for angle detection of the coordinate detection pen 1, control over the angle of the coordinate detection pen 1 can be

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	Fig.26	achieved.” IKEDA, [0015], Fig. 5; <i>see also id.</i>, Abstract (“[Problem to be Solved]: In a coordinate input device using capacitive coupling, the presence of only one electrode for coordinate detection prevents input control based on the angle of use of the coordinate detection pen against the board surface...[Means for Solving the Problem]: An electrode for coordinate detection is arranged at the tip of the coordinate detection pen and the body of the pen. The pen body is equipped with an electrode designed to detect a ring-shaped angle.”); Claim 1 (“two detection electrode units: one for detecting coordinates and another for detecting angles...enabling the detection of the tilt angle of the aforementioned coordinate detection pen itself”).

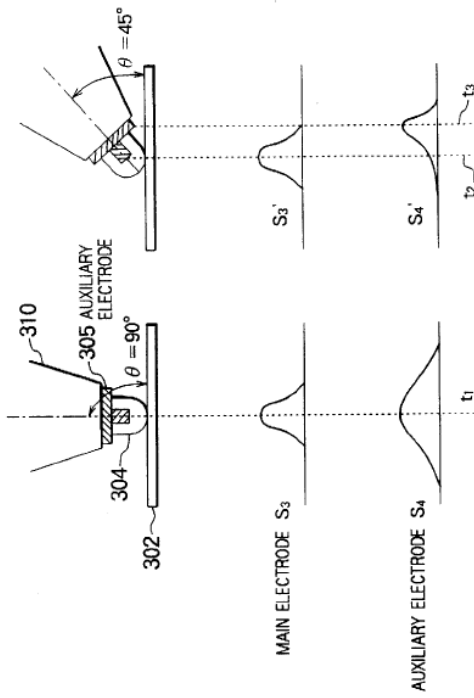
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
	Fig.27  YOSHIDA further explains that the stylus can employ a plurality of electrodes (D1) to generate a “rotational electric field,” which provides stability against changes in roll orientation. In particular, YOSHIDA notes that “even though the pen which serves as the electric field generator rolls, the electrostatic capacity between the electrodes of the pen and the electrodes of the panel do not change.” YOSHIDA, 26:36–48; see also 8:66–9:11; 57:1–20. This teaching shows that the system can be configured so that some angular variations (such as roll) do not affect the detected signal, thereby	[Fig.5]  IKEDA Fig. 5 Figure 5 of IKEDA discloses how the first detection unit is positioned at the pen tip, and the second detection unit is ring-shaped and positioned along the pen body, allowing the system to measure tilt by analyzing changes in capacitive coupling at different locations along the pen axis. A POSITA would have understood that when a stylus includes multiple conductive electrodes, each electrode establishes its own capacitive coupling

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	allowing consistent positional data even as the pen rotates. <i>Fig.28</i>  A POSITA would have understood that YOSHIDA describes a capacitive architecture in which an AC field is driven from the pen tip and sensed by the LCD panel's existing X/Y electrode matrix. Those electrodes are time-multiplexed into detection circuitry (e.g., a differential amplifier) so that the same panel hardware performs both display and input functions. In such arrangements, the mutual capacitances between the stylus electrodes and the	with the sensor surface, producing distinct relationships that can be analyzed for input data. YOSHIDA illustrates this with electrodes 604a and 604b, which form separate capacitive links with the panel's X/Y grid. IKEDA reinforces this principle by teaching that a tip electrode and an additional electrode along the pen body create distinct capacitive couplings that can be used not only for coordinate determination but also for inclination detection. A POSITA would have been motivated to integrate IKEDA's tilt-specific configuration into YOSHIDA's capacitive stylus architecture to extend its capabilities from coordinate tracking to precise angle measurement. Both references address similar design challenges in capacitive stylus technology and are directed to improving how stylus posture is sensed. Because the techniques are technically compatible, their combination would have been straightforward and would predictably yield a stylus capable of reporting both position and angular information with greater accuracy. Moreover, market demand at the time strongly favored styluses that could capture tilt and rotation, as evidenced by contemporaneous commercial products such as Wacom's tilt-sensitive pens. A POSITA would have

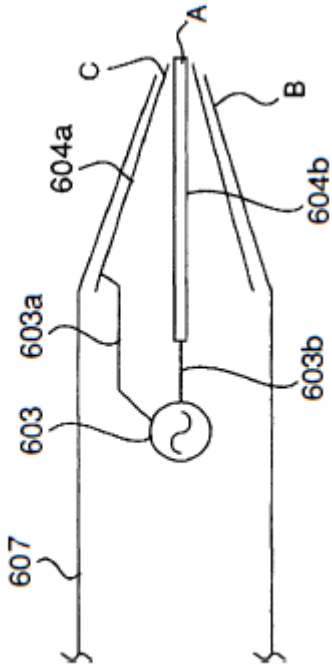
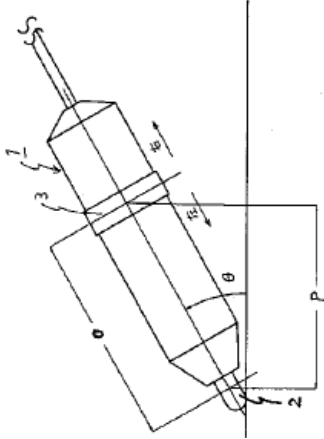
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103) panel grid are the key signal carriers. Variations in those capacitances reflect not only the x-y position and distance of the pen tip, but also its angular posture relative to the surface. For example, as the pen tilts, the electric field distribution shifts asymmetrically across the panel electrodes, producing detectable differences in the capacitive coupling strengths. At the same time, YOSHIDA illustrates that by arranging electrodes to generate a rotationally symmetric field, certain angular components (such as roll) can be designed out of the measurement, thereby improving stability. A POSITA would recognize that these disclosures collectively confirm that YOSHIDA teaches the use of electrode-to-panel capacitive relationships for extracting not just coordinate data but also angular information.	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		recognized that merging IKEDA’s angle-sensing disclosure with YOSHIDA’s electrode configuration was a natural response to these commercial pressures and would achieve improved performance without introducing technical incompatibilities. <u>IGUCHI</u> IGUCHI discloses a method of detecting angle information of a pen-shaped position indicator by generating detection signals in the sensor surface from which angular data can be obtained. As shown in FIG. 26a and FIG. 26b, “the main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310” and “the auxiliary electrode 305 is arranged around this main electrode 304.” IGUCHI, 30:25-29, Figs. 26a-26b. FIG. 26a FIG. 26b

