HISTORY OF PATNA :FROM ANCIENT TIMES TO PRESENT

By

Anand M. Sharan

Professor of Mechanical Engineering

Faculty of Engineering

Memorial University of Newfoundland

St. John's, Newfoundland, Canada A1B 3X5

Email: asharan@mun.ca

Fax: (709) 864-4042

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Patna, one of the world's oldest continuously inhabited cities, boasts a historical legacy that is both unique and unparalleled. Its significance spans across centuries, weaving through spiritual enlightenment, political upheaval, and scientific advancement.

The city's recorded history begins around the 6th century BCE, during the time of **Lord Mahavir**, the 24th Tirthankara of Jainism, who was born in **Vaishali**, just north of the Ganges River. This region, part of ancient **Magadh**, is highlighted in **Figure 1**, while the city of Patna itself is detailed in **Figure 2**. Around the same period, **Lord Buddha** was born in **Lumbini** (modern-day Nepal), also shown in the map. Buddha travelled to Vaishali and eventually reached the sacred Hindu city of **Gaya**, seeking spiritual truth.

It was near Gaya, in the **Urvala forest**, that Buddha performed rigorous penance for twelve years. According to legend, his long fast was broken by a humble offering of **kheer** (rice pudding) from a tribal girl named **Sujata**. This marked the beginning of his journey toward enlightenment.

Meanwhile, **Lord Mahavir** attained enlightenment atop **Mount Vipul**, located near the **hot springs of Rajgir**, the then capital of the Magadhan ruler **Bimbisara**. His son, **Ajatashatru**, later constructed the **cyclopean wall** around Rajgir—believed to be one of the oldest existing stone structures in India.

Patna also holds great importance in **Sikh history** as the birthplace of **Guru Gobind Singh**, the tenth Sikh Guru, in the 17th century CE. His life and sacrifice, along with those of his family, are remembered with reverence and admiration across the world.

Figures 3 to 5 highlight the sacred sites associated with these religious leaders and their enlightenment.

The author strongly believes that **true religious leaders and scientists share a common quest: the pursuit of truth**. The historical narratives of Patna serve as compelling evidence of this belief—demonstrating that the city has long been a cradle of enlightenment, both spiritual and intellectual.

Table 1 presents the genealogical schemes of the **Magadh Empire**, while **Table 2** outlines key events in early Indian history.

The city's prominence continued into the age of empires. **Alexander the Great**, after conquering the vast Persian Empire and numerous smaller kingdoms, reached the frontiers of the powerful **Nanda Empire**—depicted in **Figure 5A**. The Nandas possessed a massive standing army, and Alexander, assessing the risk, chose not to engage in battle.

The Nanda regime, known for its heavy taxation, eventually fell to a palace coup. **Dhana Nanda**, the ruling king, was overthrown by **Chandragupta Maurya**, with the strategic guidance of the brilliant minister and scholar **Chanakya** (also known as **Kautilya** or **Vishnugupta**). Chanakya authored the **Arthashastra**, the earliest known treatise on statecraft and economics, and also the **Nitishastra**, offering practical wisdom on governance and ethics.

During Chandragupta's reign, **Seleucus I Nicator**, a general of Alexander and ruler of the eastern Hellenistic empire, launched an expedition to reclaim territories in India. However, the confrontation ended not in war, but in diplomacy. A **peace treaty** was signed—Chandragupta retained his territories (including parts of present-day Afghanistan and Iran), while **Seleucus received 500 war elephants**, which he later used to strengthen his western campaigns.

To maintain diplomatic ties, Seleucus sent his ambassador **Megasthenes** to Chandragupta's court. The **accounts of Megasthenes** provide a vivid and detailed description of life in ancient **Pataliputra** (modern-day Patna), and serve as an invaluable historical record—explored in the next section.

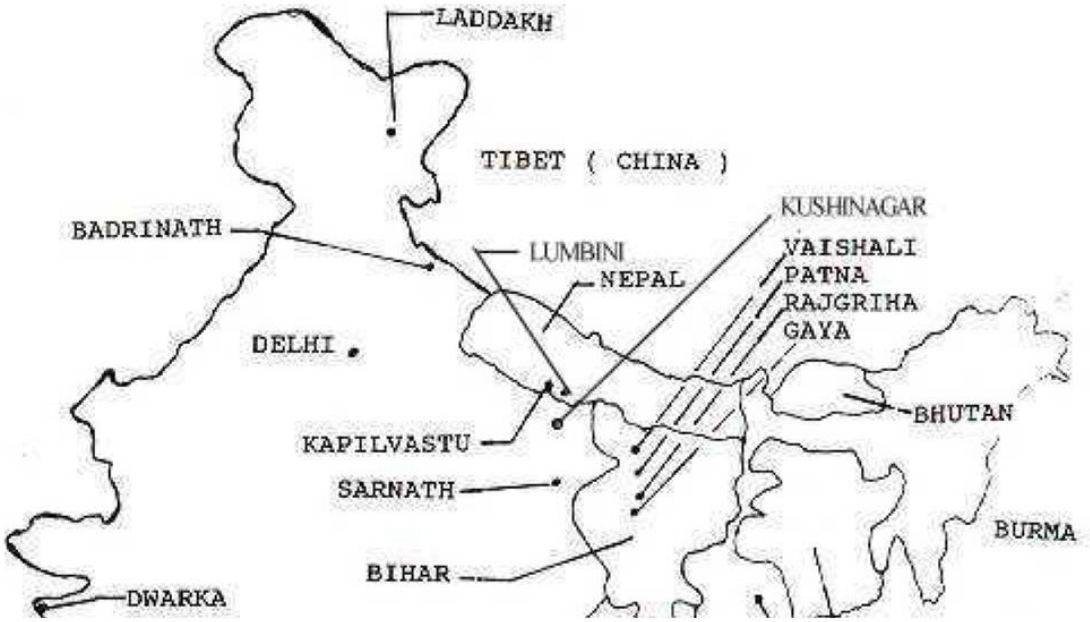

FIG 1 MAP OF NORTH INDIA INCLUDING MAGADH

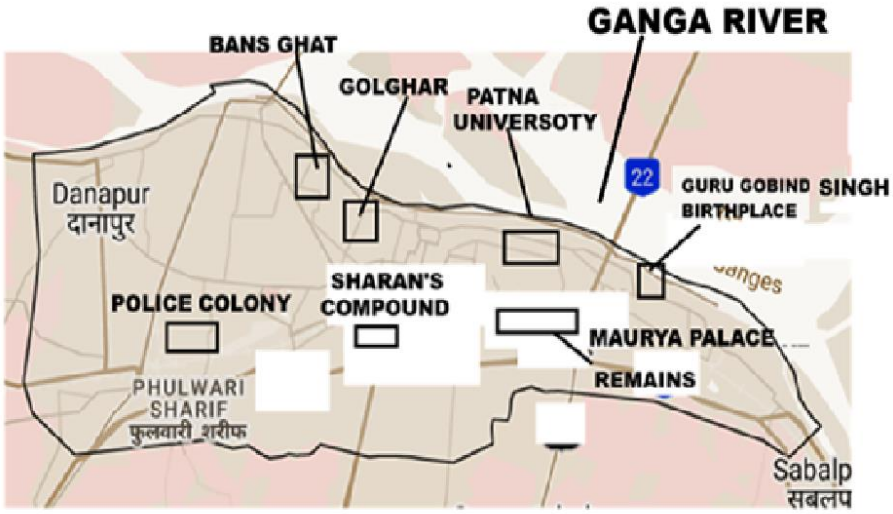

FIG 2 MAP OF PATNA

FIG 3 PLACE OF ENLIGHTENMENT OF LORD MAHAVIR

FIG 4 PLACE OF ENLIGHTENMENT OF LORD BUDDHA

FIG 5 PLACE OF BIRTH OF GURU GOBIND SINGH

Megasthenes' Pataliputra

Nestled at the confluence of the sacred Ganges and the mighty Sone rivers—where the modern city of Patna, Bihar, now stands—lay the magnificent city of **Pataliputra**. Its location was no accident. Fertile plains stretched in all directions, nourished by the twin rivers. Water was plentiful, the soil generous, and trade routes flowed like lifeblood through the region. It was a city chosen with wisdom, positioned not just for survival but for prosperity and power.

The Cityscape

Pataliputra stretched across the land in the shape of a long parallelogram, an impressive urban sprawl of 80 stadia in length (approximately 14.5 kilo meters) and 15 stadia in width (around 2.7 kilo meters). The city's layout was deliberate and orderly, reflecting the methodical minds that governed it.

Fortifications and Defense

The city was ringed by an imposing wooden wall, a construction born of the abundant forests surrounding the region. This timber stronghold was no mere fence—it was bolstered by 570 towers and 64 grand gates, each a testament to the city's military foresight and architectural skill. Encircling the walls lay a broad, deep moat, filled with water likely drawn from the rivers, creating a formidable barrier against invaders.

The Royal Palace

At the heart of Pataliputra stood the royal palace of Chandragupta Maurya. Though built of timber, it defied expectations. Lavishly adorned and vast in scale, the palace was surrounded by lush parks, manicured gardens, and tranquil ponds. To Megasthenes, it rivalled—indeed, surpassed—the famed Persian palaces of Susa and Ecbatana. Intricate carvings, elegant sculptures, and ingenious water features spoke of a refined aesthetic and a mastery of design.

Governance and Society

Megasthenes observed a well-structured administrative system, a model of civic organization. Officials were appointed for distinct public duties: public welfare, sanitation, trade and commerce, and military affairs. The people, he noted, were disciplined and morally upright, though his interpretations of the caste system and Indian philosophy were often clouded by his Greek perspective.

The Land and Its People

The countryside around Pataliputra was a portrait of fertility and abundance. Crops flourished, and the agrarian economy thrived under careful stewardship. Life, for many, was marked by prosperity and peace, shielded by the stability of governance and the richness of the land. Trade, too, bloomed—its rivers serving as highways for goods, culture, and ideas.

The Military Might

The Mauryan Empire's strength, Megasthenes noted with awe, lay not only in its governance but also in its military power. A formidable standing army, regiments of war elephants, and a disciplined martial structure underpinned the empire's expansion and control.

Chanakya: The Architect of Empire

Chanakya, also known by his other names—Kautilya and Vishnu Gupta—was a legendary figure in ancient Indian history. A master strategist, philosopher, and political thinker, he was the author of the Artha Shastra, one of the most significant ancient Indian treatises on statecraft, politics, economics, military strategy, and diplomacy.

Composed around the 4th century BCE, during the rise of the Maurya Empire, the Arthashastra laid down a detailed and pragmatic framework for governance. It reflected Chanakya's deep understanding of human behaviour, administration, and realpolitik.

Chanakya played a pivotal role as the chief advisor and mentor to Chandragupta Maurya, guiding him in matters of governance, military strategy, and diplomacy. It was under Chanakya's counsel that Chandragupta successfully overthrew the Nanda dynasty and laid the foundations of one of the greatest empires in Indian history.

In addition to the Arthashastra, Chanakya is also credited with writing the Nitishastra, also known as Chanakya Niti. This collection of maxims and aphorisms, also dated to around the 4th century BCE, offers insights into practical ethics, personal conduct, morality, and governance. Unlike the systematic and technical nature of the Arthashastra, Chanakya Niti presents timeless wisdom in a concise and accessible manner, much of which remains relevant even today.

Together, these works portray Chanakya as a thinker far ahead of his time—one who combined philosophical depth with political acumen, and whose ideas helped shape the course of Indian history.

TABLE 1: ANCIENT KINGS OF PATALIPUTRA

NUMBER	KING	DATE IN BC
1	Udayin	460–444
2	Anuruddha	444–440
3	Nāgadāsaka	437–413
4	Kalasoka	395–367
5	Mahapadma Nanda	345–329
6	Dhana Nanda	329–322
7	Chandragupta Maurya	322–297
8	Bindusara	297–273
9	Ashoka the Great	268–232

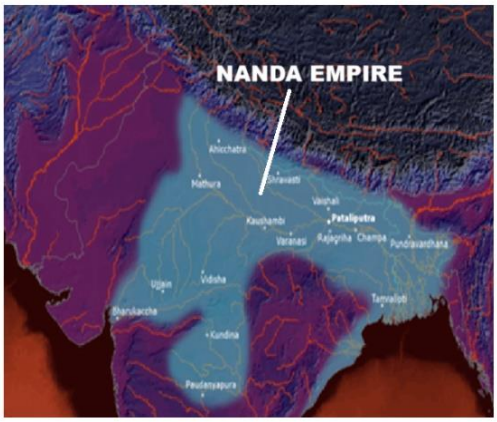

FIG 5B MAP OF NANDA EMPITE

FIG 5A ASHOKA'S EMPIRE

TABLE 2 : IMPORTANT DATES IN ANCIENT INDIAN HISTORY

EVENT	ACCEPTED HISTORICAL DATE	SETHNA'S DATE
Death of Mahavira	468 B.C	1171 B.C.
Death of Buddha	483 B.C.	1168 B. C.
Alexander's Crossing of Indus	326 B.C.	326 B. C.
Accession of Ashoka	269 B.C.	950 BC
End of Ashoka's Rule	232 B.C.	914 B.C.
Beginning of Malva Era	57 B.C. **(Vikram Era)**	711 B.C.
Beginning of Saka Era	78 A.D.	551 B.C.
Accession of Chandragupta I (Imperial Guptas)	320 A.D.	315 B.C.
Accession of Samudragupta	330 A.D.	285 B.C.
Death of Samudragupta	380 A.D.	259 B.C.
Accession of Chandragupta II (Vikramaditya)	380 A.D.	259 B.C.
Fa Hien's Visit to India	399 414 A.D.	399 414 A.D.
Death of Chandragupta II (Vikramaditya)	415 A.D.	221 B.C.
Tormana Invades Malwa	500 A.D.	140 B.C.
Torman's Death and Mihirkula ' s Accession to the Throne	503 A.D.	137 B. C.
Yashodharman Defeats Mihirkula	528 A.D.	122 B.C.

FIG 5C MAP OF GUPTA EMPIRE

Eminent Historical Figures Associated with Patna and the Magadh Region

Chanakya (Kautilya / Vishnugupta)

Chanakya, also known by his pen names **Kautilya** and **Vishnugupta**, was one of ancient India's most formidable intellectuals. He authored the **Arthashastra**, a foundational text on **statecraft, political philosophy, economics, military strategy, and diplomacy**. Composed in the 4th century BCE, during the rise of the **Mauryan Empire**, the Arthashastra remains one of the most significant ancient Indian treatises on governance.

Chanakya played a pivotal role in mentoring **Chandragupta Maurya**, guiding him in matters of administration, policy, and strategy. It was under his wise counsel that Chandragupta succeeded in overthrowing the **Nanda dynasty** and establishing the Maurya Empire, which would become one of the largest empires in Indian history.

Chanakya is also credited with writing the **Nitishastra**, a collection of aphorisms and ethical guidelines offering **practical wisdom**, often compared to maxims from Confucius or Machiavelli.