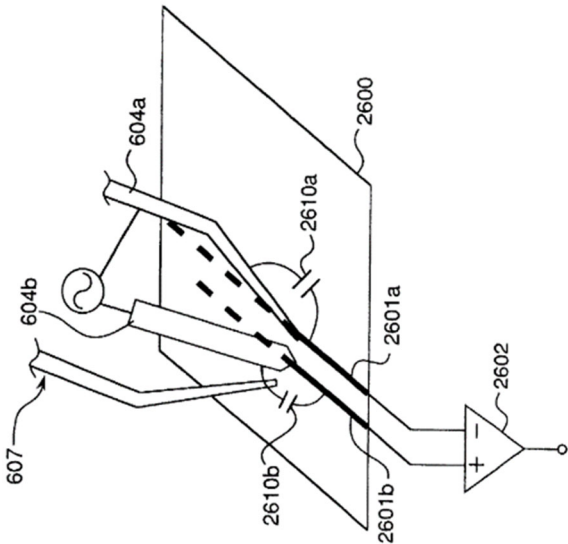
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		IGUCHI explains that the capacitive relationships formed by these electrodes vary as the pen tilts, and that asymmetry between the main and auxiliary electrode couplings produces inclination-dependent signals: “No shape of the electrostatic capacity is formed with right and left symmetry with respect to the main electrode. This is because no peak of the electrostatic capacity provided by the main electrode 304 is in conformity with a peak of the electrostatic capacity provided by the auxiliary electrode 305 by inclining the pen shaft.” IGUCHI, 31:5-11, Fig. 27c. FIG. 27c  These asymmetric capacitive couplings yield detection signals in the sensor surface that reveal tilt and angular movement of the pen. IGUCHI's Figure 27c demonstrates how variations in capacitance between the main and auxiliary electrodes allow

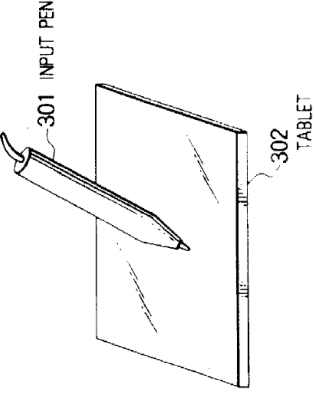
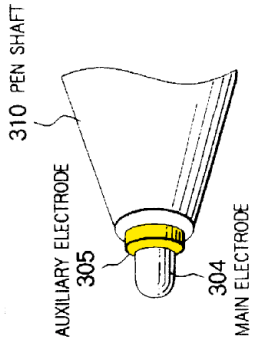
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		calculation of angular displacement. In addition, IGUCHI discloses that “inclination data of the pen shaft can be taken out by a difference between these timing signals caused by a difference between these coordinates.” IGUCHI, 15:6-12. A POSITA would have understood that the “inclination data of the pen shaft” corresponds to “angle information of the pen-shaped position indicator,” and that the “difference between timing signals” corresponds to the “detection signals in the sensor surface.” IGUCHI, 31:26-44. IGUCHI also supports the detectability of angular displacement by describing how time-differentiated signals from electrodes at different positions encode tilt. For example, IGUCHI states that “a time difference is caused between timing t2 of a peak of an output signal S3’ provided by the main electrode and timing t3 of a peak of an output signal S4’ provided by the auxiliary electrode.” IGUCHI, 31:37-41, Fig. 29b.

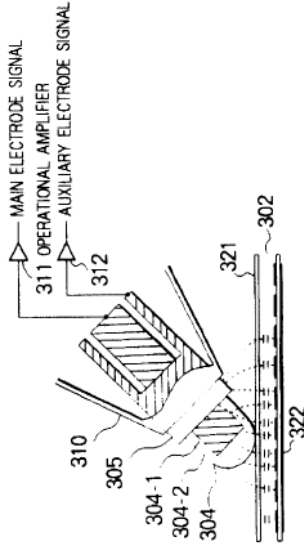
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
		FIG. 29a FIG. 29b ($\theta = 90^\circ$) ($\theta = 45^\circ$)  Figure 29b plots output signals S3' and S4' from the main and auxiliary electrodes over time, visually illustrating the measurable timing offset between them. This phase difference allows accurate determination of the pen's tilt angle relative to the sensor surface, confirming that IGUCHI discloses generating detection signals based on capacitive relationships from which angular information of the pen-shaped position indicator is obtainable. A POSITA would have understood that capacitive stylus systems create multiple capacitive

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		relationships when more than one electrode interacts with the sensor surface. YOSHIDA discloses that electrodes 604a and 604b of the stylus each form capacitive couplings with the LCD panel electrodes, and that variations in those couplings reflect not only positional coordinates but also angular posture. YOSHIDA, Figs. 26, 27; 27:13–25; 26:36-48. IGUCHI complements this disclosure by expressly teaching how off-axis electrode placement at the pen tip and measurable timing differences between electrode outputs encode tilt and inclination data IGUCHI, 15:6-12; 30:25-29; 31:5-11, 31:37-41; Figs. 26a–26b, 27c, 29b. A POSITA would have been motivated to combine YOSHIDA’s disclosure of electrode-to-panel capacitive relationships with IGUCHI’s disclosure of timing-based signal differentiation because doing so would predictably yield a stylus capable of detecting not only positional coordinates but also angular information of the pen-shaped position indicator. This combination represents a straightforward application of known capacitive input principles, improving the accuracy and robustness of stylus-based systems.