Ashoka the Great

Ashoka, the grandson of Chandragupta Maurya, stands among the most revered rulers in world history. His reign, as marked in **Tables 1 and 2**, saw the Mauryan Empire reach its zenith. Ashoka's **conquest of Kalinga** was a turning point—shaken by the immense bloodshed, he embraced **Buddhism** and adopted a policy of **non-violence and Dharma (righteousness)**.

Ashoka actively promoted Buddhism both within and beyond India's borders. He dispatched **missionaries** to distant lands such as **Egypt, Syria, Greece**, and even sent emissaries to **Ptolemy II's court in Alexandria**. His efforts significantly contributed to the spread of Buddhism across Asia, well before the birth of Jesus Christ.

Ashoka's reign also saw the **Second Buddhist Council**, held at **Pataliputra**, reinforcing Patna's place in spiritual history. He is remembered for commissioning **rock edicts and pillar inscriptions**, many of which survive across the Indian subcontinent, including in **Afghanistan**. He undertook pilgrimages to sacred sites such as **Lumbini** and **Bodh Gaya**, building stupas and monuments along the way.

The **Mauryan Empire** persisted for approximately a century after Ashoka's death.

SPLIT IN JAINISM

There was a famine in Magadh around fourth century BCE. Leader of migration was a senior monk named Bhadrabahu who migrated to Karnataka.. However, another monk. Sthulabhadra, another leader, stayed behind in Magadh. When Bhadrabahu returned after the farmine was over and found that the canons of the religion werel changed by the those who remained in Magadh. This caused the split in the religion around second century BCE.

This event is mentioned in the book entitled - Jainism: North of the Narmada

Authored by: Natubhai Shah.

Prem Suman Jain, in his book entitled-Jainism philosophical and Theological Dimensions, mentions that (a) Jainism started before the Indus Valley Civilization days, and (b) All the kings starting from Bimbisar to all the Maurya kings were Jains, and that the Golden Age of Jainism was in Magadh. However, the historian R. S. Tripathy in his book – Ancient Indian History says that other than Chandragupta Maurya – all were Hindus.

Patanjali

Patanjali, believed to have lived in the 2nd century BCE, was a renowned Sanskrit scholar and sage. He authored the Mahabhashya, a detailed commentary on Panini's grammar, and is widely regarded as the compiler of the Yoga Sutras, a foundational text of Classical Yoga.

During Patanjali's time, the Shunga dynasty (c. 185–73 BCE) ruled the Magadh region. In his work *Amarakosha*, Patanjali references military campaigns involving Pushyamitra Shunga, including conflicts with the Yavana (Greek) invaders—suggesting he lived during or shortly after Pushyamitra's reign.

Ashvaghosha

Ashvaghosha was a philosopher, poet, and Buddhist scholar of great repute. He flourished under the patronage of Kanishka, the Kushan emperor, who ruled from Peshawar, his capital. Ashvaghosha is thought to have originated from Pataliputra or Vaishali before being invited to Kanishka's court.

He authored the Buddhacharita, an epic Sanskrit poem narrating the life of the Buddha. Ashvaghosha played a significant role in Mahāyāna Buddhism and helped disseminate Buddhist thought across Central Asia.

The Gupta Empire and the Golden Age of India

The **Gupta dynasty**, which reigned from around **320 CE to 550 CE**, is often referred to as the **Golden Age of India**. Patna (ancient Pataliputra) continued to thrive as a center of **learning, mathematics, astronomy, art, and literature**.

Chandragupta II, also known as **Vikramaditya**, ruled during the height of this cultural renaissance. His court was famed for the **Navaratnas (Nine Gems)**—an assembly of great thinkers, scientists, and poets. Vikramaditya, like the legendary **King Arthur**, was known for mingling with his subjects in disguise, seeking to understand their lives firsthand.

The **Saka rulers**, who had their capital at **Ujjain**, were eventually defeated by the Guptas. Ujjain emerged as a center of **astronomical research**, complementing the traditions already established in Patna.

The **Suryasiddhanta**, a seminal astronomical text, was refined during this period. Great mathematicians and astronomers like **Bhaskara I** and **Bhaskara II** led institutions in **Ujjain**, while **Nalanda University**, established by **Kumargupta I** (c. 415 CE), became a global center of

Buddhist and scientific learning. Nalanda attracted scholars from China, Korea, Tibet, and Southeast Asia.

After the **destruction of the Library of Alexandria** in 392 CE, Nalanda served as a new beacon of global knowledge. Interestingly, this Buddhist model of combining religious institutions with academic education later inspired the evolution of **Christian monastic universities in Europe**.

During the later medieval period, **Raja Sawai Jai Singh II**, a governor under Mughal rule and a patron of science, established **observatories** in **Ujjain, Delhi, Jaipur, Mathura, and Varanasi**. His mentor, **Jagannath**, a Maharashtrian Brahmin well-versed in **Sanskrit and Persian**, played a key role in this scientific revival.

Thus, from Patna, knowledge radiated outwards—shaping India's cultural, scientific, and spiritual landscape for centuries to come.

FIG 6 REMAINS OF NALANDA UNIVERSITY

Figures 7 and 8 illustrate two important aspects of Earth's motion in space.

Figure 7 depicts the **Earth's orbital motion** around the Sun, completing one full revolution every year, while simultaneously **rotating about its own axis** approximately once every 24 hours.

Figure 8 demonstrates the phenomenon of **axial precession**—a slow, conical motion of Earth's rotational axis. This precessional cycle takes approximately **26,000 years** to complete and causes gradual shifts in the orientation of Earth's axis relative to the fixed stars.

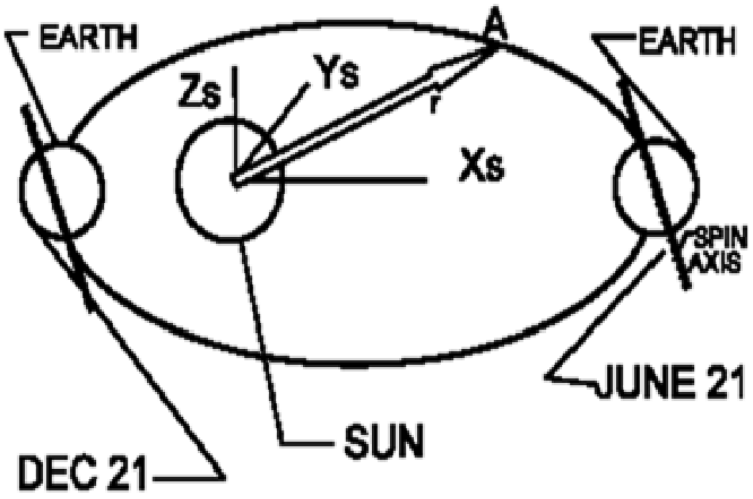

FIG 7 POSITIONS OF THE EARTH ORBITING THE SUN

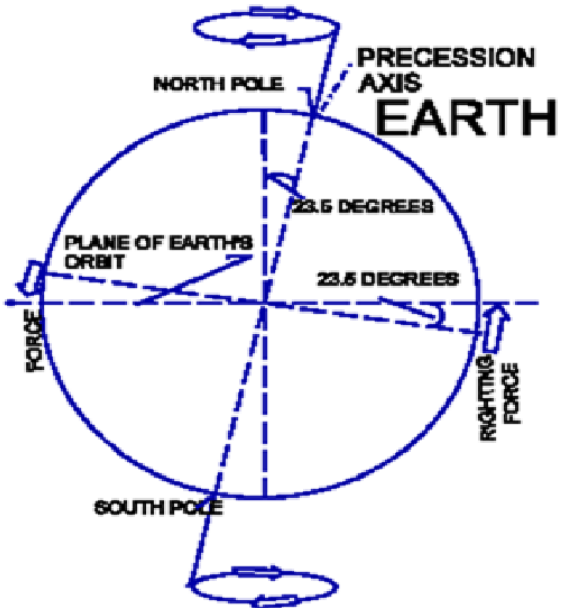

FIG 8 PRECESSION OF THE EARTH'S AXIS

Aryabhata, one of India's greatest mathematicians and astronomers, lived during the reign of **Buddha Gupta** in the late 5th and early 6th centuries CE. Born in **476 AD**, Aryabhata wrote his renowned treatise, the **Aryabhatiya**, in **499 AD** at the young age of **23**. Composed in **Sanskrit**, the text covers a wide range of topics in mathematics and astronomy, including arithmetic, algebra, plane and spherical trigonometry, as well as planetary motions and eclipses.