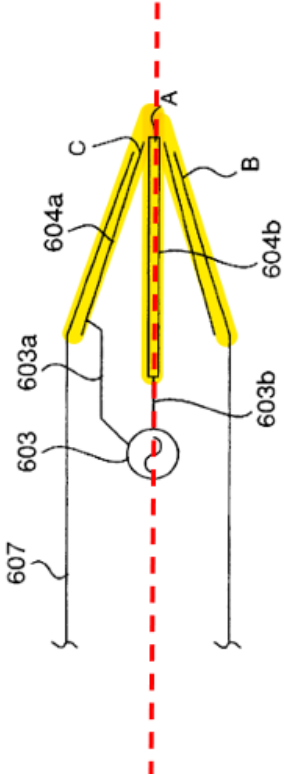
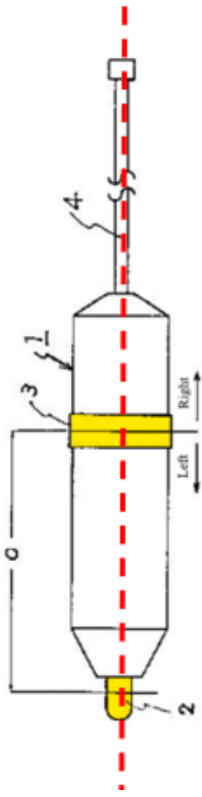
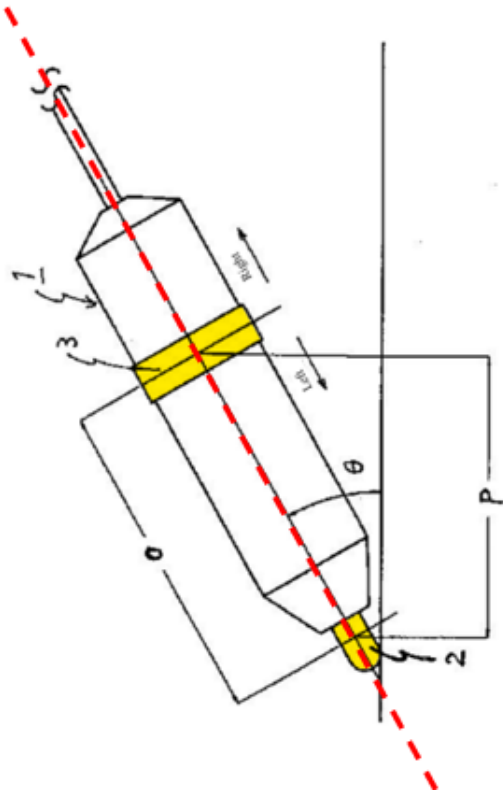
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 (“YOSHIDA”) (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A (“IKEDA”) or U.S. Patent No. 5,736,980 (“IGUCHI”)
22[a] forming first and second capacitive relationships between a sensor surface and first and second electrodes, respectively,	<i>See supra</i> 14[pre] – 14[c]; <i>see also</i> 1[g] (forming first and second capacitive relationships). YOSHIDA discloses forming capacitive relationships between a sensor surface and two electrodes located within the pen-shaped stylus. The electric field generator 607 includes a rod-shaped inner electrode 604b and a megaphone-shaped outer electrode 604a, which are arranged at the tip of the pen. YOSHIDA, Fig. 6A, 24:58–25:5. Fig. 6A  These electrodes interact with the panel electrodes (e.g., segment electrodes 202 and common electrodes 201) through capacitive coupling to generate detection signals, as illustrated in Fig. 26.	<i>See supra</i> 14[pre] – 14[c]; <i>see also</i> 1[g] (forming first and second capacitive relationships). <u>IKEDA</u> IKEDA discloses first and second electrodes that each form a capacitive relationship with a sensor surface. Specifically, the pen includes a coordinate detection electrode (detection unit 2) positioned at the tip and a ring-shaped detection electrode (detection unit 3) positioned along the body. IKEDA, ¶[0006], Fig. 5.  The two detection units are spatially separated and interact with the tablet's sensor grid to generate independent capacitive signals. IKEDA explains that coordinate data is obtained from “the two detection

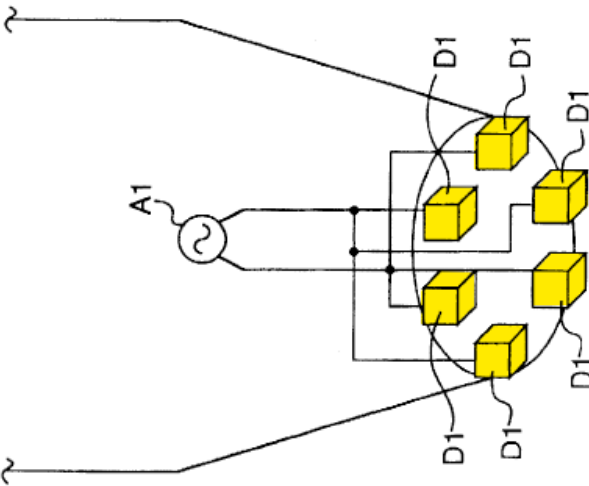
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	YOSHIDA, 27:5-25. As YOSHIDA explains, by detecting the potential difference across pairs of panel electrodes, “the coordinates of the bottom portion correspond to the coordinates of the position in which the electrodes 604a and 604b are located.” YOSHIDA, 27:19-23. This reflects two distinct capacitive relationships formed between each of the stylus electrodes and the sensor surface. <i>Fig.26</i> 	units 2 and 3 stored in the regions of RAM 8,” which are processed to detect pen tilt. IKEDA, ¶[0013]. A POSITA would have recognized that these two detection electrodes form distinct capacitive relationships with the sensor surface, enabling detection of angular displacement and stylus orientation. The interaction of each electrode with the sensor surface is inherent in capacitive detection. <i>IGUCHI</i> IGUCHI discloses two electrodes—a main electrode 304 and an auxiliary electrode 305—positioned at the tip of the stylus and arranged to form capacitive relationships with the sensor surface. IGUCHI, Figs. 26a and 26b, 30:25-29 (“The main electrode 304... is arranged at an end tip of the pen shaft 310... [and] the auxiliary electrode 305 is arranged around this main electrode 304”).