Table 6: Aryabhata's Contributions to Mathematics and Astronomy

Subject	Findings
1. Place Value System and Zero	Aryabhata used a **positional decimal number system**. While he did not explicitly use the symbol **zero (0)**, the concept was **implied through place value**. This foundational idea later spread globally.
2. Approximation of π (Pi)	He approximated π as: π≈6283220000=3.1416\pi \approx. \frac{62832}{20000} = 3.1416π≈2000062832=3.1416 Aryabhata described this as an **approximation**, demonstrating an early understanding of **irrational numbers**.
3. Algebra and Quadratic Equations	He solved equations like ax +c=by + c an early form of **Diophantine equations**. He also discussed **square roots**, **cube roots**, and **geometric progressions**.
4. Trigonometry	Aryabhata introduced **sine (jya)** and **cosine (kojya)** tables. He provided sine values at intervals of **3.75°**, laying the foundation for modern trigonometry.

5. Heliocentric Concepts	He proposed that the **Earth rotates on its axis** daily—**a revolutionary idea** for his time. While not fully heliocentric, this marked a shift from the prevailing **geocentric view**.
6. Scientific Explanation of Eclipses	Aryabhata explained **solar and lunar eclipses** through **shadow theory**—Earth's shadow causes lunar eclipses, and the Moon blocks sunlight during solar eclipses. He **rejected mythological** explanations involving Rahu and Ketu.
7. Sidereal Periods	He calculated **sidereal rotation**, **planetary periods**, and the **length of the year** with remarkable precision—many of his values are close to modern astronomical measurements.
8. Laws of Planetary Motion	Aryabhata proposed **laws of motion** for celestial bodies moving along the **ecliptic path**, indicating a structured view of orbital dynamics.
9. Earth's Rotation and Day-Night Cycle	He was the **first known scholar** to scientifically explain the phenomenon of **day and night** as a result of the **Earth spinning on its axis**.

LAWS OF KEPLER AND ARYABHATT LAWS:

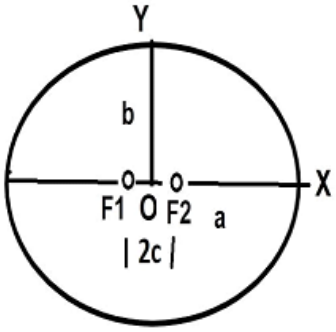

FIG A1 A CIRCLE WITH DETAILS

Figure 1

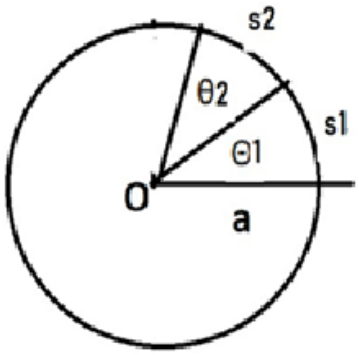

FIG A2 A CIRCLE WITH DIFFERENT SECTORS

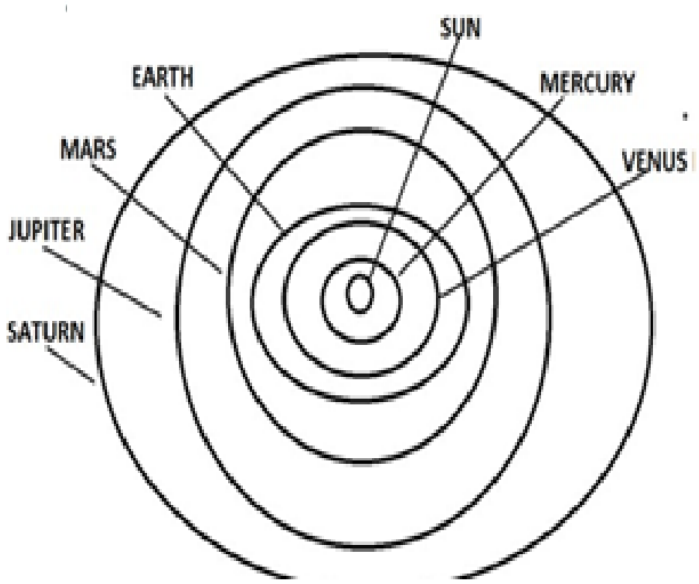

FIG A3 VARIOUS PLANETS GOING AROUND THE SUN

Planetary Motion: Aryabhata and Kepler

Fig. A3 illustrates the solar system with the Sun at its center, surrounded by various planets revolving in their respective orbits. In the 16th century AD, Johannes Kepler formulated three foundational laws describing planetary motion:

- Law of Ellipses: Every planet moves in an elliptical orbit with the Sun at one of its foci.
- Law of Equal Areas: A line joining a planet and the Sun sweeps out equal areas in equal intervals of time.
- Law of Harmonies: The square of the orbital period (T^2) of a planet is proportional to the cube of the semi-major axis (r^3) of its orbit.

$$\frac{r^3}{T^2} = K_1 \quad (1)$$

where r is the radius of the orbit and T is the time period.

Aryabhata I: The Indian Pioneer in Astronomy

Aryabhata I (476–550 AD), a mathematician and astronomer, lived in Pataliputra (modern-day Patna) during the reign of Magadh king Buddhagupta. In 499 AD, at the young age of 23, he authored the renowned Sanskrit treatise Aryabhatiya in the city then known as Kusumpura, the capital of the Magadh Empire.

India has undergone many political and cultural shifts since Aryabhata's time—first ruled by Islamic kingdoms from the 12th century and later by the British from the 18th century until 1947. During British rule, Aryabhatiya was translated into English by W. E. Clark of Oxford University in 1930, and numerous scholars, both Indian and Western, published commentaries and journal articles on it.

In Aryabhatiya, Aryabhata proposed three laws regarding planetary motion:

- Planets move in circular orbits.
- All planets move at uniform speeds; the nearer ones appear faster due to their smaller orbits.
- The Earth rotates on its axis, causing day and night.

Although Aryabhata described planetary orbits as circular, this was based on observational limitations of his time. Kepler's ellipses can be seen as a refinement of Aryabhata's circular model, particularly since for many planets, the eccentricity is very small, making their orbits nearly circular.

Elliptical Orbits and Their Relation to Circular Paths

The equation of an ellipse is:

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \quad (2)$$

$$c = \sqrt{a^2 - b^2} \quad (3)$$

$$e = \frac{c}{a} = \sqrt{1 - \left(\frac{b}{a}\right)^2} \quad (4)$$

As the distance between foci (ccc) approaches zero, a and b converge and the ellipse becomes a circle. Thus, when the ratio b/a≈1, as is the case for most planetary orbits (except Mercury), the orbits appear nearly circular. This supports Aryabhata's assumptions within the observational capabilities of his era.

It is important to note that Mercury's orbit deviates significantly due to relativistic effects, not fully explained by Newtonian gravity or Kepler's laws, but accurately described by Einstein's General Theory of Relativity. Hence, Mercury stands as an exception.

Comparative Analysis: Aryabhata vs. Kepler

Table 4 presents orbital parameters of planets. In Column 5, the b/a ratio is nearly 1 for all planets except Mercury, aligning with Aryabhata's circular assumption. Column 7 contains calculated values of Kepler's third law (K_1), while Column 8 shows orbital speed variation (K_2).

In Table 5, the maximum variations within K_1 and K_2 across planets are summarized. K_2 confirms that orbital speed decreases with increasing distance from the Sun—Mercury moves fastest. K_1 values, however, show no consistent decreasing trend.

Table 6 calculates the ratio of maximum variations, showing them to be extremely small, indicating the high precision of both models. However, because Aryabhata's model describes planetary speeds and orbital forms with remarkable alignment to modern findings, his conceptual framework can be considered foundational and impressively accurate for its time—even broader than Kepler's, which does not address Earth's rotation. K_1 represents the maximum error in the Kepler's model and K_2 that of Aryabhatta's if this ratio (K_2/ K_1) becomes less than 1 then K_1 is greater than K_2 . It proves that Aryabhayya's model is better. The extremely small ratio k2/k1 shows that Kepler's model has very high error hence Aryabhatta's model is more accurate.

TABLE **4** VARIOUS DETAILS OF LANETARY MOTIONS IN THE SOLAR SYSTEM [3]

Planet	Semimajor Axis (AU)	Orbital Period (yr)	Orbital Speed (km/s)	Orbital Eccentricity (e)	Inclination of Orbit to Ecliptic (°)	Rotation Period (days)	Inclination of Equator to Orbit (°)
Mercury	0.3871	0.2408	47.9	0.206	7.00	58.65	0
Venus	0.7233	0.6152	35.0	0.007	3.39	243.01	177.3
Earth	1.000	1	29.8	0.017	0.00	0.997	23.4
Mars	1.5273	1.8809	24.1	0.093	1.85	1.026	25.2
Jupiter	5.2028	11.862	13.1	0.048	1.31	0.410	3.1
Saturn	9.5388	29.458	9.6	0.056	2.49	0.426	26.7
Uranus	19.1914	84.01	6.8	0.046	0.77	0.746	97.9
Neptune	30.0611	164.79	5.4	0.010	1.77	0.718	29.6

TABLE 5: VARIOUS PARAMETERS IN SI UNITS

1	PLANETS	A (m)	e (m)	b (m)	b/a	T (seconds)	V (Orbital Speed)	Kepler (a^3/T^2) K1
2	1	2	3	4	5	6	7	8
3		(1.00E	(1.00E +08)	(1.00E +11)	(1.00E +00)	(1.00E +06)	(1.00E +03)	1
4	Mercury	5.8	308.2	0.6	1.0	7.6	47.9	3.36759E+18
5	Venus	10.8	10.5	1.1	1.0	19.4	35.0	3.36578E+18
6	Earth	15.0	25.4	1.5	1.0	31.5	29.8	3.36638E+18
7	Mars	22.8	139.1	2.3	1.0	59.3	24.1	3.39004E+18
8	Jupiter	77.8	71.8	7.8	1.0	374.1	13.1	3.36945E+18
9	Saturn	142.7	83.8	14.2	1.0	929.0	9.6	3.36696E+18

TABLE 6 MAXIMUM VARIATION IN K1 and K2

	K1	K2	RATIO k2/k1
MAXIMUM VARIATION	$6.3x10^{14}$	$3.8x10^{4}$	$6.0x10^{11}$

The End of the Gupta Era and the Shift of Indian Power

The decline of the Gupta Empire marked the end of a golden age in Indian history. As shown in historical records, the Guptas faced relentless invasions by the Huns, notably under Mihirakula and Toramana. Despite resisting for over 350 years, the empire eventually collapsed. This demise also signified the end of Pataliputra's status as the capital of India—**a title it held for over 900 years, unparalleled by any city in the world.**

Huen Tsang's Visit to Pataliputra

In the 7th century, during the reign of Emperor Harshavardhana, the Chinese Buddhist monk and traveller Huen Tsang (Xuanzang) visited India and recorded his impressions of Pataliputra (modern-day Patna). His accounts reflect the city's cultural and scholarly vitality, even as its ancient grandeur had begun to fade.

Pataliputra, he observed, remained a significant political and cultural hub, forming part of Harshavardhana's extensive dominion. The city was home to numerous Buddhist monasteries, stupas, and temples. It attracted scholars and monks from across the region, fostering a vibrant intellectual atmosphere. Huen Tsang noted that Buddhist teachings continued to flourish here, and many remnants of Mauryan architecture still stood, though in decay. The ruins of the once-magnificent palace of the Nandas, later used by Chandragupta Maurya, lay at Kumhrar—between the current location of Patna University and these archaeological remains.

The people of Pataliputra, according to Huen Tsang, were intelligent and deeply engaged in religious discussions, practicing a blend of Buddhist and Hindu traditions.

The Muslim Period and Decline of Patna

Centuries after Huen Tsang's visit, India experienced political fragmentation. In the 12th century, northern India, including Bihar, fell to the invading forces of Muhammad Ghori. His general, Bakhtiyar Khilji, easily conquered Bihar and destroyed Nalanda University, a tragedy comparable in magnitude to the burning of the Library of Alexandria. Khilji

established his base near Bihar Sharif, shifting the political center away from Patna and diminishing its significance for a time.

Raja Todar Mal's Role in Eastern Campaigns

Raja Todar Mal, celebrated as Emperor Akbar's finance minister and one of his "Navaratnas" (Nine Gems), played a pivotal role in consolidating Mughal control in eastern India. Although not primarily known as a military commander, Todar Mal participated in military operations during the Mughal campaigns in Bihar and Bengal, around 1574 CE.

At that time, the region was rife with Afghan rebellions. Akbar personally led an expedition to suppress these uprisings, and Todar Mal—alongside commanders like Munim Khan and Raja Man Singh—assisted in capturing Patna. Following the conquest, Todar Mal remained in Bihar to establish effective revenue administration, laying the foundation of Mughal fiscal policies in the region.

Mughal Influence: Asaf Khan and Aurangzeb's Era

Mumtaz Mahal, the beloved wife of Emperor Shah Jahan, hailed from a family of Persian nobility. Her father, Mirza Ghiyas Beg, and her brother Asaf Khan were influential figures in the Mughal court. Asaf Khan, during Shah Jahan's reign, served as the governor of Bihar. He was responsible for maintaining Mughal dominance in the region, managing local resistance, and overseeing administrative affairs.

During the reign of Aurangzeb, references suggest that a relative of the emperor governed Bihar. It was around this period, or shortly thereafter, that the term "Bankipur" began to appear—although the name is more commonly associated with the British era. Some historians attribute the term to the area's bustling trade scene, especially in banking and finance.

Patna under British Rule: Saltpetre Trade and Strategic Importance

By the 18th century, Patna had reemerged as a strategic commercial and military hub under British colonial rule. European powers, particularly the British, established factories in Patna to process saltpetre—a critical ingredient in gunpowder—found abundantly in the fertile soil of the Indo-Gangetic plain.

The high-quality saltpetre produced around Patna was exported to Britain, where it was refined in cities like London and Leeds. During the American Civil War, this supply gave the Union Army a significant advantage over the Confederates, who suffered ammunition shortages due to naval blockades. The availability of Patna's saltpetre thus had global ramifications, influencing the outcome of a war thousands of miles away.