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		FIG. 26a  FIG. 26b  Because the auxiliary electrode is arranged off-axis from the main electrode, IGUCHI explains that each electrode couples independently with the tablet surface: "coordinates of the main and auxiliary electrodes with respect to a tablet plate are separately detected when the pen shaft is inclined." IGUCHI, 15:6–12.

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		FIG. 27c  IGUCHI further discloses that “a time difference is caused between timing t2 of a peak of an output signal S3’ provided by the main electrode and timing t3 of a peak of an output signal S4’ provided by the auxiliary electrode.” IGUCHI, 31:37–41, Fig. 29b. These time-differentiated capacitive outputs confirm that angular displacement is encoded in the detection signals. <i>Id.</i> at 31:26–44. A POSITA would have been motivated to combine YOSHIDA’s disclosure of electrode-to-panel capacitive relationships (Figs. 26, 27; 27:13–25; 26:36–48) with IGUCHI’s disclosure of offset electrodes producing independently detectable timing-based signals (15:6–12; 30:25–29; 31:5–11, 31:37–41; Figs. 26a–26b, 27c, 29b). Both references address the same problem, accurately detecting stylus position and angle in capacitive input systems,

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		and each teaches complementary features. Integrating IGUCHI’s explicit angular detection mechanism into YOSHIDA’s signal-processing architecture would have predictably improved accuracy and robustness of angle measurement while reducing the need for mechanical sensors. Given the commercial demand for advanced stylus functionality in markets such as tablets and smartphones, a POSITA would have been incentivized to make this combination to provide more precise angle detection in capacitive stylus systems.
22[b] wherein the first and second electrodes are arranged near a pen-tip portion of the pen-shaped position indicator to surround an axis of the pen-shaped indicator, and	<i>See supra</i> 1[b] (first electrode arranged at a first position of the pen-tip portion), 1[c] (second electrode arranged at a second position of the pen-tip portion), and 4[a] (wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator). YOSHIDA discloses a pen-shaped electric field generator in which an inner electrode 604b is surrounded by a megaphone-shaped outer electrode 604a at the pen tip. YOSHIDA, Fig. 6A, 24:58–25:5.	<i>See supra</i> 1[b] (first electrode arranged at a first position of the pen-tip portion), 1[c] (second electrode arranged at a second position of the pen-tip portion), and 4[a] (wherein the first and second electrodes are arranged to surround the axis of the pen-shaped position indicator). <u>IKEDA</u> IKEDA discloses two detection electrode units, one for coordinate detection and one for angle detection, disposed along the pen axis, including a ring-shaped electrode 3 for angle detection. IKEDA, Figs. 1 and 5, ¶[0006].

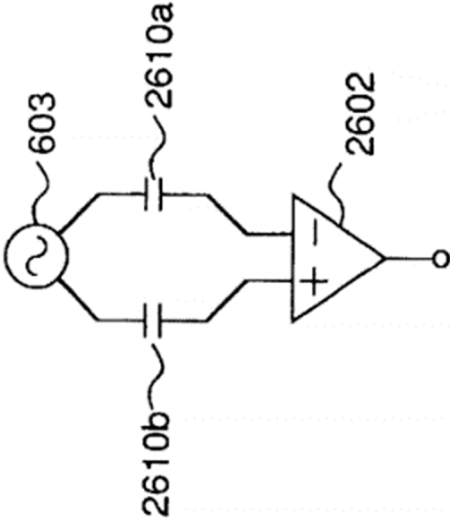
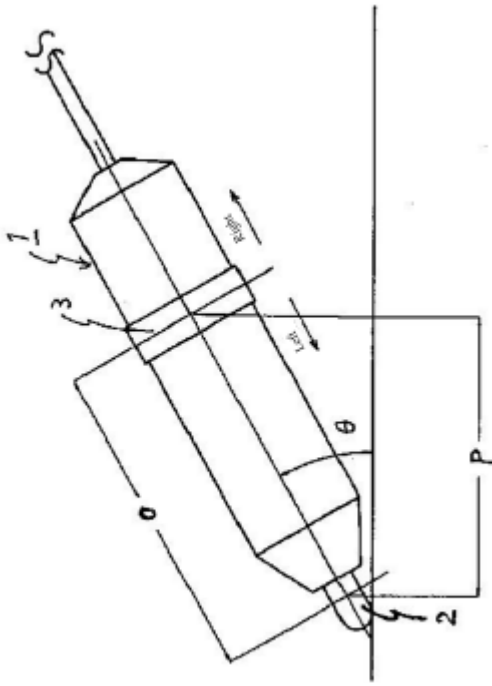
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	Fig. 6A  As shown in Fig. 6A, this concentric configuration places both electrodes symmetrically around the axis of the pen. A POSITA would have understood this arrangement as being centered about the axis, with both electrodes structurally and electrically configured to surround it. <i>See also</i> Fig. 28; 26:36-48 (“In the electrode structure, a plurality of electrodes D1 are mounted on a circumference of the tip end portion of the pen.”).	[Fig 1.]  [Fig.5]  IKEDA confirms the same design principle by disclosing a ring-shaped detection electrode 3 positioned on the pen body and surrounding the axis

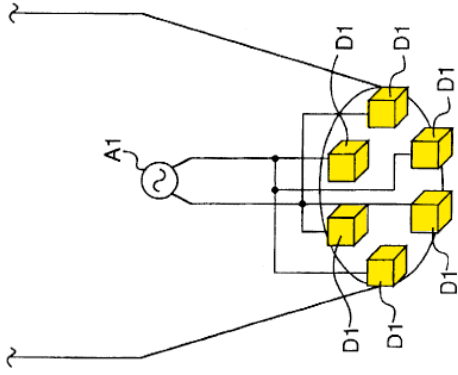
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	Fig.28  Arranging both (or multiple) electrodes to surround the axis as disclosed by YOSHIDA was a conventional design approach in capacitive stylus systems to ensure uniform field distribution and enable angle-dependent signal variation.	of the shaft for angle detection. IKEDA, ¶[0006], Figs. 1, 5. A POSITA would have recognized this concentric structure as demonstrating that surrounding the axis with electrodes was a conventional design approach in capacitive stylus technology to facilitate tilt detection. A POSITA would have been motivated to combine YOSHIDA’s coaxial electrode arrangement with IKEDA’s ring electrode disclosure because arranging electrodes symmetrically around the axis was a known way to ensure uniform field distribution and consistent tilt measurements. Such an arrangement predictably reduces error caused by uneven electric fields and improves angular detection accuracy. At the same time, commercial demand for high-precision styluses, particularly for applications requiring smooth and reliable tilt input, such as digital art and professional drafting, would have further encouraged a POSITA to adopt this concentric design. Combining YOSHIDA’s and IKEDA’s disclosures would therefore have been a straightforward and advantageous improvement in the field.