Danapur Cantonment and the Revolt of 1857

The British recognized the strategic value of eastern India and established Danapur Cantonment near Patna in the 18th century. This military base became critical during the Sepoy Mutiny of 1857, when, on July 25, three regiments stationed at Danapur joined forces with Kunwar Singh, a key rebel leader in Bihar. Though the British later retook the cantonment and punished the mutineers, the episode symbolized the region’s resistance to colonial rule.

Post-rebellion, Danapur was fortified and evolved into a major British military center. Today, it remains home to the Bihar Regiment—one of India’s most decorated infantry units—and continues to serve as a training ground for modern warfare.

PATNA GOLGHAR HISTORY

FIG 14 PATNA GOLGHAR BUILT BY BRITISH IN 1770 AS A GRANERY

Standing tall on the banks of the Ganges in Patna, the **Golghar** is one of Bihar's most iconic and enduring historical landmarks. Built in **1786** by **Captain John Garstin**, a British engineer, the structure was commissioned during the tenure of **Warren Hastings**, the first Governor-General of India.

The Golghar was conceived in the aftermath of the **Bengal Famine of 1770**, a tragic event that claimed millions of lives due to food shortages. In response, the British administration sought to build a massive **granary** that could store food grains and safeguard the region against future famines.

Designed with a unique beehive-like shape, the Golghar is an architectural marvel. Its thick walls and spiral staircase—winding around the exterior—allowed workers to carry sacks of grain to the top and pour them in from above. the Golghar remains a powerful symbol of both colonial engineering and the historical efforts to combat famine.

Today, this majestic structure stands not just as a relic of the past, but as a silent witness to the resilience and history of Patna.

Opium Trade

The Patna region in India played a crucial role in the British East India Company's (EIC) opium trade, which significantly influenced Anglo-Chinese relations and led to the infamous Opium Wars.

- **Patna asSource:**
  The EIC established major opium production and processing centers in Patna and Benares (modern-day Varanasi). These facilities were vital to the Company's strategy of cultivating opium for export.
- **Opium Trade to China:**
  Opium produced in EIC-controlled territories, particularly in Patna, was shipped to China, where demand was high. Opium from the Malwa region—outside British control—also entered the Chinese market through smuggling and other trade routes.
- **The Opium Wars:**
  The Chinese government's efforts to suppress the opium trade, due to its harmful social effects, culminated in two military conflicts: the First Opium War (1839–1842) and the Second Opium War (1856–1860). These wars were fought between China and Britain, the latter acting in part to protect EIC commercial interests.
- **Impact on China:**
  The massive influx of Indian opium into China had devastating consequences, including widespread addiction, economic instability, and significant social unrest. These issues weakened the Qing dynasty and left long-lasting scars on Chinese society.

FIG 9 BANS GHAT USED FOR COMMERCE ON THE GANGA RIVER

The Making of Modern Patna – From Partition to Post-Independence

The Partition of Bengal and the Rise of Bihar

In the early 20th century, amidst growing nationalist sentiment and regional identity movements, the region of Bihar began asserting its cultural and administrative distinctiveness from the larger Bengal Presidency. A central figure in this historic movement was Dr. Sachchidananda Sinha—a distinguished lawyer, journalist, and parliamentarian. His leadership proved pivotal in the successful campaign to separate Bihar from Bengal, culminating in the formation of the Bihar and Orissa Province in 1912.

Dr. Sinha's political journey gained momentum when he was elected to the Bengal Legislative Council in 1910. From this platform, he passionately advocated for the creation of a separate province, working in tandem with leaders such as Mahesh Narayan. Their efforts included formal petitions to British officials like Lieutenant Governors Charles Elliott and Alexander Mackenzie, underlining the need for administrative autonomy for Bihar. One of Sinha's most effective alliances was with Ali Imam, who served as the Law Member in the Viceroy's Executive Council. Imam's position gave additional weight to the movement, enabling it to make inroads at the highest levels of British colonial administration.

Beyond legislative channels, Dr. Sinha recognized the power of public opinion and harnessed journalism to rally support. He was instrumental in launching and editing influential publications such as The Bihar Times and The Biharee, which voiced the aspirations of the Bihari people and

criticized the continued amalgamation with Bengal. These platforms played a key role in shaping public discourse and reinforcing the legitimacy of Bihar's demand for self-governance.

These collective efforts bore fruit during the Delhi Durbar on December 12, 1911, when King George V announced the annulment of the 1905 Partition of Bengal and sanctioned the formation of the Bihar and Orissa Province. The new province was officially inaugurated on April 1, 1912, with Sir Charles Bayley appointed as its first Lieutenant Governor. Dr. Sinha's multifaceted strategy—combining legal advocacy, strategic alliances, and public mobilization—proved instrumental in achieving this milestone. His legacy continues to inspire regional leadership and pride.

Further detailed narratives on this chapter of Bihar's history can be found in Arvind Das's book, The Republic of Bihar.

The Birth of Patna University

A significant educational milestone came with the establishment of Patna University on October 1, 1917, during the British Raj. It was the seventh oldest university in the Indian subcontinent and the first in Bihar. Initially conceived as an affiliating and examining body, the university did not conduct its own teaching but was responsible for overseeing a network of colleges spread across Bihar, Orissa, and parts of Nepal.

Previously, most institutions in the region were affiliated with Calcutta University, but Patna University brought academic administration closer to home. Among the early colleges under its jurisdiction were:

- Patna College (established 1863)
- Patna Science College
- Bihar College of Engineering (now NIT Patna)
- Prince of Wales Medical College (now Patna Medical College)

This institutional framework laid the foundation for Patna's emergence as a prominent center of education in eastern India.

Patna During World War II

During the Second World War, Patna briefly assumed strategic importance when it served as a Control Centre for the Eastern Command, operating out of the Secretariat compound. Although this role was short-lived, it added a unique chapter to the city's wartime history.

Post-Independence Patna: A Cradle of Leadership

The period following India's independence witnessed a transformation of Patna into a center of political activity and governance. Mahatma Gandhi visited the city, delivering a memorable speech at Gandhi Maidan, inspiring a new generation of political leaders.

Patna also produced two towering figures in Indian constitutional history:

- Dr. Sachchidananda Sinha, who served as the first President of the Constituent Assembly, though he later stepped down due to ill health.
- Dr. Rajendra Prasad, who succeeded him and went on to become the first President of independent India, holding office for an unprecedented 12 years.

Educated under the structured British schooling system, these leaders—largely emerging from the Indian National Congress—carried forward the legacy of methodical governance. Among them was Dr. Shree Krishna Sinha, Bihar's first Chief Minister (1937–1962), who was lauded for his capable administration.

During this time, Patna had a limited number of government schools (only three), supplemented by private institutions. The teaching community was well-educated and deeply committed. Education remained accessible, with affordable fees and a strong emphasis on discipline and quality instruction.

Government operations—from hospitals and police to civic administration—functioned with impressive efficiency. Patna's administrative setup during this era became a model for organized governance.

Patna as a Planned Capital

When Bihar and Orissa were carved out as a new province in 1912, Patna was designated as the capital. Simultaneously, the capital of British India shifted from Calcutta to New Delhi. Both cities underwent extensive development as model capitals.

The British undertook an ambitious project to develop Patna with architectural grandeur and systematic urban planning. The city saw the construction of:

- An imposing Secretariat
- The Governor's Mansion
- Schools, colleges, and government quarters

Wide boulevards, organized neighbourhoods, and a lack of congestion defined the city's early layout. The High Court and the Patna Museum added further prestige.

Patna's transformation during this period earned it comparisons with international capital cities for its beauty, organization, and administrative significance.

The Patna Museum and Buddhist Relics

Among Patna's most cherished institutions is the Patna Museum, home to sacred relics believed to belong to Gautama Buddha. These were discovered during archaeological excavations at the Relic Stupa of Vaishali between 1958 and 1962, led by renowned archaeologist A.S. Altekar.

The relics—enshrined in a white casket—include:

- Buddha's ashes
- A stone bead
- A broken glass bead
- A copper punch-marked coin
- A conch
- A small gold leaf

These ancient artifacts connect Patna to its Buddhist heritage, reinforcing the city's place in both spiritual and historical narratives.

FIG 10 PATNA OLD MUSEUM

The Legacy of Patna and the Decline of Bihar's Fortunes

One of Patna's most revered artefacts—the casket believed to contain the relics of the Buddha—is displayed under high security at the Patna Museum. Visitors are accompanied by guards, a testament to the cultural and spiritual significance of the relic. Its authenticity has been affirmed through a combination of archaeological, scientific, and literary evidence, elevating the city's historical importance on the global Buddhist map.

A Nation in Transition: Post-Colonial India

India's transition from colonial rule to independence was unique. A key reason the country did not descend into administrative chaos post-1947 was the continuity of the British-style bureaucratic system, which had been internalized by the first generation of Indian political leaders. These leaders—mostly upper-caste and British-educated—had the benefit of exposure to a structured system of governance and legal thinking, which they adopted and continued.

The author was born during the Second World War, a time when the world was undergoing dramatic shifts. Technological progress, political upheaval, and global realignments were reshaping modern civilization at a pace never seen before. During this transformative era, industrialized countries surged ahead by adopting scientific methods and investing in rational, structured education systems.

India, on the other hand, emerged from centuries of colonial plundering and suppression. The country had been denied the opportunity to undergo an industrial revolution, which had been the bedrock of wealth creation in Europe and Japan. It remained largely agrarian, and the mindset required for industrial development—a mindset rooted in scientific thinking and strategic planning—was largely missing.

Nehru's Vision and the Roadblocks Thereafter

Among India's early leaders, Jawaharlal Nehru stood out as a rare visionary with a scientific temperament. Educated in the West, Nehru understood the critical role that science, technology, and institutional development played in national progress. He faced little ideological opposition in the early years of independence, allowing him to implement progressive policies relatively unchallenged. As a result, India experienced significant growth during his tenure.

However, the momentum began to wane after his death in 1964. His successor, Lal Bahadur Shastri, had the potential to carry the torch forward, but his untimely death after just eighteen months in office created a political vacuum. The Congress Party then turned to Nehru's daughter, Indira Gandhi. Her early years in power were marked by political uncertainty and internal challenges, which slowed down the pace of economic and industrial advancement.

Bihar: From Prominence to Paralysis

The national political instability of the post-Nehru era had a cascading effect on states like Bihar. Once counted among the top five Indian states in terms of governance and economic indicators, Bihar steadily began to decline. By the 1990s, the state experienced a near-collapse of its educational institutions and administrative machinery.

Corruption became endemic, and the once-structured system fell into disorder. Industrial activity remained stagnant, forcing masses of young people to migrate in search of employment. While other regions of India pushed forward with liberalization and infrastructure development, Bihar struggled with basic governance.

A major factor behind this stagnation has been the persistent caste-based politics that dominate the state. Unlike any other modern democracy, elections in India—and particularly in Bihar—are often fought and won on the basis of caste identities. This parochial system has diverted attention from merit, development, and modern policy-making.

The Way Forward

If India, and Bihar in particular, are to regain their lost potential, a fundamental shift in political thinking is necessary. The 21st century demands leadership rooted in scientific reasoning, long-term planning, and social unity—values that helped other nations industrialize and prosper. Caste, a relic of the past, has no place in a future-oriented democracy. Unfortunately, many modern political actors continue to exploit these divisions for electoral gain, convincing large segments of the population to cling to outdated identities rather than forward-looking aspirations.

India's story is one of immense potential. But unless the forces of rational governance, inclusive education, and industrial innovation take precedence over narrow social divisions, regions like Bihar will continue to lag behind, despite their rich cultural and historical legacies.

Scientific Pursuits in Energy and Environment

The author has long held a deep and abiding interest in the fields of **energy and environmental sustainability**. His research journey spans both **Canada** and **India**, particularly in **Patna**, where he explored innovative ways to harness renewable energy for practical use.

Inspired by the pioneering legacy of **Aryabhata**, the author extended this ancient vision into the modern age by focusing on the use of **solar energy**. His work led to significant advancements in **solar-powered electrical generation** and the **development of electric vehicles** as a sustainable mode of transportation.

These innovations, rooted in scientific rigor and driven by a commitment to environmental stewardship, have been recognized internationally. Several of his **research findings have been published in leading scientific journals**, and his **technological inventions have been patented in the United States**.

The various figures to follow illustrate the diverse and impactful potential of solar energy in addressing contemporary challenges, demonstrating how it can be effectively applied in:

- Generation of electrical power
- Pollution-free and cost-efficient transportation
- Cooking using **induction heating**
- Environmentally friendly **refrigeration technologies**—particularly relevant in an age of escalating **global warming**

This body of work not only builds upon historical scientific traditions but also looks ahead, offering practical, sustainable solutions for the future.

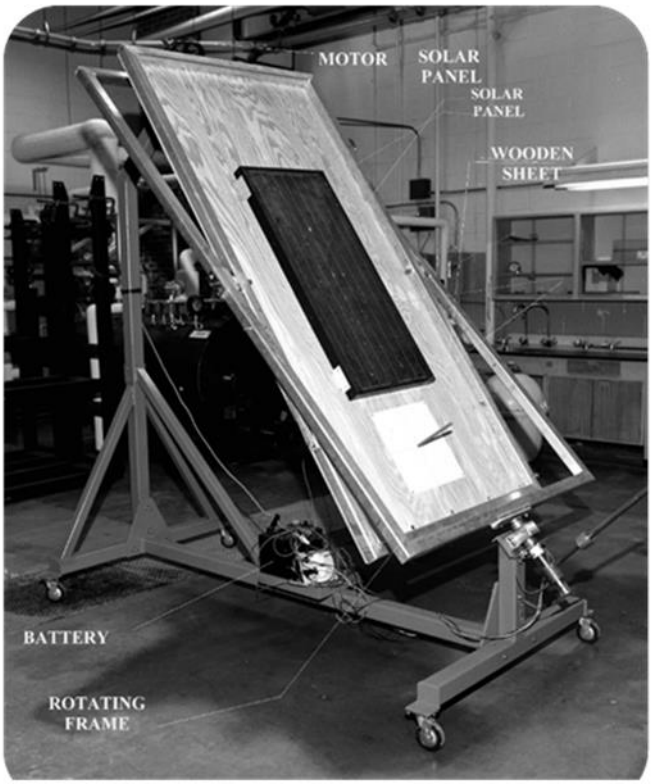

FIG 11 SOLAR TRACKING SYSTEM

FIG 11A PHOTOVOLTAICS FOR LARGE SCALE POWER GENERATION

FIG 12 MANUAL SOLAR TRACKING SYSTEM

Research also included heating using the Sun's heat which can be used for cooking as well as for refrigeration. He also carried out research on Water purification – potable water.