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		<u>IGUCHI</u> IGUCHI discloses a main electrode 304 at the end tip of the pen shaft, which is positioned to interact capacitively with the sensor surface. IGUCHI, Fig. 26a, Fig. 26b, 30:25-29 (“[t]he main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310” and “[t]he auxiliary electrode 305 is arranged around this main electrode 304.”). FIG. 26a FIG. 26b FIG. 26a is a perspective view of a pen (301) with an input pen (301) and a tablet (302). FIG. 26b is a cross-sectional view of the pen tip, highlighting the auxiliary electrode (305) and the main electrode (304). A POSITA would have recognized that positioning a main electrode at the tip of a capacitive stylus enhances signal transmission and interaction with the sensor surface, ensuring accurate coordinate detection. IGUCHI explicitly discloses a main electrode 304 arranged at the end tip of the pen shaft, reinforcing that this configuration was a well-known design principle in capacitive input

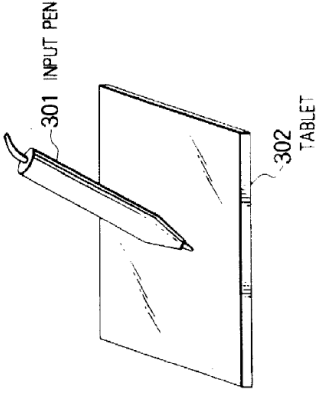
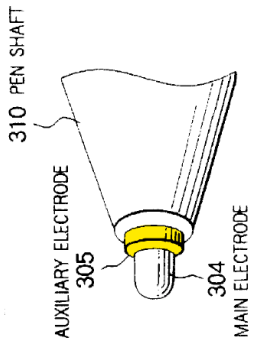
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		technology. Integrating IGUCHI’s electrode placement into YOSHIDA’s stylus would have been an obvious design choice to improve capacitive coupling efficiency and facilitate precise input detection, as capacitive stylus systems commonly employ such electrode positioning to optimize performance.
22[c] wherein the first and second electrodes are supplied with first and second signals generated by a signal production circuit via first and second lines, respectively, wherein the first and second signals are distinguishable	<i>See supra</i> 1[f] (first and second signals generated by signal production circuit are transmitted to the first and second electrodes via the conductive lines) and 1[d] (the first and second signals are distinguishable from each other).	<i>See supra</i> 1[f] (first and second signals generated by signal production circuit are transmitted to the first and second electrodes via the conductive lines) and 1[d] (the first and second signals are distinguishable from each other).

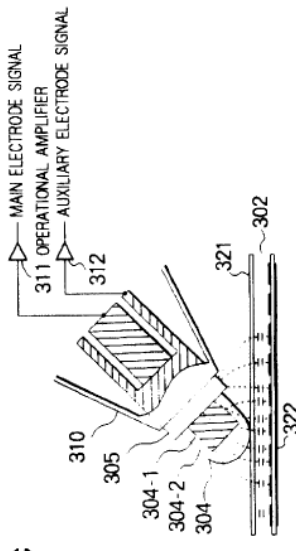
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from each other; and		
22[d] detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships.	<i>See supra</i> 1 [g]; 14[c]. YOSHIDA discloses a capacitive stylus system where multiple electrodes 604a and 604b interact with a sensor surface to generate detection signals. YOSHIDA explains that an electric field is generated from the stylus electrodes and capacitively coupled with the sensor surface to provide positional data. YOSHIDA, Figs. 26, 27, 27:13–25 (“by performing two times similar detection operations from the segment electrode side and from the common electrode side so as to detect and decide the coordinates . . . the coordinates (x, y) of the position in which the electrodes 604a and 604b of the electric field generator 607 are located can be specified”). These disclosures demonstrate that each stylus electrode independently forms a capacitive relationship with the panel’s electrode matrix, and that the positional information is extracted by comparing signals from the different capacitive couplings.	<i>See supra</i> 1 [g]; 14[c]. <u>IKEDA</u> IKEDA discloses a capacitive stylus that detects tilt angle using multiple electrodes positioned along the stylus body. Specifically, IKEDA states: “A coordinate detection electrode (first detection unit) is positioned at the tip of the coordinate detection pen, and a ring-shaped coordinate detection electrode (second detection unit) for angle reading is placed on the body of the coordinate detection pen.” IKEDA, [0006], Fig. 5 (illustrating angle detection using capacitive coupling). Additionally, IKEDA discloses how these electrodes form capacitive relationships that allow tilt detection: “Using the coordinate data from the two detection units 2 and 3 stored in the regions of RAM 8, the dimensional control program converts the dimensions between the detection unit for coordinate detection and the detection unit for angle detection, storing the angle dimension P where the coordinate