FIG 13 SOLAR HEATING AT PATNA

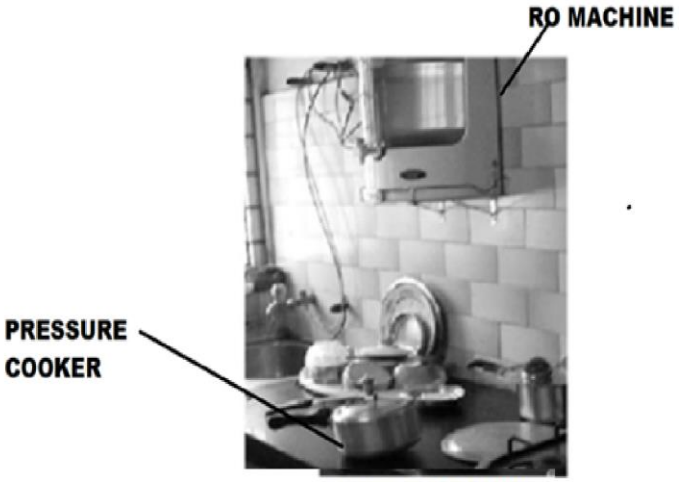

FIG 14 THE RO MACHINE

FIG 15 INDUCTION STOVE WITH KNOBS TO CONTROL HEATING

FIG 19 SOLAR POWERED VEHICLE BUILT IN CANADA AND PATENTED IN USA

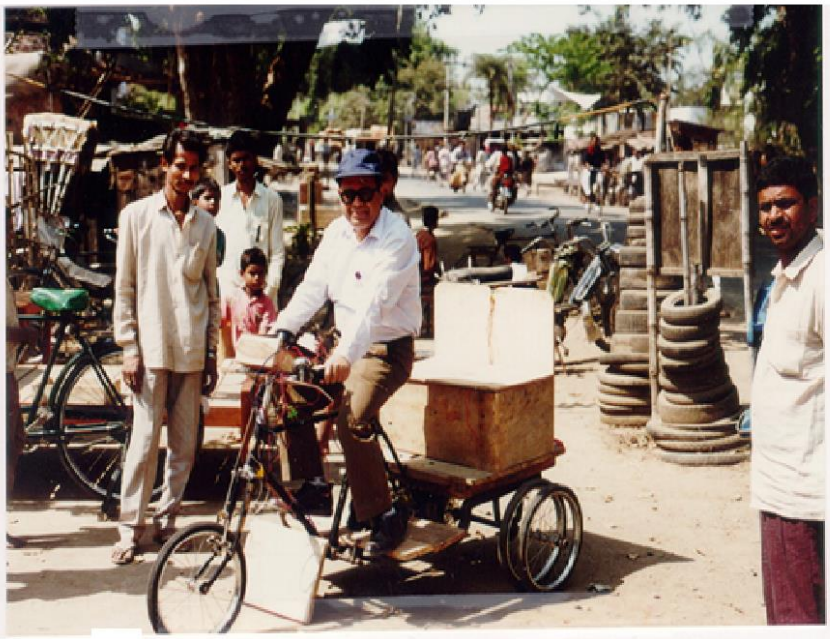

FIG 16 AN ELECTRIC RICKSHAW UNDER CONSTRUCTION AT PATNA

FIG 17 AN ELECTRIC RICJSHAW MODEL CONSTRUCTED AT PATNA

FIG 18 THREE WHEEL ELECTRIC VEHICLE

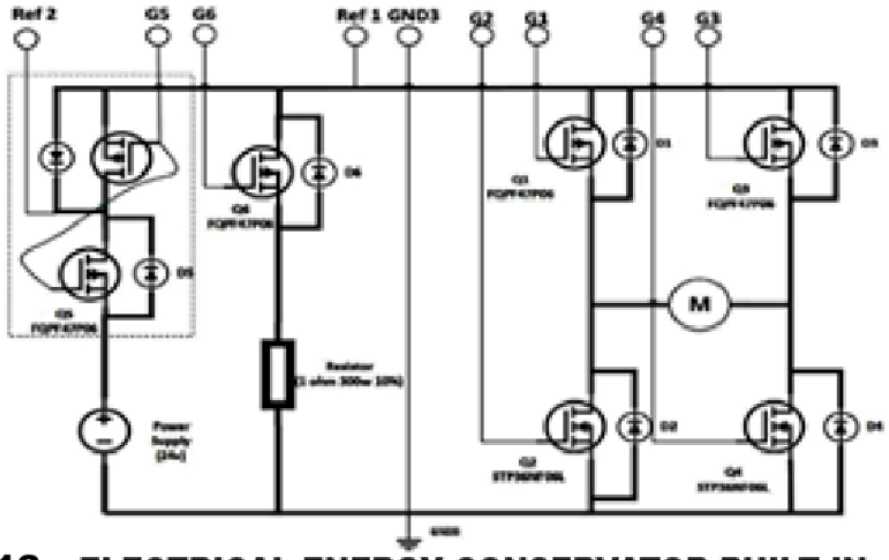

FIG 13 ELECTRICAL ENERGY CONSERVATOR BUILT IN CANADA

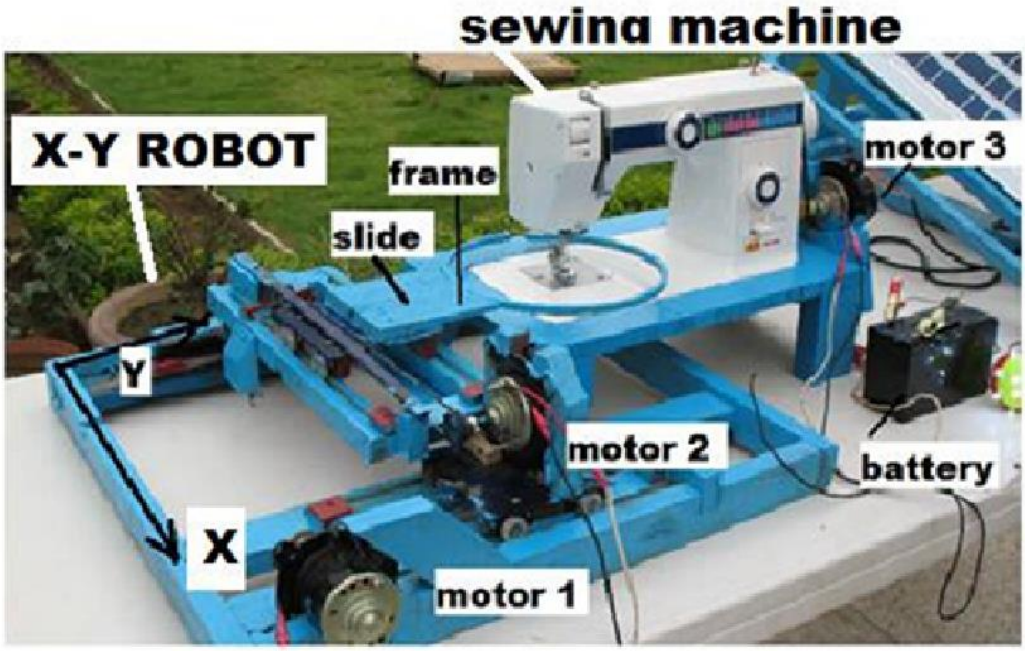

FIG 20 A ROBOT MAKING PATTERN IN AUTOMATED MANUFACTURING

Acknowledgements and Closing Remarks

The author extends his deepest gratitude to those whose unwavering support, wisdom, and encouragement have made this work possible.

First and foremost, he pays homage to his beloved grandfather, **Harihar Charan**, whose values and legacy continue to inspire. Special thanks are owed to his parents, **Chandra Shekhar Prasad** and **Rama Devi**, for their enduring love and guidance.

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Finally, the author expresses deep appreciation and thanks to Manu Jain for her valuable time in editing this document.

LOCATIONS OF THE RESEARCH WORK AT PATNA

Research work was carried out at two location- one at Sherans compound Jamal Road and the other one at Police Coloney at Patna (Fig 2).

(a) (b)

FIG 21 SHARAN'S COMPOUND AT JAMAL ROAD PATNA

FIG 22 B/43 HOUSE AT POLICE COLONY AT PATNA