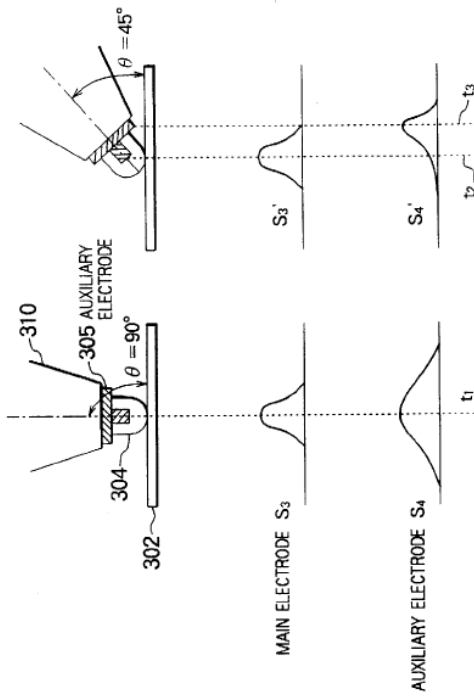
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	Fig.27  YOSHIDA further explains that the stylus can employ a plurality of electrodes (D1) to generate a “rotational electric field,” which provides stability against changes in roll orientation. In particular, YOSHIDA notes that “even though the pen which serves as the electric field generator rolls, the electrostatic capacity between the electrodes of the pen and the electrodes of the panel do not change.” YOSHIDA, 26:36–48; see also 8:66–9:11; 57:1–20. This teaching shows that the system can be configured so that some angular variations (such as roll) do not affect the detected signal, thereby	[Fig.5]  IKEDA Fig. 5 Figure 5 of IKEDA discloses how the first detection unit is positioned at the pen tip, and the second detection unit is ring-shaped and positioned along the pen body, allowing the system to measure tilt by analyzing changes in capacitive coupling at different locations along the pen axis. A POSITA would have understood that when a stylus includes multiple conductive electrodes, each electrode establishes its own capacitive coupling

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	allowing consistent positional data even as the pen rotates. <i>Fig.28</i>  A POSITA would have understood that YOSHIDA describes a capacitive architecture in which an AC field is driven from the pen tip and sensed by the LCD panel's existing X/Y electrode matrix. Those electrodes are time-multiplexed into detection circuitry (e.g., a differential amplifier) so that the same panel hardware performs both display and input functions. In such arrangements, the mutual capacitances between the stylus electrodes and the	with the sensor surface, producing distinct relationships that can be analyzed for input data. YOSHIDA illustrates this with electrodes 604a and 604b, which form separate capacitive links with the panel's X/Y grid. IKEDA reinforces this principle by teaching that a tip electrode and an additional electrode along the pen body create distinct capacitive couplings that can be used not only for coordinate determination but also for inclination detection. A POSITA would have been motivated to integrate IKEDA's tilt-specific configuration into YOSHIDA's capacitive stylus architecture to extend its capabilities from coordinate tracking to precise angle measurement. Both references address similar design challenges in capacitive stylus technology and are directed to improving how stylus posture is sensed. Because the techniques are technically compatible, their combination would have been straightforward and would predictably yield a stylus capable of reporting both position and angular information with greater accuracy. Moreover, market demand at the time strongly favored styluses that could capture tilt and rotation, as evidenced by contemporaneous commercial products such as Wacom's tilt-sensitive pens. A POSITA would have

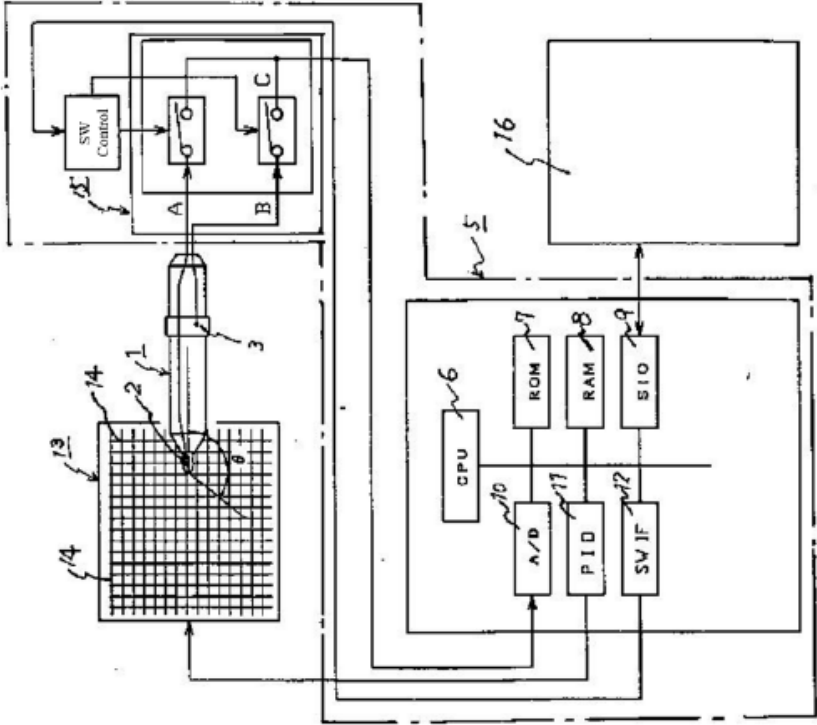
Claim Elements U.S. Patent No. 10,108,277	Primary Reference: U.S. Patent No. 5,798,756 ("YOSHIDA") (35 U.S.C. § 103)	Secondary Reference: Japanese Patent Application Publication No. JPH1011206A ("IKEDA") or U.S. Patent No. 5,736,980 ("IGUCHI")
	panel grid are the key signal carriers. Variations in those capacitances reflect not only the x-y position and distance of the pen tip, but also its angular posture relative to the surface. For example, as the pen tilts, the electric field distribution shifts asymmetrically across the panel electrodes, producing detectable differences in the capacitive coupling strengths. At the same time, YOSHIDA illustrates that by arranging electrodes to generate a rotationally symmetric field, certain angular components (such as roll) can be designed out of the measurement, thereby improving stability. A POSITA would recognize that these disclosures collectively confirm that YOSHIDA teaches the use of electrode-to-panel capacitive relationships for extracting not just coordinate data but also angular information.	recognized that merging IKEDA's angle-sensing disclosure with YOSHIDA's electrode configuration was a natural response to these commercial pressures and would achieve improved performance without introducing technical incompatibilities. <u>IGUCHI</u> IGUCHI discloses detecting angular information of the pen-shaped position indicator based on the first and second capacitive relationships. As shown in FIG. 26a and FIG. 26b, "the main electrode 304 covered with resin is arranged at an end tip of the pen shaft 310" and "the auxiliary electrode 305 is arranged around this main electrode 304." IGUCHI, 30:25-29, Figs. 26a-26b.

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		FIG. 26a  FIG. 26b  Because the auxiliary electrode is arranged off-axis from the main electrode, the system detects independent signals from each: "coordinates of the main and auxiliary electrodes with respect to a tablet plate are separately detected when the pen shaft is inclined," and "inclination data of the pen shaft can be taken out by a difference between timing signals caused by a difference between these coordinates." IGUCHI, 15:6–12. These disclosures confirm that angle information of the pen-shaped position indicator is derived from comparing the separate capacitive couplings.

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		FIG. 27c  IGUCHI further explains that the signals from the two electrodes are time-differentiated, enabling detection of angular displacement. Specifically, IGUCHI discloses that “a time difference is caused between timing t2 of a peak of an output signal S3’ provided by the main electrode and timing t3 of a peak of an output signal S4’ provided by the auxiliary electrode.” IGUCHI, 31:37–41, Fig. 29b.

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		FIG. 29a FIG. 29b ($\theta = 90^\circ$) ($\theta = 45^\circ$)  MAIN ELECTRODE S_3 AUXILIARY ELECTRODE S_4 IGUCHI's Figure 29b shows output waveforms S_3' and S_4' from the main and auxiliary electrodes, demonstrating a measurable timing offset. This timing difference reflects the pen's tilt relative to the sensor surface, confirming that angular information is detected based on the first and second capacitive relationships. A POSITA would have been motivated to combine YOSHIDA's disclosure of a capacitive stylus system in which multiple electrodes form separate

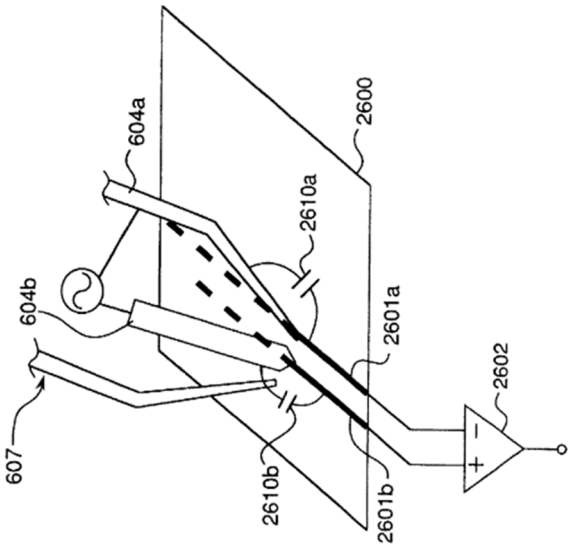
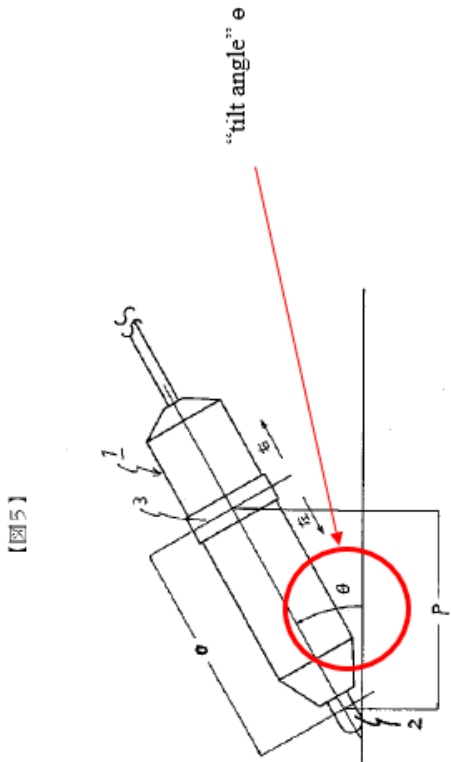
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		capacitive relationships with the panel surface and provide detection signals (Figs. 26, 27; 27:13–25; 26:36–48) with IGUCHI's disclosure of main and auxiliary electrodes producing distinct, time-differentiated signals that encode tilt and inclination (15:6–12; 30:25–29; 31:5–11, 31:37–41; Figs. 26a–26b, 27c, 29b). Both references address the same problem, detecting angular information in a capacitive input system, and each offers complementary solutions. Combining IGUCHI's explicit angular detection mechanism with YOSHIDA's signal-processing architecture would have predictably improved accuracy and robustness of angle detection, reducing reliance on mechanical sensors and supporting market demand for precise stylus input in emerging devices such as tablets and smartphones.
Claim 23 23[pre] The method according to claim 22, comprising:	<i>See supra</i> 22[pre]–22[d]; <i>see also</i> 1[pre]–1[g], 14[pre]–14[c].	<i>See supra</i> 22[pre]–22[d]; <i>see also</i> 1[pre]–1[g], 14[pre]–14[c].

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		[Fig. 3]  A POSITA would have been motivated to combine these teachings because Yoshida and Ikeda each teach aspects of stylus tip design in capacitive systems. Yoshida’s inner rod-shaped electrode and

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		Ikeda’s tip-based detection unit both operate to transmit signals at the point of user interaction with the tablet surface. Combining these would predictably improve tip sensitivity and ensure accurate signal transmission. Both references address the same design challenge of providing a reliable conductive path to the tip electrode, and a POSITA would have recognized that leveraging the best features of each system would result in a stylus with superior accuracy and responsiveness. <u>IGUCHI</u> IGUCHI discloses a conductive main electrode 304 located at the end of the pen shaft 310 and covered with resin. IGUCHI, Figs. 26a and 26b, 30:25–29. The main electrode is coupled to a signal line 306, which supplies signals generated by the circuit to the conductive tip element. IGUCHI, Figs. 26a and 26b; <i>see also</i> Fig. 29b (signal timing).

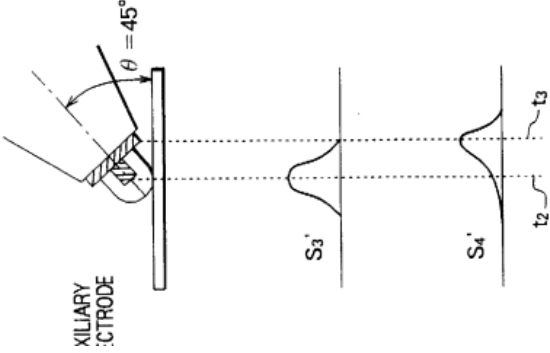
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		FIG. 26a FIG. 26b FIG. 29a ($\theta = 90^\circ$) FIG. 29b ($\theta = 45^\circ$)

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		When supplied with these signals, the conductive pen-tip electrode interacts with the sensor surface to form a capacitive relationship that enables detection of the stylus position. A POSITA would have understood that this configuration satisfies the requirement of providing a conductive pen tip at the pen-tip portion, to which a signal from the signal production circuit is supplied via a conductive line, thereby forming a capacitive coupling with the sensor surface for input detection.
Claim 24		
24[pre] The method according to claim 22,	<i>See supra</i> 22[pre]–22[d]; <i>see also</i> 1[pre]–1[g], 14[pre]–14[c].	<i>See supra</i> 22[pre]–22[d]; <i>see also</i> 1[pre]–1[g], 14[pre]–14[c].
24[a] wherein the angle information is a tilt angle of the pen-shaped position indicator relative to the sensor surface.	<i>See supra</i> 22[pre]–22[d]; <i>see also</i> 14[pre]–14[c], Claim 5, Claim 18. YOSHIDA discloses a capacitive stylus system where multiple electrodes interact with a sensor surface to generate detection signals. YOSHIDA, Fig. 26, 27:13-25.	<i>See supra</i> 22[pre]–22[d]; <i>see also</i> 14[pre]–14[c], Claim 5, Claim 18. <u>IKEDA</u> IKEDA discloses a coordinate detection pen that measures the inclination angle relative to the sensor surface: “By detecting each coordinate using the detection unit 2 for coordinate detection and the detection unit 3 for angle detection of the coordinate detection pen 1, control over the angle of the coordinate detection pen 1 can be achieved.”

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	Fig.26  The relative strengths of these detection signals vary depending on the inclination of the pen-shaped position indicator, which a POSITA would have understood to correspond to the tilt angle of the pen relative to the sensor surface. Such variations are a direct result of changes in the spatial relationship between each electrode and the sensor surface during pen tilt, thereby changing the detected capacitances.	IKEDA, [0015], Fig. 5 (shows pen angle detection); [0014]; [0001] (“By analyzing the positional dimensions between the two coordinate detection units and the dimensions of the coordinates read by each detection unit, it is possible to detect the pen’s tilt.”).  IKEDA Fig. 5 IKEDA’s system includes a first detection unit at the pen tip and a second, ring-shaped detection unit on the pen body, allowing capacitive measurements at different positions to determine the pen’s tilt angle relative to the surface.

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	<i>See also</i> Fig. 28; 26:36-48 ("In the electrode structure, a plurality of electrodes D1 are mounted on a circumference of the tip end portion of the pen, and the electrodes D1 are connected to an AC power source A1 so that a rotational electric field is generated on the circumference.").	A POSITA would have recognized that incorporating IKEDA's explicit tilt detection method into YOSHIDA's capacitive stylus design was a routine and predictable approach to achieving tilt angle measurement. Because YOSHIDA already discloses multiple electrodes forming distinct capacitive relationships with a sensor surface, adding IKEDA's ring-shaped detection electrode would naturally extend the system to provide tilt information. This integration would improve angular resolution without requiring additional mechanical sensors, reducing complexity while enhancing performance. A POSITA would have been motivated to combine these teachings because both references operate in the same field of capacitive stylus design and address the closely related problem of capturing not just coordinate position but also angular posture. The combination would have predictably resulted in a stylus capable of reporting both position and tilt. At the time, there was a strong commercial demand for more sophisticated input devices for drawing and design, particularly in professional markets such as digital illustration and CAD. A POSITA would have recognized that the combination of YOSHIDA's electrode framework with IKEDA's tilt-specific

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		disclosure directly responded to these market needs and represented a logical progression of known stylus technology. <u>IGUCHI</u> IGUCHI discloses tilt detection by describing how capacitive signal variations can be used to measure angular displacement over time. IGUCHI, Fig. 29b, 31:37-41. Specifically, IGUCHI states: "[A] time difference is caused between timing t2 of a peak of an output signal S3' provided by the main electrode and timing t3 of a peak of an output signal S4' provided by the auxiliary electrode." IGUCHI, 31:37-41, Fig. 29b.

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		FIG. 29b ($\theta = 45^\circ$)  The diagram illustrates a tilted pen (labeled 'PEN') at an angle $\theta = 45^\circ$ relative to a horizontal surface. A 'SECONDARY ELECTRODE' is positioned near the pen tip. Below the pen, two signal profiles are shown: S_3' at time t_2 and S_4' at time t_3. The profiles show a change in shape and position between the two time points, indicating a change in the sensor surface or the relative distance between the electrodes. A POSITA would have understood that such timing differences arise when the pen is tilted, as changes in the relative distances between the electrodes and the sensor surface alter the capacitive coupling and the resulting signal profiles. IGUCHI's explicit teaching that these timing differences can be measured to determine angular displacement provides a direct

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		basis for detecting a tilt angle. Incorporating IGUCHI’s time-differentiated signal approach into YOSHIDA’s capacitive stylus framework would have been a predictable and straightforward enhancement, using well-known capacitive signal processing techniques to achieve accurate tilt detection without mechanical sensors. A POSITA would have been motivated to combine these teachings because IGUCHI’s disclosure of temporal signal analysis naturally complements YOSHIDA’s capacitive system for position detection. Integrating the two would predictably yield a stylus capable of both coordinate and tilt measurement, leveraging established capacitive principles. This combination would directly address commercial trends toward feature-rich digital pens designed to replicate natural handwriting and artistic motions. At the time, tablet and interactive display markets were driven by demand for tools offering higher accuracy and versatility, and a POSITA would have recognized that combining YOSHIDA and IGUCHI provided an obvious path to meeting those expectations.